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MAKERERE UNIVERSITY BUSINESS SCHOOL

**THE DETERMINANTS OF EXPORT GROWTH IN UGANDA – THE
GRAVITY MODEL ANALYSIS**

BY

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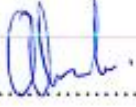
**A DISSERTATION SUBMITTED TO MAKERERE UNIVERSITY BUSINESS
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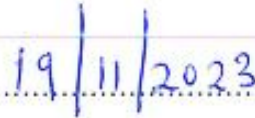
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DECLARATION

I, VUNDRU Wilbert Drazı hereby declare that this dissertation titled “*The Determinants of Export Growth in Uganda – The Gravity Model Analysis*” is my original work which to the best of my knowledge has never been submitted to any other institution of higher learning for any academic award. Where work of others has been referred to, it has been duly acknowledged.

Signature.....

Date.....

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APPROVAL

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DEDICATION

This dissertation is dedicated to my late father, Drazil Fabian Valson (RIP) who dreamt that he would one day author a dissertation but did not...

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I thank the Almighty God for his mercies and abundant gift of health and knowledge that have seen me through the completion of this dissertation.

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TABLE OF CONTENTS

DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
ABSTRACT	x
CHAPTER ONE	1
INTRODUCTION	1
1.0 Introduction	1
1.1 Background to the Study	1
1.2 Problem Statement	3
1.3 Purpose of the study	4
1.4 Specific Objectives of the Study	4
1.5 Research Hypotheses.....	4
1.6 Scope of the study	4
1.6.1 Subject Scope	4
1.6.2 Time scope.....	5
1.6.3 Geographic scope	5
1.7 Significance of the study	5
1.8 Theoretical Framework	5
CHAPTER TWO	7
LITERATURE REVIEW	7
2.0 Introduction	7
2.1 Theoretical Review on Trade	7
2.1.1 Absolute Advantage Theory	7
2.1.2 Comparative Advantage Theory.....	8
2.1.3 Heckscher-Ohlin (H-O) Trade Model	8
2.1.3 The Specific Factors Model.....	8
2.1.4 Gravity Model of Trade	9
2.2 Empirical Literature based on the objectives of the study.	10
2.2.1 Bilateral Exchange Rate Volatility and Export Growth.	10
2.2.2 Foreign Investment and Export Growth.	12

2.2.3 Infrastructure and Export Growth.....	13
2.2.4 Institutional Quality and Export Growth.	15
2.2.5 Traditional Gravity Model Variables (Gross Domestic Product, Distance) and Export Growth.	15
Summary of the literature review.	18
CHAPTER THREE	19
METHODOLOGY	19
3.0 Introduction	19
3.1 Research Design.....	19
3.2 Data Source and Description of the variables sourced.....	19
3.3 Specification of the empirical model	21
3.4 Estimation Technique.....	24
3.5 Diagnostics tests.....	25
3.5.1. Test for Multicollinearity.....	25
3.5.2. Stationarity tests on Model Variables.....	25
3.5.3. Panel Co-Integration Test.....	26
3.5.4. Test for Heteroscedasticity	26
3.5.5. Tests for Model Specification.....	26
3.6 Ethical Considerations.....	26
CHAPTER FOUR.....	27
PRESENTATION AND INTERPRETATION OF RESULTS.....	27
4.0 Introduction	27
4.1 Description of the study variables	27
4.2 Diagnostic Tests	28
4.2.1 Test for Multicollinearity.....	28
4.2.2 Stationarity Test on Model Variables	29
4.2.3 Co-Integration Test.....	30
4.2.4 Test for Heteroscedasticity	30
4.3 Gravity Model Estimation.....	31
CHAPTER FIVE	33
DISCUSSION OF RESULTS, CONCLUSION AND POLICY RECOMMENDATIONS ...	33
5.0 Introduction	33
5.1 Discussion of results.....	33

5.1.1 Effect of Bilateral Exchange Rate Volatility on export growth in Uganda.....	33
5.1.2 Foreign investment has an effect on export growth rate in Uganda.....	33
5.1.3 Infrastructure Quality has an effect on export growth rate in Uganda.	34
5.1.4 Institutional Quality has an effect on export growth in Uganda.....	34
5.1.5 Gravity Model Variables and Augmented Dummies on export growth in Uganda.	35
5.2 Conclusions	36
5.3 Policy Recommendations	36
5.4 Limitations to the study and Suggested Areas for further research.	37
References.....	38
Annex 1: Countries Included in the Study and Rank of Importance in terms of Valuation of Exports between 2005 and 2021.....	45

LIST OF ABBREVIATIONS

COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
FDI	Foreign Direct Investment
GARCH	Generalized Auto Regressive Conditional Heteroskedasticity
GMM	Generalized Method of Moments
GDP	Gross Domestic Product
IMF	International Monetary Fund
IGAD	Intergovernmental Authority on Development
OLS	Ordinary Least Squares
PPML	Poisson Pseudo Maximum Likelihood
SAARC	South Asian Association for Regional Cooperation
SADC	Southern African Development Community
SDG	Sustainable Development Goal
USD	United States Dollar

ABSTRACT

Empirical research suggests that export growth contributes to economic growth. As such, the study set out to investigate the determinants of export growth in Uganda within the framework of an augmented gravity model of trade using panel data covering 17 years from 2005 – 2021 for Uganda and 21 of her top trading partners. The Poisson Pseudo Maximum Likelihood regression (PPML) was used to reveal the effect that variables such as exchange rate volatility, foreign direct investment, infrastructure quality, institutional quality and EAC membership have on Uganda's export growth. The findings suggest that exports grow significantly with the expansion of infrastructure quality, institutional quality of Uganda and foreign direct investment. The effect of exchange rate volatility was determined to be insignificant with respect to Uganda's export growth. Surprisingly, membership in the East African Community was found to have a negative effect on export growth in Uganda. Distance between Uganda and her trading partners was also found to have a significant negative effect. This study recommends that to improve Uganda's export growth rate, government should boost inbound FDI because it could act a conduit for technological transfer which could directly impact on the volume and value of Uganda's exports through value addition. Government of Uganda should invest more in infrastructure like rail lines since it would help boost the level of exports. The significance of the East African Community membership should be reviewed by policy makers to make sure that non-tariff barriers to trade are removed to allow for exports in Uganda and the region to grow.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This section presents the background of the study, the problem statement, the objectives, scope, and significance of the study.

1.1 Background to the Study

For most countries, export growth plays a significant role in determining the development paradigm and a high export capacity is a key element for sustained long-term economic growth (Di-Pietro & Anoruo, 2006; Mbulawa, 2021; Navarro Zapata *et al.*, 2023). Export growth has the potential to spur economic growth premised on its ability to accelerate the production of goods and services beyond the domestic consumption needs, the positive spill-over effects on job creation, impact on the balance of payments and ultimately their immense contribution to poverty eradication (Kaberuka *et al.*, 2014; Kalaitzi & Chamberlain, 2020). Economists have long emphasised the importance of exports as the engine of economic growth, and the rapid expansion of East Asian countries in the 1970s and 1980s gives a prime example of the importance of this sector. The desire to boost exports is currently one of the most prominent economic strategies in the developing world because of its known returns, especially the ability to increase economic growth (Fletcher & Rammelt, 2017; Sharma & Mishra, 2022).

Developing countries have perpetually registered low export levels. In Sub-Saharan Africa, countries have recently just reached an average of 23 percent of Gross Domestic Product (GDP) in 2021, comprising a paltry 3 percent of global trade (World Bank, 2021).

In the East African Community region, the exports of goods and services expressed as a percentage of GDP in 2021 was as follows; Burundi 5 percent, the Democratic Republic of Congo 40.39 percent, Rwanda 19.1 percent, Kenya 10.6 percent, Tanzania 14.3 percent (World Bank, 2021). Uganda exported just 14.8 percent of GDP on average in the last decade (World Bank, 2021). Uganda therefore not only falls below the Sub-Saharan Africa average in exports, but also fails to catch up with some of her peers in the East African Economic Community trading block.

While various scholars suggest that export growth might overall be a strong determinant of economic growth, the trajectory of the exports in the region is still low for most countries and

it is therefore important to have a continuation of the discussion through an assessment of the determinants of export growth for economies that still reap lowly from export because this would be critical in formalizing robust and effective policies for those economies.

Uganda, like many other developing nations and its East African neighbours, adopted an export-oriented growth strategy in the early 1980s. Uganda has since changed its trade policies to boost exports. Reforms include removing export tariffs and import input duties for exports (Musinguzi, 2002). Uganda Investment Authority, Uganda Exports Promotions Board, and Uganda National Bureau of Standards are examples of statutory institutions that were established to promote Uganda's export sector and encourage export-oriented investments. With the hope of expanding her exports in the regional market, Uganda has also participated actively in regional integration activities. It participates in the Intergovernmental Authority on Development (IGAD), the Common Market for Eastern and Southern Africa (COMESA), and the East African Community (EAC) (Karamuriro and Karukuza (2015).

As a result of the above policy measures among others, Uganda has registered some growth with respect to export earnings. Trade statistics show that export earnings have increased during the post reform period from 0.20 billion US dollars in 1980 to 6.4 billion US dollars in 2021 (World Bank, 2021).

