



**SCHOOL OF
ECONOMICS AND
MANAGEMENT**

Beyond Distance: Understanding the Trade Disadvantage of the Sub-Saharan African Landlocked Countries

Author: Mai Ahrne Bojang

Lund University - Department of Economics

Bachelor thesis - NEKH03

May 2023

Supervisor: Maria Persson

Abstract

This paper analyses the magnitude of exports of the landlocked countries of Sub-Saharan Africa to the European Union and attempts to find an explanation for the low trade flows of the region. Understanding the cause of the limited trade of landlocked countries in the region is important to enable successful implementation of trade enhancing policies and reforms. The study first estimates the magnitude of the exports of landlocked countries compared with the coastal economies in the region. Secondly, the study estimates the effects of two of the most commonly explained reasons for the limitations for the trade of landlocked countries, the distance to ports and the time it takes to complete the border measures needed when accessing a foreign countries territory for accessing seaborne trade. A log-linearised Gravity model is used for the estimation during two different time frames for the respective regressions 2000-2018 and 2015-2018. The results of the study found that the landlocked countries of the region exported 53.7 percent less to the European Union than the countries with coastal location. The impact of the variables relating to the distance to ports and the time it takes to complete border measures remains unanswered in the study due to a lack of significant results.

Key words: Landlocked, Gravity model, Sub-Saharan Africa, European Union, International trade

Abbreviations

CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
CERDI	Centre d'Etudes et de Recherches sur le Développement International
CIF	Cost, Insurance and Freight
EBA	Everything But Arms
EPA	Economic Partnership Agreement
EU	European Union
FOB	Free on Board
GSP	General Scheme of Preference
LLDC	Landlocked Developing Country
OLS	Ordinary Least Squares
PPML	Poisson Pseudo-Maximum Likelihood
SSA	Sub Saharan Africa
UN	United Nations
WTO	World Trade Organization

Table of contents

- 1. Introduction 4
- 2. The trade of the SSA landlocked countries 6
 - 2.1 The trade issues of the landlocked countries of SSA 7
 - 2.2 The trading relationship between the EU and Africa 8
- 3. The economics of being landlocked..... 10
- 4. Previous Research 12
- 5. Empirical strategy 14
 - 5.1 Regression model..... 14
 - 5.2 Estimation issues..... 17
 - 5.3 Data..... 19
- 6. Empirical Results 21
- 7. Conclusions 24
- 8. References 26

1. Introduction

Trade is one of the fundamental components of economic growth and poverty reduction (Hayashikawa, 2009, p. 3). No country has managed to both achieve and sustain economic growth without seizing the opportunities offered by open world markets (Hayashikawa, 2009, p. 10). However, many nations of the world have not yet managed to realise the benefits of trade, some of the worst-off countries regarding trade are landlocked developing countries. The level of development in these countries is on average about 20 percent lower than it would have been if they were not landlocked (United Nations, 2023a). Sub-Saharan Africa is a region with 16 landlocked countries, 13 of them are among the least developed countries (World Bank, 2023a) while the remaining three are considered developing countries (United Nations, 2023c).

The reasoning for why being a landlocked country can have negative implications regarding trade has its foundation in the lack of domestic access to ports. The majority of international freight is delivered through sea transport (World Trade Organisation, 2020, p. 48). Sea transport is significantly cheaper than other transport modes, it is typically 6-7 times less costly than road transport and 12-16 times less costly than air freight. (World Bank, 2009). In the Sub-Saharan African region goods need to pass through long distances of land transport to access ports, which is not only costly but time consuming due to the lacking transport infrastructure in the region (World Bank, 2022). Further, for landlocked countries to access the cost-effective sea transport they need access neighbouring transit countries territory. Accessing an additional countries territory means dealing with additional border measures, which in the Sub-Saharan African region takes time and is related to high costs. A case study from the World Bank's doing business project concluded that the estimated time it takes for an exported goods to pass a border in Sub-Saharan Africa is 97 hours, which is the highest average score of all regions in the world. It is nearly the double amount of time it takes in The Middle East, North Africa, South Asia, Latin America, and the Caribbean. At the same time, the time to cross a border in Europe and Central Asia is over six times as short (Doing business archive, 2019). The costs created by the long transport routes along with the need to pass a border to access maritime transport erodes the landlocked countries international competitiveness (United Nations, 2023a).