Table 1.1: Uganda's Exports between 1980 and 2021

Year	Uganda	
	Exports of goods and services (current US\$)	Exports of goods and services (Percent of GDP)
1980	242,000,000	19.4
2016	3,629,227,706	12.4
2017	5,122,376,588	16.7
2018	4,967,717,820	15.1
2019	6,048,575,655	17.1
2020	5,796,021,005	15.4
2021	6,396,009,317	15.8

Source(s): World Bank, 2021

Despite the aforementioned policy measures among others adopted by Uganda, her contribution to the total value of world exports is still limited, amounting to only 0.02 percent in 2021 (World Bank, 2021). Additionally, over the last decade, the rate of growth has fluctuated at times with some negative growth realized at some points which seems to suggest

that there are some challenges still faced by Uganda's exports regardless of the positive strides in policies that have been adopted over the years. In view of the consensus that exports can play a significant role in an economy and yet Uganda's contribution at the world stage has stayed insignificant for close to four decades, it is necessary to re-examine the elements that affect export flows between Uganda and her trading partners. The challenges this study will focus on could be attributed to; the size of the economies that Uganda trades with – this is theoretically thought to be a trade increasing dimension; distance between trading partners which is conceptualized theoretically to be a trade resistance dimension since they are costs; exchange rate volatility is also a construct thought of to be a cost; foreign investment theoretically thought to be a trade increasing dimension; infrastructure quality and institutional quality of Uganda's trading partners theoretically thought to be a trade increasing dimension. These factors may assist in explaining Uganda's poor export growth at the world stage and aid further policy making and adoption that will affect the economy positively.

1.2 Problem Statement

Export growth has a positive relationship with economic growth (Kaberuka *et al.*, 2014). Growing exports is vital for any developing country that intends to transform into a modern state. As exports increase, new exporters expand; become more productive; and invest in higher quality products because of being exposed to international competitive pressures and new demand for higher quality and broader markets (Carbaugh, 2022). Since the early 1980's Uganda has adopted numerous policy and legal frameworks to be able to grow her exports. However, despite instituting these frameworks, the statistics show that Uganda registered fluctuating levels of export growth and in some instances even registering negative growth in 2020 (World Bank, 2021). Furthermore, the statistics show that Uganda's contribution to the world market was 0.01 percent in 1980, three decades later, her contribution stands at 0.02 percent (World Bank, 2021) which is abysmal. If this challenge of less export growth persists, Uganda may not be in position to achieve its Vision 2040 of becoming a modern economy, additionally, the eighth sustainable development goal of growth might not be attained. It is therefore apt to further re-examine the determinants of export growth like foreign investment, infrastructure quality, bilateral exchange rate volatility using a gravity model analysis approach to address any possible contradictions from previous studies and also further the debate with recent empirical evidence on effect of exchange rate volatility and governance factors of Uganda where literature is scant leading to formulation of appropriate policies that could potentially accelerate export growth and its associated benefits.

1.3 Purpose of the study

The study sought to examine the determinants of export growth of Uganda using a gravity model analysis approach.

1.4 Specific Objectives of the Study

- i. To examine the effect of bilateral exchange rate volatility between Uganda and her trading partners on export growth in Uganda.
- ii. To examine the effect of foreign investment in Uganda on export growth in Uganda.
- iii. To examine the effect of infrastructure quality in Uganda on export growth in Uganda.
- iv. To examine the effect of institutional quality of Uganda on export growth in Uganda.
- v. To examine the effect of GDP and distance of Uganda and her trading partners on export growth in Uganda.

1.5 Research Hypotheses

H₀₁: Bilateral exchange rate volatility has an effect on export growth in Uganda. The null hypothesis will be rejected if the associated p-value > 0.05.

H₀₂: Foreign investment has an effect on export growth rate in Uganda. The null hypothesis will be rejected if the associated p-value > 0.05.

H₀₃: Infrastructure Quality has an effect on export growth rate in Uganda. The null hypothesis will be rejected if the associated p-value > 0.05.

H₀₄: Institutional Quality has an effect on export growth in Uganda. The null hypothesis will be rejected if the associated p-value > 0.05.

H₀₅: Gross Domestic Product and Distance (Gravity Model Variables) has an effect on export growth in Uganda. The null hypothesis will be rejected if the associated p-value > 0.05.

1.6 Scope of the study

1.6.1 Subject Scope

The study was limited to the effect of bilateral exchange rate volatility, foreign investment, infrastructural quality, and institutional quality on export growth in Uganda. Furthermore, since the study adopted the gravity model, GDP and distance which are the foundations of the model will also be included as peripheral variables.

1.6.2 Time scope

The study period was designed to have coverage on relevant annual data between 2005 and 2021. This period was inferred due to readily available data from reliable sources for all the variables.

1.6.3 Geographic scope

The study covered determinants of Uganda's exports growth using annual panel dataset of Uganda and her top trading partners.

1.7 Significance of the study

Because Uganda's exports are still low as elucidated in the sections above, and yet export growth is viewed as an engine for economic growth, a renewed understanding of determinants of export growth in Uganda is overly critical and this study will contribute in ways elucidated below.

- i. The study will help to advance the debate among policy makers on the determinants of export growth through the gravity model analysis. When policymakers have a firm grasp on the factors that drive export growth, they can steer exports in a direction that is desirable, helping the economy expand and flourish in a very efficient way.
- ii. To the best of my knowledge the literature on the effect of governance indicators of Uganda with respect to export growth as well as exchange rate volatility on export growth is scant and hence this study will aim to close that gap.
- iii. Scholars might benefit from a generic conceptual model since it can serve as a point of reference for potential future researchers who may be interested in doing a similar study.

1.8 Theoretical Framework

The study will build on an augmented gravity model as used by scholars like Shinyekwa and Othieno 2013; Shinyekwa *et al.* 2021 and Karamuriro and Karukuza (2015). The mathematical form of the augmented model is shown below.

$$\begin{aligned} EXP_{ijt} = & \beta_0 + \beta_1 GDP_Part_{jt} + \beta_2 GDP_UG_{ut} + \beta_3 DIS_{uj} + \lambda_1 LANDLOCK + \lambda_2 EAC \\ & + \beta_4 Exchange_Vol_{ijt} + \beta_5 Foreign_Investment_{ut} \\ & + \beta_6 Infrastructure_UG_{ut} + \beta_7 InstitQuality_Part_{jt} \\ & + \beta_8 InstitQuality_UG_{ut} + \epsilon_{ijt} \end{aligned}$$

Where EXP denotes the Exports and is the dependent variable, GDP is Gross Domestic Product, DIS is Distance between trading partners, LANDLOCK and EAC are dummy variables to show whether a country is landlocked or is part of the East African Community respectively. Exchange_Vol denotes the bilateral nominal exchange rate volatility measure, Infrastructure_UG denotes quality of Uganda's infrastructure, IQ is institutional quality.

The apriori expectations are shown below.

$$\beta_1 > 0 \text{ and } \beta_2 > 0, \beta_3 < 0, \lambda_1 < 0, \lambda_2 > 0, \beta_4 \text{ is uncertain } \beta_5 > 0, \beta_6 > 0, \beta_7 > 0, \beta_8 > 0$$

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter provides review of existing literature explaining the determinants of export growth. It provides first; the theoretical review of trade and second, empirical literature of the study objectives.

2.1 Theoretical Review on Trade

Trade is viewed as a vital component of every economy's capacity to expand and flourish. Because it generates the foreign exchange necessary for the industrialization of every economy, it is a crucial tool for economic development (Rahman, 2009). Modern ideas about commerce are the consequence of the steady evolution of economic theory. The study will provide a brief overview of classical trade theories like the absolute advantage model, the theory of comparative advantage, the Heckscher-Ohlin model, and the specific factors model, all of which were developed by early theorists and continue to have an impact on contemporary trade theory.

2.1.1 Absolute Advantage Theory

Adam Smith (1723-1790) authored a book called "The Wealth of Nations," in which he explained the theory of absolute advantage trade (Smith, 1776). It was a response to the mercantilists' fixed ideas about why and how trade helps the global economy. Smith showed that the possible benefits of specialisation are not just related to the way jobs are split up within companies, but also to trade between countries. His theory of absolute advantage was against the mercantilists' strong restrictions on foreign trade. Instead, he favoured free trade. Smith said that trade between nations happens because some countries are better at making certain goods than others. This is called an absolute advantage. From this point of view, the theory says that a country should export products that it makes better than others and import products that it makes worse than others. Smith argued that free trade would make the world's output go up and that both countries would benefit from trading with each other. But Smith's theory couldn't explain why countries with a complete advantage in making all tradeable goods still trade with countries that have a complete disadvantage in making the same goods (Dunn & Mutti, 2004; and Salvatore, 1998).

2.1.2 Comparative Advantage Theory

David Ricardo (1772-1823) proposed the theory of comparative advantage as an extension of the absolute advantage trade theory, and he demonstrated that mutually beneficial commerce is still feasible regardless of whether or not absolute advantage exists between states. According to the theory, a country should focus on producing and exporting those items for which its opportunity cost is lowest, while the other country should do the opposite. Because of this, global production of the items would rise. The comparative advantage theory, as emphasised by Anderson (2004) and Suranovic (2006), states that differences in labour productivity across nations are primary drivers of international commerce. Experiments conducted by MacDougall (1951), Stern (1962), and Balassa (1963) all corroborate the Ricardian finding that differences in the distribution of the factors of production (labour) underpin comparative advantage. There was a lot of push back against this model because of its unrealistic assumptions and because it didn't account for the effects of trade on the well-being of the components of production (Salvatore, 1998).

2.1.3 Heckscher-Ohlin (H-O) Trade Model

Including capital as a fourth factor of production, the Heckscher-Ohlin (H-O) trade model was created by two Swedish economists, Eli Heckscher and Bertil Ohlin. Understanding the elements that characterise the degrees of comparative advantage between countries and the patterns of international trade flows was the impetus for expanding the comparative advantage theory. The authors suggested that countries had different comparative advantages because of the uneven distribution of productive resources or factors. Because of this, they believe that economies have an incentive to adopt production techniques that make extensive use of factors that are abundant in their economies because doing so reduces the cost of using those factors. A central tenet of the model is that countries should export products that make intensive use of domestically abundant factors and import products that make intensive use of domestically unabundant factors because, presumably, different products require different levels of factor input usage in their production (Salvatore, 1998).

2.1.3 The Specific Factors Model.

According to Apalatoya (2019), there are only a few take aways in which the Heckscher-Ohlin business model and the specific factors model diverge. Differentiating between the Heckscher-Ohlin model and the specific factors model boils down to the length of time horizons assumed by each. The model assumes that the output of a country can be traced down to just three factors: the availability of labour, capital, and land. The model also assumes that both

manufactured and agricultural goods are produced in the economy, that labour is fully mobile across sectors, but that capital and land are sector specific. Given these hypotheses, the model determined that the pattern of international trade flows is influenced by the relative abundance of the given element. Therefore, the impact of trade on the owners of labour is defined by the consumption preference of the working force, as the model concludes that the advantage to the owners of the movable factor is unknown. It's possible that a worker's economic situation might be worse if he or she prioritised purchasing the exportable good over the importable good. But it's easy to see how free trade would affect the people who own those parts. One economic winner is the owner of a factor utilised in the production of an exportable product, whereas another economic loser is the owner of the same factor in the importing competitive sector.

2.1.4 Gravity Model of Trade

In contrast to the above-mentioned comprehensive specialisation trade models, which are too vague to provide meaningful insight into the precise nature of international trade flows, the gravity theory is often believed to be remarkably effective. As a result, the aforementioned theories of international commerce can only account for the fact that countries trade various products; they cannot shed light on the variation in trade intensity among states. As part of international trade flows, however, the gravity model allows for additional factors to be incorporated for explanation (Paas, 2000).

In recent years, the gravity model of trade has emerged as a dominant framework for analysing the factors that drive global commerce (Bacchetta *et al.*, 2012). According to Newton's theory of gravitation, the strength of the attraction between two objects is directly related to the square of the distance separating their respective centres of mass from one another, where one unit of mass is one kilogramme (in meters).

Newton's law of gravitation was initially applied to the study of trade by Tinbergen (1962) and Poyhonen (1963). They reasoned that just like planets are gravitationally drawn to one other based on their sizes and vicinity, so are countries based on their GDP and proximity to each other (Bacchetta *et al.*, 2012). By factoring in market size, as approximated by nation population size and GDP, they were able to incorporate economies of scale into their gravity theory. The model was expanded to include a geographical dimension represented by the distance between trading partners. Hence, the gravity model of trade postulates that two countries' commerce is positively correlated with their GDP and negatively correlated with

their physical separation. Below is the multiplicative form of the standard gravity model of commerce:

$$E_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} D_{ij}^{\beta_3} \quad (2.1)$$

Where E_{ij} is the export flows between country i and j, Y_i and Y_j represents the GDP of country i and j respectively, D_{ij} measures distance between the capital cities of country i and j, and finally β s are coefficients of the variable noted above.

The log-linear form of equation (3.1) is shown below:

$$\ln E_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} \quad (2.2)$$

Where β_1 and β_2 are expected to be positive whereas β_3 is expected to be negative as distance is a proxy for transport cost and its interpretation will mean that, as distance between trading roots increases, the cost of transportation will rise. Although, with criticisms for lacking theoretical basis, the model has witnessed wide usage in empirical studies in recent time.

2.2 Empirical Literature based on the objectives of the study.

2.2.1 Bilateral Exchange Rate Volatility and Export Growth.

Samuelson and Nordhaus (2010) define exchange rate as prices of one currency expressed in terms of another. The exchange rate plays a pivotal role in determining the price of a nation's product in the rest of the world and domestic price of goods imported from abroad.

A risk-averse firm will pay more to avoid exchange rate risk, which is an implicit cost, according to the theoretical argument supporting the negative relationship between exchange rate volatility and exports. This means that in the presence of exchange rate volatility, aggregate trade is diminished since the quantity of exports supplied with this additional cost is smaller with risk than without risk. Assuming no hedging options, Hooper and Kohlhagen (1978) come to the same conclusion of a negative relationship between exchange rate volatility and trade volume. They state that firms reduce output and, by extension, trade volume in response to exchange rate volatility to lessen their exposure to exchange rate risk. Alternatively, exports may rise if exporters were able to use the uncertainty around currency rates to their advantage.

Whether a stable exchange rate benefits exports has not been determined theoretically or empirically by several studies conducted in both developed and developing nations Clark *et al.*, (2004); Cote (1994) and McKenzie (1999) present reviews of the literature that show multiple models that support both negative and positive connections between exchange rate volatility and exports.

Chowdhury (1993), using the multivariate error-correction model on a time-series data set, discovered that currency exchange rate volatility had a substantial negative effect on the export volume of each G-7 member countries. Wei (1999) used a panel of 63 nations to estimate switching regressions and discovered that fluctuations in exchange rates have a negative and statistically significant influence on bilateral commerce. The negative and statistically significant correlation between exchange rate volatility and bilateral trade was also found by Rose (2000), who estimated a gravity model with 186 countries. The impacts of currency exchange rate volatility on U.S. exports and output were also investigated by Rahman and Serletis (2006), who employed a Structural Vector Autoregressive model adjusted for multivariate GARCH. They concluded that exports are significantly harmed by fluctuations in the exchange rate. Similarly, Kihangire (2004) used monthly data to conclude that fluctuating exchange rates hurt Uganda's exports through his OLS estimations.

Exchange rate volatility is thought to reduce trade flows in the South Asian Association for Regional Cooperation (SAARC) regions, according to Banik and Roy (2021), exchange rate uncertainty does have a negative impact on trade, although it is not significant. They used a panel setting to conduct their study, which encompassed the five-year period of 2005–2018 and eight SAARC members: Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan, and Sri Lanka. To determine the volatility of the exchange rate, the authors considered both the standardized value (standard deviation) and the conditional variance model. The results of this study are further reinforced by Mukhtar and Malik (2010) who investigated how exports are affected by exchange rate volatility. They discovered that exchange rate volatility has a considerable negative impact on India, Pakistan, and Sri Lanka's exports both in the short run and the long run using cointegration and vector error correction model techniques on the long-run export demand function. The last two studies described mostly use time-series techniques and only consider four of the eight SAARC nations.

Exchange rate fluctuations have a negative impact on exports for a variety of reasons, including the fact that they increase the level of trade riskiness, which in turn creates uncertainty about the profits, leading to a rise in the price of tradables because of the risk markup (risk premium) imposed by sellers to protect profits. Companies protect their earnings by moving resources from the more volatile trading sector to the less volatile non-tradable sector when the exchange rate fluctuates. Furthermore, as agents try to hedge against exchange rate risk, transaction costs rise (Njoroge, 2015; Schnabl, 2009). Ito *et al.* (2008) show that uncertainty in the value of the yen discourages Japanese companies from collaborating on manufacturing networks. They

prove that stable exchange rates are necessary for the bidirectional flow of intermediate products in global supply chains. According to Thorbecke (2008), shipments of electronic parts and components within East Asia are reduced due to instability.

However, some studies also find that exchange rate volatility is not a significant determinant of trade. Aristotelous (2001) using a timeseries framework investigated the impact of exchange-rate volatility and exchange-rate regime on the British exports to the United States using data for the period 1889–1999. The findings suggest that neither exchange rate volatility nor the different exchange-rate regimes that spanned the last century had an effect on export volume. Tenreyro (2004) using a gravity model with 104 countries finds insignificant effect of exchange rate volatility on trade. While the International Monetary Fund (1984) observed two instances when exchange rate volatility had a negative and significant influence on bilateral exports between G-7 nations, they discovered other instances where it had a favourable and significant impact. Using a gravity model and several different estimating strategies, Clark *et al.*, (2004) analysed a panel of 178 countries and found that the influence of exchange rate volatility on trade varies depending on the method used to estimate it. Short-term and long-term effects of currency rate volatility on exports for 13 developing countries are studied by Arize *et al.*, (2000) utilising Johansen's Multivariate method and Error Correction Model.

The hypothesis that exchange rate volatility hurts trade is unsupported by actual data, which ranges from no effect to a negative or positive effect. Empirical research using different samples, estimating equations, estimation procedures, and estimate approaches reach varied outcomes. McKenzie (1999) states that panel data estimate methods show a statistically significant association between exchange rate volatility and exports and thus this study attempts to explore that notion as well with panel data.