Previous studies have already determined the trade disadvantage of landlocked countries and estimated the impact of variables such as the level of infrastructure and comparing the transport costs of landlocked countries with maritime countries (Raballand, 2003; Limão Venables, 2001; MacKellar, Wörgötter and Würz, 2000). However, no study was found that specifically estimated the case of the SSA landlocked countries. This will be the focus of this study, along with an estimation of the impact on trade of the two main distinctions of landlocked countries compared to countries with coastal locations; their distance to ports and their need to pass a border to access seaborne transport.

The study will investigate the trade disadvantage of landlocked countries in the SSA region through two questions regarding their trade with one of the region's biggest trading partners, the European Union (European Union, 2022). Firstly, the study will investigate whether the landlocked countries face a trade disadvantage by answering the question: *Do the Landlocked countries of SSA export less to the EU than the maritime countries of the region?* This is essentially a replication of studies in previous literature on landlockedness under the specific circumstances of the SSA exports to the EU to the reassure that the disadvantage exist in the region. Secondly the study will investigate the cause of the assumed less exports of landlocked countries by estimating the effects of two of the most common explanations for the trade disadvantage of landlocked countries. This will be done by answering the question: *Is the disadvantage due to time consuming border measures or the distance to ports?* Understanding the level of impact of these two variables have on the trade of landlocked countries is of high importance when determining which areas to prioritize when facilitating the trade of the countries.

The study specifically focuses on the SSA region due to the many landlocked countries along with the economic situation of the region. Of the 46 countries of the world that are considered the least developed, 33 of them are situated in SSA (United Nations, 2023c). Being a landlocked country in a region which already is suffering from poverty and economic vulnerability constitute an additional layer of issues. Thus, the landlocked countries of SSA would profoundly benefit from the economic growth trade could bring. Although, for their hinders of trade to be resolved they need to firstly be understood.

The analysis is done with a gravity model, which is a standard analytical framework used to estimate international trade flows. The result of the analysis indicates that the landlocked

countries export as much as 53.7 percent less to the EU than the countries of the region with coastal locations. Which displays the grave trade disadvantage of the landlocked countries in SSA and the need for trade facilitation. However, the second question of the study, the reason for the lack of exports, remains unanswered due to the lack of significant results. One of the assumed reasons for the inability to produce significant results is due to the small sample of only four years in the second regression which was caused by limited data on the time it takes to comply with border measures.

The disposition of the text is as follows. Firstly, the background section provides a deeper understanding of the trade issues of the landlocked countries of SSA as well as an overview of their trading relationship with the EU. Secondly the economic theory on the disadvantage of the landlocked countries is presented. The following section consist of an overview over similar research on the trade of landlocked countries. Further the empirical strategy with the two regression models is outlined, leading to the empirical analysis where the result of the analysis is presented. While the last section provides the final conclusions of the study.

2. The trade of the SSA landlocked countries

A landlocked nation is defined as an independent nation without direct access to an ocean (Costa, 2022). To not have domestic access to ports implicates issues for seaborne trade due to longer transport routes to access ports. However, the most important distinction of a landlocked nation compared to coastal nations is the need to cross a border and transit through another economy to access ports. As Faye, McArthur, Sachs and Snow concludes (2004, pp. 31-32), when they draw a comparison between landlocked countries and regions far from ports in large maritime countries, with as far or further distances to the coast as many landlocked nations.

Of the 44 landlocked countries of the world (Costa, 2022), 16 are situated in the SSA region. The full list of countries consist of Botswana, Burkina Faso, Burundi, Central African Republic, Chad, Eswatini, Ethiopia, Lesotho, Malawi, Mali, Niger, Rwanda, South Sudan, Uganda, Zambia and Zimbabwe (United Nations, 2023b).

2.1 The trade issues of the landlocked countries of SSA

The 16 landlocked countries of Sub-Saharan Africa are all considered developing countries (United Nations, 2023a) while 13 of them are among the least developed countries (World Bank, 2023a). All of them are therefore defined as LLDC's, Landlocked developing countries. The low development of LLDC's globally can partially be understood by their geographic location. The long transports routes needed to access seaborne transport is time consuming and creates large costs, especially in developing areas with poor transport infrastructure. On average, LLDC's, pay almost the double amount on transport and insurance services than the average for developing countries, and close to three times more than the average of developed countries (United Nations, 2023a).