2.2.2 Foreign Investment and Export Growth.

Foreign direct investment may boost exports in developing countries, notwithstanding the debate over its pros and cons. Foreign direct investment changes export composition in most nations. By boosting knowledge-based sectors, foreign direct investment into Singapore, China, Lesotho, Madagascar, and Mauritius has increased the technology content of their exports (Ishetu, 2020). Capital formation has been boosted by this export-FDI link. Foreign direct investment boosts technological advancement and encourages intra-sectoral innovation (UNCTAD, 2005).

Selimi *et al.* (2016), conducted research on the West Balkan countries for the period 1996 – 2013 using a panel framework. Their findings show that all three models, the pooled OLS model, the random effects model, and the fixed effects model, all have FDI coefficients that are positive and statistically significant proving that FDI had a substantial impact on the promotion of exports in those nations. Similarly, Uysal and Mohamoud (2018) conducted research on seven East African countries from 1990 to 2014. Using Feasible Generalized Least Square estimation technique they found that FDI had a beneficial influence on exports, which was statistically significant at the 1 percent level demonstrating that FDI had a beneficial effect on the export performance of the selected countries.

Conversely, despite a positive coefficient, a study by Sultan (2013) found that FDI had no discernible impact on exports from India. Furthermore, Majeed *et al.* (2006) using panel data of 75 countries for the period 1970-2004 showed that while FDI had a positive coefficient for the sampled countries, it had only a marginal effect on exports. The researchers employed a Fixed Effects Model (FEM) and applied a 5 percent significance level before concluding that the coefficient of FDI's impact on export growth was positive but not statistically significant. This suggests that foreign direct investment (FDI) has a negligible effect on the exports of these countries, even if it does affect them positively. Nguyen *et al.* (2012), who looked at panel and time series data from 1992-2006 using OLS and Generalized Least Squares (GLS) estimation techniques, also found no correlation between foreign direct investment and exports in Vietnam.

2.2.3 Infrastructure and Export Growth.

Shinyekwa and Othieno (2013) used panel data for the period 2001 – 2009 used the gravity framework to compare the performance of Uganda's intra-east African community trade and other trading blocs. Using static random and dynamic random models, the study revealed that infrastructure was an insignificant determinant of export performance in Uganda.

Olyanga *et al.* (2022) used the Structural Gravity Model to analyse the impact of export logistics factors on East African Community firms export competitiveness. Using panel data for the period of 2007–2018 and the PPML estimation technique, they tested the hypothesis that trade infrastructure would affect export competitiveness and found that it had a negative impact on export competitiveness.

In contrast, Chang *et al.* (2009) argue that a country's level of infrastructure (proxied in their study by the number of main telephone lines per capita) is a crucial factor in determining the

effect of trade reforms on economic growth. The availability of telephone lines, while telling, is by no means a complete measure of infrastructure. Many other aspects of hard infrastructure (such as telephone lines and other information and communications technology infrastructure, ports, and roads) and soft infrastructure (such as border and transport efficiency, and the business and regulatory environment) have been studied in other literature and found to have an impact on international trade flows. Portugal-Perez and Wilson (2012) also used the gravity framework to examine the impact of hard and soft infrastructure on bilateral trade flows for 101 countries over the period 2004 – 2007. From using the two-stage Heckman selection model they found that physical infrastructure is the most robust determinant of bilateral exports, whereas the impact of other variables often changes sign depending on specifications or the estimators used.

Helble (2014) analysed the effects of shipping and aviation cargo links and frequency on bilateral trade flows between Pacific countries using the PPML approach for countries in 14 Pacific economies (the Cook Islands, Fiji, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, and Vanuatu). The results from the study indicated that direct connections and frequent connections have a strong and statistically significant effect on bilateral trade.

Using a panel data for the period 1985-2002 across a cross-section of five Asian nations (i.e., China, Hong Kong, Japan, Singapore, and Malaysia), Gani (2008) investigated the determinants impacting trade between Fiji and its Asian partners. The findings from the generalised least squares (GLS) estimation technique indicated that Fiji's infrastructure plays a crucial role in the country's exports.

At the firm level, there is also a body of literature highlighting the significance of both soft and hard infrastructure on exports. It has also put greater emphasis on domestic infrastructure than global infrastructure. Volpe and Blyde (2013), for instance, exploited the road damage produced by a Chilean earthquake (a natural experiment) to determine the effect of road deterioration on the exports of enterprises in different regions. They employed a difference-in-difference estimator, with the export growth or decline of companies not located near damaged roads serving as a counterfactual. They found that the earthquake had a sizable, unfavourable, and statistically significant impact on the international sales of companies. In a similar empirical study, Volpe *et al.* (2014) looked at how shipping prices affect exports. As another experiment, they investigated how the closure of the key bridge between Argentina and Uruguay due to an environmental disagreement affected exports and shipping prices. They

observed a significant relationship between higher shipping costs and a 7 percent drop in exports.

2.2.4 Institutional Quality and Export Growth.

Braha *et al.*, (2016) examined the determinants of Albanian Agricultural Exports. The study employed the gravity model covering the exports of the Albanian economy from 1996-2013 and the Poisson Pseudo Maximum Likelihood (PPML) estimation technique. Their empirical findings revealed that export flows are positively affected by institutional quality of the trading partners.

Apalatoya (2019) examined the determinants of Non-Traditional Exports growth in Ghana. He applied the augmented gravity model of trade on a panel dataset of Ghana and her 78 major trading partners from 2004 to 2016. The Poisson Pseudo Maximum Likelihood regression (PPML) was used to reveal the effect of among other variables, the institutional quality effect on Non-Traditional Exports (NTEs) in Ghana. He deduced that a high level of the trading partner institutional quality variables such as political stability and absence of violence and rule of law facilitates NTEs positively whereas a high level of regulatory quality control affects NTEs negatively.

Taye (2009) analysed Ethiopian exports using a gravity model framework. Using a panel data set including 30 of Ethiopia's trading partners from 1995 to 2007, the model was estimated using the Generalised Two Stages Least Squares method. Ethiopia's export performance was found to be highly determined by domestic good institutional quality.

2.2.5 Traditional Gravity Model Variables (Gross Domestic Product, Distance) and Export Growth.

Chan and Au (2007) applied the gravity model of trade to examine the determinants of China's textiles exports. Their study applied panel dataset on China and her top 10 importing countries from 1985 to 2004. The findings of the study using the OLS estimation technique indicated that GDP of China and her importers GDP, GDP per capita of the importer, affect exports positively and are statistically significant.

Similarly, Cline (2014) applied Ordinary Least Squares regression on pooled data on a hundred developing nations between 1981 and 2001. The rate of export expansion was conveyed as a role of the portion of manufactured exports, the actual effective rate of exchange, the actual rate of growth of Gross Domestic Product, and the Per Capita Income. There was a statistically

significant association amid the increase of the GDP and the actual effective rate of exchange. Braha *et al.*, (2016) also examined the determinants of Albanian Agricultural Exports. The study employed the conventional gravity model covering the exports of the Albanian economy from 1996-2013 and the Poisson Pseudo Maximum Likelihood (PPML) estimation technique. Their empirical findings revealed that export flows increase with increasing domestic economic size and distance is a significant negative determinant of exports.

Bergstrand (1985) also adopted the gravity model of trade to examine factors that determine bilateral exports flows across 15 OECD nations. The result of the study revealed that economic sizes of both countries, have a significant positive influence on bilateral exports flows, whereas geographical distance between the capital cities of the trading partners was found to negatively affect the volume of trade between countries.

Jordaan and Eita (2011) conducted an empirical study to investigate the determinants of South Africa's wood exports using the gravity model approach. The study applied a panel data on South Africa and its 68 trading partners from 1997-2004. They revealed that South Africa's population and importer's GDP are positively related to wood exports with the coefficients being statistically significant.

Karamuriro and Karukuza (2015) in examining the determinants of Uganda's export performance used a panel dataset for the period 1980 to 2012 also found that Uganda's GDP, importer's GDP had a significant positive effect on Uganda's exports. They also found that distance was found to be negative and statistically significant at the 1 percent level in the random effects and GMM models.

Eita (2008) used a panel data set consisting of export data from 39 nations between 1998 and 2006 to conduct research into the factors that affect Namibia's exports. Eita (2008) modelled exports from Namibia as a function of GDP and per capita GDP, as well as the GDP and per capita GDP of its key importers, the distance between them, and the exchange rate. The export model for Namibia also includes dummy variables to account for the impact of being a neighbouring member of the Southern African Development Community (SADC) or the European Union (EU). The findings demonstrated that rising levels of both the domestic economy and the economies of importers drove up Namibia's exports while distance was found to have a negative impact on Namibia's exports.

A study by Oguledo and Macphee (1994) estimated a reformulated gravity model of trade derived from the linear expenditure framework with trade flows data from 162 countries for 1976. Their study revealed that factors such as GDP, population and distance which are commonly used in the gravity model have significant influence on trade flows. Since the authors used cross-sectional data for the estimation, the outcome of the study is affected by the problem of heteroscedasticity.

According to Jordaan and Eita (2011) in an empirical study to investigate the determinants of South Africa's wood exports using the gravity model approach. They revealed that the distance between South Africa and her trading partners was statistically insignificant.

Using the gravity model of trade, Habab *et al.* (2010) investigated the determinants of Egyptian agricultural exports growth. The study utilized panel data on Egypt and her 50 major trading partners from 1994 to 2008. Their estimated results revealed that Egypt's GDP has a positive effect on Egyptian agricultural trade whereas transportation costs, proxied by distance influence it negatively. All these were statistically significant.

Chan and Au (2007) applied the gravity model of trade to examine the determinants of China's textiles exports. Their study applied panel dataset on China and her top 10 importing countries from 1985 to 2004. All the variables were statistically significant except the distance variable.

Kristjansdottir (2005) adopted the gravity equation to examine determinants of Icelandic exports growth, using panel dataset on Iceland exports based on four sectors and its 16 top trading partners over a period of 11 years. Her empirical findings showed that the size and income of Iceland do not seem to matter much on the volume of exports, not even when corrected for the small country sizes but regional trading blocs and individual sectors matter. Finally, the study also revealed that marine products varied considerably in their sensitivity to distance and country factors.

Shinyekwa and Othieno (2013) also used the gravity model as described earlier. They found that the distance variable to be significant negative determinant of export performance of Uganda.

Summary of the literature review.

In the light of the literature review, what is apparent is that scholars in studying exports have found different estimates sometimes even in the same country. To the best of my knowledge the literature with respect to the inclusion of governance indicators as regressors in the study of exports in the context of Uganda is scant. Additionally, in the context of Uganda, the literature on the impact of exchange-rate volatility on export growth is also scant.

The study therefore, intends to contribute to filling this gap while also further buttressing findings of other scholars or providing alternate viewpoints with respect to other typically researched determinants of export growth.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter describes the methodology that was used to achieve the stated objectives. It explains the sources of data, its coverage, and the number of data points for the study. It also describes the tests that were undertaken to accomplish the study objectives.

3.1 Research Design

The study used an annual panel design with a quantitative approach. This design enables testing of the interactions between variables and aids in the establishment of relationships between them. Researchers have shown that panel data is superior to cross-sectional and time series data in many applications. Gomez and Milgram (2010) point out that panel data allow for the analysis of variable features over time while avoiding the multicollinearity issue that might arise with cross-sectional data.

3.2 Data Source and Description of the variables sourced.

The study used secondary annual panel data covering a period of 17 years that is 2005 to 2021 for Uganda and 21 of her top export destinations. The availability of data on all the variables used in the analysis and the relative importance of each importing country informed the choices made for the sample period and the countries included in the investigation. The list of countries included in this study can be found in annex 1. The variables of interest have previously been aggregated at the national level; therefore, the requisite data can be found in existing databases, justifying the use of secondary sources.

With reference to the theoretical model adopted in this study, I employed two main sets of explanatory variables as the determinants of Uganda's bilateral exports. I used macroeconomic variables and institutional variables to explain the supply and demand side conditions that could potentially determine export growth of between Uganda. Outlined below is a brief description of the variables employed in this study:

Export Value (*Export_Value*): This is the dependent variable and it refers to the exports from Uganda expressed in thousands of US. Dollars. The data was accessed from World Integrated Trade Solutions (WITS) database, and International Trade Center database.

Gross Domestic Product (GDP): Gross domestic product is the market value of total production of goods and services in a country. The data was accessed from the World Bank, World Development Indicators database.

Distance (Distance): The physical distance in kilometers from Kampala to the capital of importer. Additionally, a dummy variable to further augment the construct of trade costs will be landlocked (*Landlocked*). These variables were accessed from the CEPII gravity dataset.

East African Community (EAC): This is a dummy variable that represents membership in the East African Community.

Exchange Rate Volatility (Exchange_Vol): Denotes exchange rate volatility between the two countries at year t . Volatility or fluctuation of the exchange rate is also referred to as exchange rate risk, which is normally measured by the Standard Deviation.

Following (Dell’Ariccia, 1999; Nicita, 2013; Rose, 2000; Tenreyro, 2004) real exchange rate volatility was calculated employing the following formula in 3.3. I first calculate the nominal exchange rate and then estimate the Standard Deviation using the equation in 3.1.

$$Exchange_Vol_{ijt} = std.dev. [\ln(ER_{ijt}) - \ln(ER_{ijt-1})] \dots\dots\dots (3.1)$$

Where ER_{ijt} indicates the monthly nominal exchange rate between Uganda and her trading partners at a time t . The standard deviation is then calculated over a one-year period. The data concerning exchange rates was sourced from the International Monetary Fund (IMF).

Foreign Investment (Foreign_Investment): This refers to foreign direct investment flows measured in thousands of US Dollars to Uganda. It is conceptualized as measure of technological transfer and the data was accessed from the International Monetary Fund (IMF).

Infrastructure Quality (Infrastructure_UG): This is an index computed by the African Development Bank and the Composite Index’s major components, namely: (i) electricity; (ii) transport; (iii) ICT. It was conceptualized as potential trade cost for the supplier (Uganda) and the data was accessed from the African Development Bank.

Institutional Quality (IQ): This is an aggregated measure of six (6) worldwide governance (institutional quality) indicators. This encompasses (i) Voice and Accountability which reflects perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media; (ii)

Political Stability and Absence of Violence which reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism; (iii) Government Effectiveness which reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies; (iv) Regulatory Quality which reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development; (v) Rule of Law which reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence; and (vi) Control of Corruption which reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Data on these institutional quality indicators was sourced from The World Bank's Worldwide Governance Indicators online database. However, a structurally composite indicator over those categories is not available. As a compromise, I used the simple arithmetic average as the aggregate index.

3.3 Specification of the empirical model

The study adopted an augmented gravity equation of trade. The motive behind the use of the gravity equation is that it has been widely used to examine factors that determine bilateral trade flows due to its empirical robustness and explanatory power capabilities. According to Kepaptsoglou *et al.* (2010), the gravity model provides an excellent empirical robustness outcome when analyzing international trade flows. Furthermore, based on literature studies on this topic, many of the previous studies used the gravity model as a tool for analysis, as does the present research.

Bilateral trade flows (imports and exports) are a function of market size and bilateral trade barriers, according to the conventional gravity model. International trade can be explained by each country's gross domestic product (GDP), population, geographic proximity, and a set of dummies. The econometric model specification adheres to well-established methodologies (for example, Tinbergen (1962), Poyhonen (1963), Eita (2008), and UNCTAD (2005)). The general specification of the model is shown in equation 3.2.

$$EXP_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 DIS_{ij} + \lambda_k DUM_{ij} + U_{ijt} \dots\dots\dots (3.2)$$

Where EXP_{ij} represents trade flow from country i to j; GDP represents Gross Domestic Product; DIS_{ij} indicates the geographical distance between the capital cities of country i and j; DUM_{ij} is a dummy variable that determines trade flows; U_{ijt} is the stochastic error term, β and λ are the parameters of the model to be estimated.

The conventional gravity model, as argued by Anderson and van Wincoop (2004), is inadequate for explaining the dynamics of international trade and that is why some scholars add in a set of dummies and other variables that help explain why certain countries trade with others; whether or not a country is an island or landlocked, and membership in a regional trading pact are all seen as dummies believed to be significant factors of intra-trade. Since including these dummies increases reliability and importance, I included them as well.

Equation (3.2) was further augmented with inspiration from among others, the works of Shinyekwa and Othieno (2013), Shinyekwa *et al.* (2021), Karamuriro and Karukuza, (2015) and Olyanga *et al.* (2022) through addition of some variables to fit appropriately the gravity model to examine the determinants of export growth in Uganda. The model estimated is shown below.

$$\begin{aligned} \ln EXP_{ijt} = & \ln \beta_0 + \beta_1 \ln GDP_Part_{jt} + \beta_2 \ln GDP_UG_{ut} + \beta_3 \ln DIS_{uj} + \\ & \lambda_1 LANDLOCK + \lambda_2 EAC + \beta_4 \ln Exchange_Vol_{ijt} + \\ & \beta_5 \ln Foreign_Investment_{ut} + \beta_6 \ln Infrastructure_UG_{ut} + \\ & \beta_7 \ln InstitQuality_Part_{jt} + \beta_8 \ln InstitQuality_UG_{ut} + \\ & \epsilon_{ijt} \dots\dots\dots (3.3) \end{aligned}$$

As per Amemiya, (1980), selection of regressors should be based on economic-theoretic considerations as well as on statistical evidence. I therefore chose variables for the study based on trade theories and earlier empirical studies.

Below, I will expound on the theoretical justification and apriori expectations of the estimated model.

The Gross Domestic Products of the two countries are a common measure of their economic size in the gravity model. In the home country u (Uganda), the larger its GDP (GDP_UG), the larger its production capacity, the more likely it is to attain economies of scale and increase its

exports' supply based on its comparative advantage. In the partner country j (Uganda's trading partners), a higher Gross Domestic Product (GDP_Part) indicates a higher standard of living and the means to purchase more goods and services from outside, including those produced in country u (Uganda). Therefore, growth in their GDPs is expected to increase the amount of bilateral trade between them. Hence, I expect their estimated coefficients to be $\beta_1 > 0$ and $\beta_2 > 0$.