Further the need to access another countries territory for seaborne trade creates a dependence on the efficiency of the trade procedures and infrastructure of their transit neighbours. Which in the case of LLDC's, whom often neighbour other developing countries, creates large costs and is time consuming (United Nations, 2023a). Faye, McArthur, Sachs, and Snow (2004, pp. 40-43) define four types of dependencies landlocked nations face in relation to their transit neighbours in the paper *The Challenges Facing Landlocked Developing Countries*. Firstly, they depend on what has already been mentioned, infrastructure. Secondly, they depend on their political relationships, thirdly the stability of the transit country and lastly their administrative practices. These dependencies lead to twice the requirements for efficient trade for landlocked nations, compared to maritime countries, since the same requirements are necessary for themselves.

The heightened dependency landlocked countries face on transport infrastructure and efficient border measures, both domestically and of their transit neighbours, is of high concern in the SSA region. In many parts of the continent the quality of the roads does not meet the international standards and many highways have unwarranted checkpoints causing delays (Buvik and Takele, 2019, pp. 8-9). The World Bank has compiled data for the trade logistics of the world, including the SSA region. They analysed components such as quality of logistics services, the ease of arranging competitively priced shipments, the frequency of shipment delays, the quality of trade and transport related infrastructure, the ability to trace consignments, and the efficiency of the customs clearance. In 2018, the 44 SSA countries included in the survey in general performed low. The lowest performance was found in the efficiency of the customs clearance process and the trade and transport related infrastructure such as railways,

roads, ports, warehouses, and intermodal facilities (World Bank, 2022). Both these factors are crucial for the ability of the landlocked countries in the regions to access maritime transport.

The poor performance regarding the customs clearance and border management of Africa can be attributed to many reasons, such as burdened bureaucratic procedures, lack of efficient communication between agencies, corruption, inefficient transparency and inadequate cooperation regionally (Buvik and Takele, 2019, p.9).

A comparison with some of the worlds developed landlocked nations reveals further difficulties for the LLDC's. Compared to the landlocked countries of Europe, LLDC's lack the proximity of large developed countries and major world markets and little trade occurs with their neighbours (United Nations, 2023a). Only a share of 16,6% of total African exports in 2017 was intra-African, compared to Europe where intra-European trade amounted to 68,1% the same year (United Nations Conference on Trade and Development, 2019). In addition, the European landlocked nations, on average face relatively shorter distances to ports than average for LLDC's globally (United Nations, 2023a). Which shows how being a landlocked country in the SSA region means facing numerous of additional hindrances compared to other regions in the world.

The relevancy of addressing the challenges for trade of landlocked nations naturally stems from the need of seaborne transport. Maritime traffic is indeed the main mode of transport for trade, globally accounting to 57 percent in 2019 (World Trade Organisation, 2020, p. 48). However, there are countries that rely heavily on other modes of transport in the SSA region. For example, one of the landlocked nations, Botswana, exported 87,0 percent of total exports by airborne transport in December 2022 while road and rail transport accounted to 12,3 and 0,7 percent respectively (Statistics Botswana, 2022, p.7). This can be explained by their largest export goods being diamonds, and gold being one of their other main exporting products (World Integrated Trade Solution, 2023). It is important to acknowledge in this study that the challenges created by landlockedness heavily depends on the mode of transport for and type of export goods.

2.2 The trading relationship between the EU and Africa

The EU is the second biggest trading partner of the Sub-Saharan African region, after China, and the biggest trading partner for the entire African continent. The entirety of Africa exported

close to 28% of its total exports to the EU (European Commission, 2021). The main goods Africa exports to the EU is presented below in graph 2.1.

Table 2.1 African Exports to the EU

Type of commodity	Commodity share of African exports to the EU (percent)
Raw materials	49
Manufactured products	35
Food and beverages	16

Source: European Commission, 2021

All of the countries of the SSA region, except Gabon, benefit from preferential market access to the EU (European Commission, 2018). The main type of preference used by the European Union is the General Scheme of Preference, GSP (European Commission, 2022a). This is a three-tiered system of preferences towards the least developed countries and lower to middle income countries and dates back to 1971. The benefits range from complete tariff and duty-free export access to duty suspensions in different degrees (GSP hub, 2023). Other than the GSP the EU have implemented Economic Partnership Agreements with countries in the SSA region. The EPA’s are bilaterally but asymmetrically constructed. The African partner countries benefit from completely tariff and duty-free access to the EU. Moreover, the African countries benefit from long transition periods to open their markets and often only have to open them partially (European Commission, 2022b).