The estimated coefficient of distance is anticipated to have a negative sign $\beta_3 < 0$. The larger the geographical distance between pairs of trading partners, the greater the associated transaction costs, which are a proxy for transportation expenses, time-related costs, and cultural costs. As a result, product prices will rise, decreasing their competitive edge and negating any benefits from increased trade. Because of this, less trade is taking place between them. LANDLOCK is also conceptualized as a trade cost and hence the expected coefficient is anticipated to be a negative sign $\lambda_1 < 0$.

Regional integration is expected to boost intra-regional exports. As a result, the calculated coefficients of these variables were expected to be positive. A positive number would imply that membership in the EAC enhances export flows between Uganda and members of these regional organisations, and vice versa and hence $\lambda_2 > 0$.

The expectations about the sign of the coefficient parameter for β_4 are uncertain (De Grauwe, 1988). This is because firms could potentially reduce output and, by extension, trade volume in response to exchange rate volatility to lessen their exposure to exchange rate risk. Alternatively, exports may grow if exporters were able to use the uncertainty around currency rates to their advantage.

The estimated coefficient of Foreign_Investment is anticipated to have a positive sign $\beta_5 > 0$. This is because foreign investments are expected to bring in superior technology that might lead to production of higher quality products which would then attract a larger market.

Because of its impact on transport costs, risk of loss, damage, or spoilage to goods in transit, and delivery timeliness, physical infrastructure is not only critical for the export supply capacity of the economy but also directly influences the competitiveness of its exports. Investing in better roads, highways, railroads, air and seaports, and telecommunication services is a cost-effective way to reduce trade costs, boost bilateral trade, improve trade facilitation, and strengthen regional integration. Thus, I expected the coefficient of Infrastructure_UG to be $\beta_6 > 0$.

The ability of a country to produce and export goods is directly tied to the strength of its domestic institutions. The term “institution” encompasses a wide range of concepts, including formal and informal standards of behaviour, methods for enforcing these rules, methods for mediating conflicts, penalties for rule violations, and institutions that facilitate market transactions. Incentives for individuals to engage in trade and invest in human and physical capital can either be fostered or undermined by the quality of institutions in the domestic economy. Because they allow agents to smooth over frictions that develop when two parties with competing interests engage into a production relationship, contract enforcement, property rights, investment protection, and the like are important. Partners may be hesitant to trade with a country even if trade barriers are reduced because they do not trust that contracts will be executed. It follows that a country’s exports and overall bilateral trade volumes will increase if its domestic institutions are of high quality, whereas the opposite should hold true if the quality of its domestic institutions declines. As a result, I anticipated a positive value for the coefficient measuring institutional quality (InstitQuality_UG) to be $\beta_8 > 0$. Relatedly, the environment that a country’s exports meet at the destination are equally important for the exporting country to grow her exports. As a result, I also anticipated a positive value for the coefficient measuring institutional quality of the trading partners (InstitQuality_Part) to be $\beta_7 > 0$.

3.4 Estimation Technique

The typical issues of the estimation of gravity equations are the zero trade flows and heteroscedasticity and as such one ought to be careful while choosing the estimation techniques to be used (Yotov *et al.*, 2017).

After identifying variables, the model form and regression method must be chosen. Santos Silva and Tenreyro (2006) argue that using an ordinary least squares (OLS) regression to estimate a log-linearized gravity equation is erroneous and biased. The log-linearized OLS regression approach cannot handle zero trade flows because the logarithm of zero is undefined. Therefore, to regress datasets containing zeros, either exclude zero trade flows and lose information from these observations or discover another workaround. Santos Silva and Tenreyro (2006) provide Poisson pseudo maximum-likelihood (PPML) estimation to avoid the issues. PPML regression methods are reliable and efficient for heteroskedasticity patterns. They are easy to implement and can include zero trade flows in the regression because the dependent variable is specified in levels, not logarithms. Due to its reliability, the PPML regression approach is the best estimator. Santos Silva and Tenreyro (2006) do a case study on data measurement errors and find that the PPML regression method is robust in all

circumstances. Egger and Staub (2016) use Monte Carlo simulations to show that the PPML estimator is one of the best all-around estimators for small or big samples and various stochastic processes. PML regression estimates must be viewed as elasticities, like OLS.

The PPML approach has been used widely (see for example, Olyanga *et. al*, 2022, Shinyekwa *et.al*, 2021 among others. This study thus also employed the PPML technique to estimate the equation below.

$$\begin{aligned}
 EXP_{ijt} = & \ln\beta_0 + \beta_1 \ln GDP_Part_{jt} + \beta_2 \ln GDP_UG_{ut} + \beta_3 \ln DIS_{uj} + \\
 & \lambda_1 LANDLOCK + \lambda_2 EAC + \beta_4 \ln Exchange_Vol_{ijt} + \\
 & \beta_5 \ln Foreign_Investment_{ut} + \beta_6 \ln Infrastructure_UG_{ut} + \\
 & \beta_7 \ln InstitQuality_Part_{jt} + \beta_8 \ln InstitQuality_UG_{ut} + \\
 & \varepsilon_{ijt} \dots\dots\dots (3.4)
 \end{aligned}$$

3.5 Diagnostics tests

The following diagnostic tests were run as part of the study to make sure the estimated model was not affected by typical econometric issues that would have tainted the parameter estimates.

3.5.1. Test for Multicollinearity

The study generated a correlation matrix between independent variables to test for multicollinearity. Gujarati and Porter (2009) recommend a very high correlation between independent variables is $r = \pm 0.8$. The empirical model's independent variables variance inflation factor (VIF) was also calculated. This was done to further determine which variables might produce a multicollinearity problem in the regression model. Multicollinearity causes regression coefficients to be poorly assessed if any VIF values exceed 10 (Kumar, 2014).

3.5.2. Stationarity tests on Model Variables

A unit root test is performed to observe whether a cointegration relationship exists between variables. If all variables are stationary, then the traditional estimation methods can be used to estimate the relationship between the variables. If the variables are non-stationary, a cointegration test will be relevant (Shinyekwa & Othieno, 2013). The Fisher-type test proposed by Maddala and Wu (1999) was used because it does not require the panel to be balanced (Turyareeba *et al.*, 2015).

3.5.3. Panel Co-Integration Test

The co-integration test developed by Kao (1999) was used in this research. By establishing a stationary co-integrating connection between the variables, spuriousness can be avoided in a regression with non-stationary variables. Even though the variables may contain stochastic tendencies, they will nonetheless move closer to one another over time, and the difference between them will be stable, if they can be connected to establish a long-term equilibrium relationship. As such, it is important to do a co-integration test.

3.5.4. Test for Heteroscedasticity

The study tested for heteroscedasticity by calculating a modified wald statistic for groupwise heteroscedasticity in the residuals of a fixed effect regression model, following Greene (2000). The test examines the null hypothesis that there is no heteroscedasticity. While it is not necessary to conduct this test given that the PPML estimation technique solves any issues of heteroscedasticity, the study elected to perform this test to buttress the postulations of Yotov *et al.*, (2017) who opine that one of the key issues of the estimation of gravity equations is heteroscedasticity.

3.5.5. Tests for Model Specification

The study applied the post estimation RESET test for model specification to ascertain that the model was well specified. The RESET test is a test that enables one to confirm whether the functional form of the estimated gravity equation is effectively defined. Thus, if the functional relationship between the reliant variable and the explanatory variables is non-linear in nature, then the estimated model is said to be mis specified. Therefore, testing the statistical significance of the additional variable, we can confirm the appropriateness of the estimated model Santos Silva and Tenreyro (2006).

3.6 Ethical Considerations

Since the data to be used are publicly available, there was no need to handle the data with confidentiality but rather that all information sourced from by the various bodies are ethically examined without any biases. Furthermore, the data collected for the study was only used for academic purposes and results will be openly accessible.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter presents the empirical results of the study. The necessary diagnostic tests of the model of the estimated model are also presented and discussed.

4.1 Description of the study variables

The study conducted a descriptive analysis of the study variables, and the key statistics are presented in table 4.1 below.

Table 4.1: Summary Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Export	350	88966.028	154918.01	367.889	1844838.9
GDP Part	357	2133943.9	4134917.7	1117.113	23315081
GDP UG	357	26636.047	9332.544	9239.222	40529.789
Distance	357	5017.507	3098.774	376	11677
Landlocked	357	.143	.35	0	1
EAC	357	.179	.384	0	1
Exchange Volatility	357	.026	.028	.004	.386
Foreign Investment	357	864.473	240.023	379.808	1273.602
Infrastructure UG	357	16.796	3.991	11.031	22.128
InstitQuality Part	357	4.389	1.084	2.333	5.834
InstitQuality UG	357	0	.38	-.608	.891

Source(s): Own Analysis

The mean, standard deviation, minimum and maximum values were generated to summarize the aggregated data. This is important because the means represent a summary of data while the standard deviation indicate how well the means represent the data (Olyanga *et al.*, 2022). Standard deviations larger than the mean imply that the variables are largely dispersed. Additionally, a small variance between the minimum and maximum values would suggest that a variable exhibits some kind of normal distribution and are stable while a large variance would suggest otherwise (Mbabazize *et al.*, 2020). From the table 4.1 above, variables like Export and GDP_Partner have a standard deviation larger than the mean; this would suggest that macroeconomic environment is rather fluid across time which does impact on the GDP of a country and how much a country might be able to trade.