Even though these agreements exist it is hard for many of the landlocked countries in SSA to truly benefit from the agreements. Of the 16 SSA landlocked countries 13 are considered to be among the least developed countries. The least developed countries are on average relatively slow when it comes to the implementation of agreements and their ability to reap the benefits of the agreements is low (United Nations Conference on Trade and Development, 2021, p. 179). While the fact that they are landlocked creates additional obstacles for trade and consequently to take advantage of the agreements.

3. The economics of being landlocked

The need to pass a border to access seaborne trade creates costs for landlocked countries. Persson (2012) simply divides these transaction costs, related to passing borders, into direct and indirect costs. The direct costs contain the costs related to complying with border measures and the costs created by trade related services. For an exporting trader to pass a border they first need to access information about the procedures needed for entering the foreign market. Thereafter they need to submit the correct information and documents. The less efficient these procedures are, the more time they take to comply with and thus the higher costs they create (Persson, 2012, pp-14-15). For landlocked countries these procedures may occur both when entering their transit neighbour and their destination market. Therefore, they run the risk of facing a doubled cost compared with maritime countries.

The indirect costs are instead a result of the delays the inefficient trade procedures can create. Time consuming border measures can incur costs caused by a depreciation of time sensitive goods value and storage. Agricultural goods run the risk of spoilage while fashion items and technology intensive products can rapidly drop in market value. The risk of delays might create the need for companies to increase their safety margin, which creates costs. The delays can even risk the loss of business opportunities due do uncertain delivery times (Persson, 2012, pp.14-15).

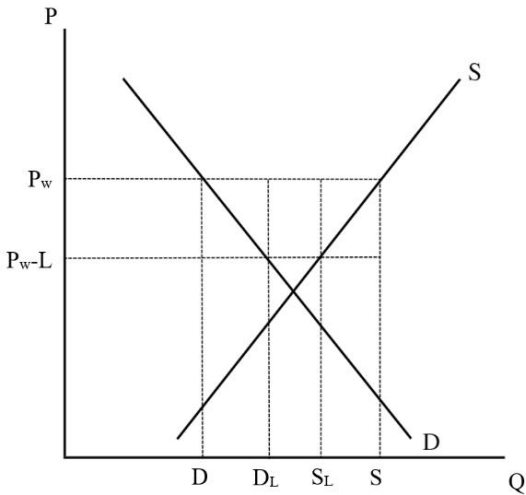
The long transport routes to access ports also create large costs for the landlocked countries of SSA. Land transport is significantly more costly than sea transport, it is typically as much as 6-7 times more costly (World Bank, 2009). The longer the distance the larger is the variable costs compiled of fuel, tyre wear and truck maintenance, personnel costs, licence fees, administrative costs (Larouche-Maltais, 2022) Additionally, the time consuming transportation may create similar effects as time consuming border procedures, such as loss of business opportunities and depreciation of the value of the goods.

MacKellar, Wörgötter and Wörz (2000) analysed how these raised costs have created special economic development issues for landlocked countries through economic theories. They conclude that through neoclassical theory it is possible to demonstrate that landlockedness can raise the price of imports and reduce the price of exports since the price-taking seller must absorb this difference in order to compete on the international market. This results in a substitution effect which leads to an increased consumption of domestic goods and a decreased consumption of imports. This will in turn reduce the surplus of the export goods which could

have been exported. While the income effect of exporting less leads to less import (MacKellar et al., 2000, p. 2). Both of these effects are displayed in the graphs below.

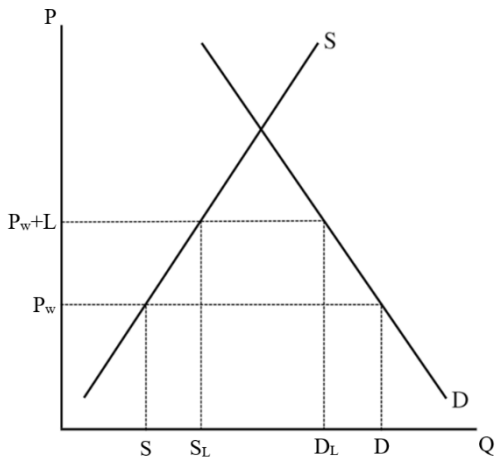
In graph 1 the effects regarding the situation of a small landlocked countries' exports are explained. The graph displays the world market. If the world market price is P_w and the extra costs for landlocked nations is L it leads to the demonstrated effects. The extra costs lead to the lower export price of $P_w - L$, for the price-taking landlocked nations. This means the landlocked nation is only able to export S_L compared to maritime nation who can export S . While the domestic demand for the export goods is higher than for maritime nations, due to the lower domestic price, displayed by D_L compared to maritime nations whom only demand D .