4.2 Diagnostic Tests

4.2.1 Test for Multicollinearity

To test for multicollinearity in the model, the study first generated a correlation matrix between the variables to ascertain the relationship between them. The results are shown in the table 4.2.1a below.

Table 4.2.1a. Correlation Matrix of Model Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	-0.160*	1									
3	0.173*	0.095	1								
4	-0.278*	0.832*	0	1							
5	0.016	-0.509*	0	-0.486*	1						
6	0.197*	-0.648*	0.054	-0.847*	0.452*	1					
7	-0.159*	-0.007	-0.212*	0.031	-0.048	-0.126*	1				
8	0.139*	0.073	0.651*	0	0	0.044	-0.193*	1			
9	0.192*	0.094	0.888*	0	0	0.04	-0.405*	0.592*	1		
10	-0.170*	0.598*	-0.004	0.659*	-0.137*	-0.409*	-0.06	0.001	-0.002	1	
11	-0.126	-0.046	-0.711*	0	0	-0.021	-0.141	-0.246*	-0.699*	0.001	1

* shows significance at $p < 0.01$; 1 = Export Value; 2 = GDP_Part; 3 = GDP_UG; 4 = Distance; 5 = Landlocked; 6 = EAC; 7 = Exchange_Vol; 8 = Foreign_Investment; 9 = Infrastructure; 10 = Institutional Quality Partner; 11 = Institutional Quality Uganda.

Source(s): Own Analysis

Gujarati and Porter (2009) suggest that a very high correlation between independent variables is $r = \pm 0.8$. Based on this threshold, the correlation matrix shows that there is strong and statistically significant correlation between GDP_Part and Distance ($r = 0.832$, $p = 0.0000$); GDP_UG and Infrastructure_UG ($r = 0.888$; $p = 0.0000$); EAC and Distance ($r = -0.848$, $p = 0.0000$). To further establish which of these variables might cause a multicollinearity problem in the regression model, the study estimated the variance inflation factor (VIF) for each of the independent variables shown in the table 4.2.1b below.

Table 4.2.1b. Variance Inflation Factor for Model Variables

	VIF	1/VIF
Distance	9.275	.108
EAC	4.612	.217
Infrastructure UG	4.421	.226
GDP UG	3.93	.254
GDP Part	3.728	.268
InstitQuality UG	2.347	.426
InstitQuality Part	2.108	.474
Landlocked	1.523	.657
Exchange Vol	1.477	.677
Foreign	1.2	.834
Investment		
Mean VIF	3.462	.

Source(s): Own Analysis

From the table above, all VIF values are less than 10 which suggests that the model would not suffer from the econometric problem of multicollinearity even if there was some borderline pairwise correlation as shown in table 4.2.1a. This conclusion is consistent with among other scholars, Kumar (2014); Mbabazize *et al.*, (2020) and Olyanga *et al.*, (2022).

4.2.2 Stationarity Test on Model Variables

The study conducted stationarity tests on model variables, using the fisher type panel unit root test, to ascertain the level of integration of the variables. The results are shown in Table 4.2.2.

Table 4.2.2 Fisher Panel Unit Root Test results.

	Variable in Levels	Variable in First Difference
Export	90.3793 (0.0004) ***	-
GDP_Part	126.4117 (0.0000) ***	-
GDP UG	87.2579 (0.0009) ***	-
Foreign_Investment	216.6782 (0.0000) ***	-
Infrastructure_UG	20.1533 (0.9999)	96.3028 (0.0001) ***
InstitQuality_UG	50.8297 (0.4407)	82.3235 (0.0027) ***
InstitQuality_Part	101.3507 (0.0000) ***	-
Exchange_Vol	139.5474 (0.0000) ***	-

Source(s): Own Analysis. *** $p < .01$

The panel unit root results in table 4.2.2 show that “Export”, “GDP_Part”, “GDP_UG”, “Foreign_Investment”, “InstitQuality_Part” and Exchange_Vol have p-values less than 0.05 which means that they are stationary (null hypothesis of unit root rejected) in levels, suggesting that they are integrated of order zero. “InstitQuality_UG” and “Infrastructure_UG,” on the other hand have p-values greater than 0.05 which would suggest they are not stationary. First differencing on the non-stationary variables resulted into them becoming stationary which indicates that they are integrated of order one 1(1) thus the study concluded that the model variables were 1(1) variables. The panel unit root test was not applied to dummy variables because they are fixed and time unresponsive.

4.2.3 Co-Integration Test

Having noted that there are 2 non-stationary regressors in the model, a co-integration test was necessary. The Kao test was applied to test for co-integration because it can include more than seven variables which is not the case for other tests like Pedroni and Westerlund.

Table 4.2.3 Kao Co-Integration Test results

Unadjusted Dickey–Fuller t-statistic	p-value
-3.1797	0.0007

Source(s): Own Analysis

The Unadjusted ADF t-statistic of the Kao co-integration test, as shown in Table 4.2.3, rejects the null hypothesis of no co-integration at 1 percent level of significance. The co-integration test results therefore suggest that there is sufficient evidence of presence of long run equilibrium relationships between Export Growth (Export) and its determinants as conceptualized by this study.

4.2.4 Test for Heteroscedasticity

The study tested for heteroscedasticity by calculating a modified wald statistic for groupwise heteroscedasticity in the residuals of a fixed effect regression model, following Greene (2000). The test examines the null hypothesis that there is no heteroscedasticity.

Table 4.2.4 Test for Heteroscedasticity results

chi2 (25)	Prob>chi2
13706.09	0.0000

Source(s): Own Analysis

The null hypothesis is rejected implying that there is heteroscedasticity. The results imply that OLS estimation methods cannot be used to estimate the model since the results would be spurious. The fact that there is heteroscedasticity in the model is no surprise as following the works of Yotov *et al.*, (2017) who opine that the typical issues of the estimation of gravity equations are the zero trade flows and heteroscedasticity and as such one ought to be careful while choosing the estimation techniques to be used.

4.3 Gravity Model Estimation

As stated in the previous chapter, Santos Silva and Tenreyro (2006) provide poisson pseudo-maximum-likelihood (PPML) estimation as a silver bullet to solving issues of zero trade flows and heteroscedasticity and as such, this study adopted this estimation technique because the data exhibit the tendencies of zero trade values and heteroscedasticity. Table 4.3 shows the results from the PPML estimation of equation 3.4.

Table 4.3 Results from the PPML Regression

Export_Value	Coef.	St.Err.	p-value	Sig
GDP_Part	0.018	0.103	0.862	
GDP_UG	0.466	0.192	0.015	**
Distance	-1.344	0.308	0.000	***
Landlocked	-0.723	0.511	0.157	
EAC	-1.617	0.549	0.003	***
Exchange_Vol	0.095	0.167	0.569	
Foreign_Investment	0.453	0.16	0.005	***
Infrastructure_UG	1.032	0.344	0.003	***
InstitQuality_Part	1.138	0.588	0.053	*
InstitQuality_UG	0.107	0.03	0.000	***
Constant	10.609	2.227	0.000	***
<i>R-Squared 44.19</i>				

*** $p < .01$, ** $p < .05$, * $p < .1$

Source(s): Own Analysis

Results in Table 4.3 show that GDP, Distance, landlockedness, membership in the East African Community, Exchange Rate Volatility, Foreign Direct Investment, Infrastructure Quality, and Institutional Quality explain 44.19 percent of the variance in export growth (R-squared= 0.4419).

From the model estimates, I found that Exchange_Vol was found to be statistically insignificant. A 1 percent increase in FDI leads to a 0.5 percent increase in exports. A 1 percent increase in infrastructure quality of Uganda leads to 1 percent increase in exports. A 10 percent

improvement in institutional quality in Uganda leads to approximately a 1 percent improvement in exports. The variables are statistically significant at a 1 percent significance level. A 1 percent increase in GDP of Uganda would lead to a 0.5 percent increase in exports. A 1 percent increase in distance between Uganda and her trading partners leads to a 1.3 percent decrease in exports.

As a post estimation check to make sure that the estimated model was well specified, the study run a RESET test and the results are shown in table 4.4.

Table 4.4 Results from the Specification error (RESET) Test

chi2 (1)	Prob>chi2
1.65	0.1984

Source(s): Own Analysis

The null hypothesis of this test is that the model is well specified. From the results in table 4.4 I concluded that the model was well specified since I could not reject the null hypothesis because the p-value exceeds any value of statistical significance adopted by the study.

CHAPTER FIVE

DISCUSSION OF RESULTS, CONCLUSION AND POLICY RECOMMENDATIONS

5.0 Introduction

The key findings and suggestions are summed up in this chapter. The goal of this research was to identify the determinants that will most affect Uganda's export growth from 2005 to 2021. The information was analysed using descriptive statistical and econometric techniques. As a result, this section provides a synopsis of the entire dissertation and highlighted key policy suggestions.