Graph 1



Graph 2 displays the domestic market in a small landlocked nation. If the world price is P_w for an import goods, the extra costs for landlocked nations leads to the domestic price $P_w + L$, which lead to the lower demand of D_L of the import goods compared to non-landlocked nations who can consume for the price P_w and thus can import the higher amount D . While the domestic supply of the import goods is higher, at S_L , than for maritime nations who only need to supply S .

Graph 2



In conclusion, the domestic production of the export goods decreases while the domestic production of the import goods increases. At the same time the domestic consumption of the export goods increases and the consumption of the import goods decreases. This inefficient import and export substitution effects means landlocked countries might not be able to exploit the beneficial exporting opportunities they would have had, if not for the increased costs caused by their geographical location, by exporting by an international comparative advantage (MacKellar et al., 2000, p. 2).

Endogenous growth theory and new trade theory offers another explanation for why landlocked countries might be at a disadvantage in the long term. Since the changed composition of output, explained by the neoclassical model, can lead to effects of the relative prices and an endogenized comparative advantage. In these theories learning by doing externalities at sectorial level increases these effects. By reducing the level of trade, it prevents the comparative advantage to evolve, which keeps the landlocked countries at a low-level equilibrium. Alternatively, the lack of external competition could reduce the growth related to entrepreneurial talent (MacKellar et al. 2000 p. 3-4).

4. Previous Research

There has been a lot of research of the trade barriers facing landlocked countries, and all the research that has been found confirm the trade disadvantage of landlocked countries globally. The central Asian landlocked countries are studied by Raballand using a gravity model approach (2003). The study examines the trade costs and the impact of being landlocked for central Asian economies. Four measurements for landlockedness are used, firstly with a dummy variable, as in this study. Secondly the distance to the closest major port. Thirdly the number of borders with coastal countries and lastly the number of national borders crossed. The conclusion of the study is that trade is reduced by 80% for landlocked nations when measured with a dummy variable. They also found that the number of border crossings explains a major share of the cost of overland transport. The study also concludes that the remoteness of major markets and poor infrastructure are important factors for decreased trade (Raballand, 2003, pp. 520-532)

A second study which examines the disadvantages of landlocked countries was performed by Limão and Venables (2001). The focus of the study is the determinants of transport costs, both by geography and the level of infrastructure of the country. They distinguish landlocked countries along with countries with other geographical characteristics. In the study three tests are performed. Initially they perform a case study and estimate the cost of shipping a standard container from Baltimore. The results show that being landlocked raises costs by roughly 75% compared to the mean of non-landlocked countries. Secondly, they break down the journey to a sea and overland route which shows that the land distance has a much higher effect on the cost. An additional 1000 km by sea leads to a cost of 190 USD by sea but a cost of 1380 USD by land. When including the variable “infrastructure”, they see that inferior infrastructure leads

to higher transport costs. For coastal economies infrastructure explains 40% of the predicted cost, while the cost for landlocked economies is increased by 36%. When including the variable “infrastructure”, landlocked countries have a median transport cost that is 55% higher than the median of a non-landlocked economy. When increasing the level of the infrastructure to the 25th percentile the value drops to 41% and the improvement of the transit country cuts it to 48%, and by improving them both the value drops to 33% (Limão and Venables, 2001, pp. 452-464). This displays the dependence landlocked countries face on their transit neighbours.

The second test is an estimation using cross sectional data of the ratio of carriage, insurance, and freight (CIF) and the importing countries values of imports, to free on board (FOB). This provides a measure of transport costs for trade between each country pair, since the CIF and FOB prices are border prices. This measurement showed a median transport cost for landlocked countries that is 46% higher than the median for coastal economies. The estimation shows the median landlocked economy only trade 40% of the trade volume of an average coastal economy at the same income levels and distance (Limão and Venables, 2001, pp. 452-434).

Yang and Chang performed a case study on Burkina Faso (2015) to evaluate the factors influencing international logistics operations for African landlocked countries. By conducting a questionnaire survey on container shipping firms, they found that transportation capability, external risks, information integration, logistics infrastructure, local agents logistics capability, and national law and policy where all pivotal factors influencing the logistic of trade for African landlocked nations. The most important of these factors, according to the respondents, where the logistics capability of the local agents (Yang and Chang, 2015, p. 939).