5.1 Discussion of results

The study was crafted on four main objectives and the associated research hypotheses. The findings of the study and therefore discussed in a style of answering the research hypotheses. Additionally, findings of peripheral variables included by the study due to the model used are also discussed.

5.1.1 Effect of Bilateral Exchange Rate Volatility on export growth in Uganda.

The first objective of the study was to examine the effect of the bilateral exchange rate volatility on Export growth in Uganda. The model estimates showed that there is a statistically insignificant relationship between the bilateral exchange rate volatility and export growth in Uganda, implying that this variable might not be a very important predictor of export. The positive coefficient is in line with the apriori expectation and this could suggest that a fluid floating exchange regime where volatility is rife might be positive for international trade for firms that can use this volatility to their advantage.

The study results are consistent with findings from other related studies, for instance, Aristotelous (2001) and Tenreyro (2004) who deduce that exchange rate volatility is an insignificant determinant of international trade. However, my findings contradict the findings of other scholars on the related subject, for instance, our study results do not tally with the findings of Chowdhury (1993); Njoroge (2020); Banik and Roy (2021, who have established that bilateral exchange rate volatility has a negative and significant effect on export growth.

5.1.2 Foreign investment has an effect on export growth rate in Uganda.

The second objective was to establish the effect of foreign investment on export growth in Uganda. The model estimates showed that there is a significant effect of foreign investment in Uganda on export growth of Uganda at a 1 percent significance level. A positive coefficient

which is in line with apriori expectation implies that when foreign investments increase, exports of Uganda also grow. The relationship arises from the fact that foreign direct investment is conceptualized to be a vehicle for technological improvements which in turn could potentially lead to better quality of outputs and reduced costs of doing business.

The study results are consistent with the findings of Apalatoya (2019); Uysal and Mohamoud (2018); and Selimi *et al.* (2016). However, the study findings contradict Majeed *et al.* (2006) and Sultan (2013) who do not deduce a significant effect of foreign direct investment on exports.

5.1.3 Infrastructure Quality has an effect on export growth rate in Uganda.

The third objective was to establish the effect of Infrastructure Quality on export growth in Uganda. The model estimates showed there is a significant effect of infrastructure in Uganda on export growth of Uganda at a 1 percent significance level. A positive coefficient which is in line with apriori expectation implies that when infrastructure quality improves, exports of Uganda also grow. Good infrastructure could potentially be a way through which countries reduce costs of doing business which ultimately then impacts on export growth of the country. These findings consistent with Helble (2014); Chang *et al.* (2009) and Portugal-Perez and Wilson (2012). However, they are different from Shinyekwa and Othieno (2013); and Olyanga *et al.* (2022) who find that infrastructure is insignificant, and that infrastructure is a negative determinant respectively.

5.1.4 Institutional Quality has an effect on export growth in Uganda.

The fourth objective was to establish the effect of Institutional Quality on export growth in Uganda. Institutional quality was conceptualized to be a supply and demand side determinant of bilateral trade and as such two variables of institutional quality were computed namely, InstitQuality_Part to denote the institutional quality of Uganda's trading partners and InstitQuality_UG to denote the institutional quality of Uganda. The model estimates showed there is a significant effect of institutional quality in of both Uganda and her trading partners on export growth of Uganda at a 1 percent significance level for Uganda and 5 percent significance level, respectively. A positive coefficient for both variables representing institutional quality for Uganda and her trading partners which is in line with apriori expectation implies that as the institutional quality of Uganda and her trading partners improve, exports of Uganda also grow.

A higher quality institutional structure lessens worries about the reliability of contract enforcement and macroeconomic management. As a result, transaction costs go down in two ways: first, because property is safer, and second, because people are more likely to trust each other during financial dealings. The findings of this study with respect to institutional quality are consistent with Apalatoya (2019); Braha *et al.*, (2016) and Taye (2009).

5.1.5 Gravity Model Variables and Augmented Dummies on export growth in Uganda.

In the view that the gravity model of trade was the chosen conduit for this study, control variables associated with the model were also included; namely GDP of Uganda and the partner countries, distance between Uganda and her trading partners and EAC membership.

The Gross Domestic Product of Uganda was found to be a statistically significant determinant of export growth in Uganda. A positive coefficient which is in line with apriori expectation implies that when Uganda's GDP increases, exports of Uganda also grow. These findings are consistent with Bergstrand (1985); Chan and Au (2007); Cline (2014); Jordaan and Eita (2011); Karamuriro and Karukuza (2015) and Olyanga *et al.* (2022). A higher GDP means a higher production capacity which in turn translates into the ability of the economy to export more (supply side). However, the GDP of trading partners was found to be statistically insignificant determinant of Uganda's export growth, although still the positive coefficient is in line with apriori expectation.

The study conceptualized distance and being landlocked to be trade costs. From the model estimation the distance variable indicates that distance has a significant negative effect on Uganda's exports at a 1 percent significance level. This outcome conforms to apriori expectation that transport cost adversely influences trade. Furthermore, the outcome on distance supports the results of among others; Braha *et al.* (2016), Karamuriro and Karukuza (2015), Shinyekwa and Othieno (2013), but contradicts the findings of Jordaan and Eita (2011) and Olyanga *et al.* (2022) who deduce distance to be an insignificant determinant of exports.

However, being landlocked was not determined by the study to be a significant determinant of export growth although still the negative coefficient is in line with apriori expectation validating the argument that landlocked importer countries have less demand for imports due the fact that landlockedness increases transportation cost relative to non-landlocked or coastal countries.

Membership in the East African Community was found to be a negative and significant determinant of export growth in Uganda at 1 percent significance level. The negative

coefficient was surprisingly contrary to apriori expectation. These results are a divergence from findings of Karamuriro and Karukuza (2015); and Shinyekwa and Othieno (2013). A negative coefficient associated with a regional trading agreement is divergence from general economic theory but a plausible explanation for this is the shift from tariff measures to non-tariff measures of protectionism by various countries. Recent examples like South Sudan rejecting maize imports from Uganda, Kenya banning dairy products from Uganda, Rwanda shutting her border with Uganda among others; among might lend to the discourse that non-tariff measures might be a key barrier to trade within the East African Community.

5.2 Conclusions

The study had five key objectives that looked at how bilateral exchange rate volatility, foreign investment, infrastructure quality, institutional quality and GDP and distance affected export growth in Uganda. From the results of the model estimated; it was found that bilateral exchange rate volatility, infrastructure quality, institutional quality and GDP all had a positive effect. And conversely, distance had a negative effect on export growth in Uganda.

5.3 Policy Recommendations

Based on the estimates obtained from the PPML regression of the specified model in equation 3.4 of this study, the following recommendations are suggested.

The study recommends that policymakers need to boost inbound FDI by offering additional incentives to foreign enterprises and adopting other relevant policies and reforms that would attract foreign firms with a bias on those that would help spur Uganda's exports. Foreign direct investment should be targeted at companies with an export focus through value addition.

The study recommends that Uganda updates systems that facilitate transportation and communication between Uganda and her business partners. More investments should be geared to improving the railway infrastructure, telephone network connectivity to reduce shipping and international business costs.

This study's results provide support for the argument that governments should spend efforts strengthening their institutions and ensuring that they are applied fairly because it would then impact on the export potential of a country since traders would be confident of the business environment. Further funding of institutions like the Uganda National Bureau of Standards to get up to date equipment would ensure enforcement of quality standards which would ultimately spur Uganda's export growth.

The study recommends that policies that lead to a remarkable growth of Uganda and her trading partner's economy should be enhanced so that GDP of Uganda will increase. Policies such as tax holidays for exporters of key commodities, deregulation, and the expansion of government expenditure through the provision of improved education and infrastructure could help expand GDP growth, hence, propel export growth in Uganda.

The study recommends that the significance of being in the East African Community be reviewed by policy makers of Uganda because the benefits of being in the EAC might be undermined by non-tariff barriers to trade. Policy formulation with respect to trade among countries in the EAC should ensure that any potential non-tariff barriers to trade are removed.

5.4 Limitations to the study and Suggested Areas for further research.

The study has some limitations and therefore opens to more areas for further research as elucidated below.

First, the study aggregates all exports of Uganda even though there are a few outstanding commodities like gold, coffee and other agriculture products that contribute the largest share of Uganda's exports. Further studies could potentially explore the possibility of focussing on commodities that Uganda exports most. Furthermore, in using disaggregated export information, researchers could potentially pull in sector specific variables like non-tariff barriers which from review of recent literature are a mainstay of how countries currently protect their local industries.

Second, the study focussed on export growth of Uganda and so further research can be done in other developing countries to confirm results from this study especially with respect to exchange rate volatility and institutional quality.

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Annex 1: Countries Included in the Study and Rank of Importance in terms of Valuation of Exports between 2005 and 2021.

Country Name	Rank
United Arab Emirates	1
Kenya	2
Congo, Dem. Rep.	3
Rwanda	5
Netherlands	6
Italy	7
Germany	8
Sudan	9
Switzerland	10
Belgium	11
Tanzania	12
Burundi	13
United States	14
United Kingdom	15
Spain	16
China	17
Hong Kong, China	18
India	19
Singapore	20
France	21
Turkey	22

Source(s): Own Analysis

** South Sudan was excluded from the analysis because there was no data for many of the variables used in the study.