As previously mentioned, MacKellar, Wörgötter and Wörz (2000) analysed whether landlocked countries face special economic development issues through economic theories. However, in the same study they performed a regression analysis on the economic growth on 92 developing countries from 1980-1986 with dummies included for landlocked countries. The regression confirms that landlocked countries are worse on an economic growth perspective and identifies how landlocked economies dependency on their transit neighbours make them twice as vulnerable for disruption in form of natural disasters, political unrest and violent conflicts (MacKellar, Wörgötter and Wörz, 2000, pp. 4-8).

5. Empirical strategy

This study is performed in two steps. The first estimation explores whether the landlocked nations of SSA do export less to the EU than the maritime countries of SSA. This is done by comparing the volume of exports from the landlocked nations of SSA's to the EU with the maritime nations of SSA. Secondly, the reason for the assumed relative lack of exports of the landlocked countries is estimated. The two factors included in the study is the countries distance to ports and the time it takes to comply with border measures when exporting. These are two of the most commonly used explanatory factors for the trade disadvantages of landlocked countries.

The Gravity model was used for both of these estimations. The gravity model is a commonly used analytical framework. The name is an analogy to Newton's theory of gravitation, since the assumption of the model is that the magnitude of trade is similar to the level of gravitation between planets, depending on size and proximity (Bacchetta et al., 2012, 103-104). The gravity model is able to estimate a "normal" value of trade flows, this "normal value" will in turn be compared with the actual level of trade flows. In the first regression evaluating if these trade flows are smaller than the estimated ones for landlocked countries will show if they experience a disadvantage. While the second regression is only run on the landlocked countries with added variables for the distance to ports and the time it takes to comply with border measures. By estimating if the impact of these variables, the cause of the assumed disadvantage for landlocked countries can be understood. The model is commonly estimated with Ordinary Least Squares, as will be done in this study, for this to be possible the model will be log linearised. The first regression is done within the time range of 19 years from 2000 to 2018, while the second regression is compiled of smaller range of four years, from 2015 to 2018.

5.1 Regression model

The Gravity model in its simplest form include the monetary value of exports, the GDP of each country and the distance between them (Baier and Standaert, 2020), these variables will all be included in both of the regressions of the study as the variables M_{ijt} , GDP_{it} , GDP_{jt} , and $Dist_{ij}$. Where i denotes the importing country and j the exporting country. Both regressions will also include a variable for the size of the population as the variable $Population_{it}$ and $Population_{jt}$. Lastly a range of additional dummy variables are included in both regressions. The dummy variables are meant to take other factors than size and proximity into account when estimating the level of trade and are typically included in Gravity model estimations (Bacchetta et al.,

2012, 106). The dummy variables will simply take the value one when specific conditions are met. Below you can find the first regression with included dummy variables for island nations, a common official language with the import nation, colonial history and one for whether the exporting country is landlocked. The first regression aims to explore whether the landlocked countries do trade less than the maritime countries of SSA.

Regression 1

$$\begin{aligned} \ln M_{ijt} = & \beta_1 + \beta_2 \ln GDP_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln Population_{it} + \beta_5 \ln Population_{jt} \\ & + \beta_6 \ln Distance_{ij} + \beta_7 Island_j + \beta_8 Language_{ij} + \beta_9 Colony_{ij} + \beta_{10} Landlocked_j \\ & + \varepsilon_{ijt} \end{aligned}$$

The dummy variable $Colony_{ij}$ captures whether the chosen country has had a colonial relationship post 1945 with the specific importing nation within the EU. (Conte et al., 2022, p 4). As mentioned by Baier and Standaert (2020), the tied background could have created similar institutions or more insight and understanding of the others trading procedures and thus lead to increased trade. The colonial background of many of the nations of SSA have also led to European languages being among the official languages of the chosen countries, which might influence the level of trade. Thus, the dummy variable $Language_{ij}$ is included, which captures whether the two countries share a common official language. Being an Island nation might influence trade as well, thus the dummy variable $Island_j$ is included for when the export country is an Island nation. Compared to landlocked nations Island nations do have close access to the ocean, however, all of the island nations of SSA except Madagascar are by the UN recognized as SIDS, Small Island Developing States. Which the UN describes face increased export and import costs due to their geographic remoteness from other countries and vulnerability to natural and economic shocks which can impact their economic development and ability to trade internationally (United Nations, 2023d). Lastly, the dummy variable $Landlocked$ is included, which is the main variable of interest in the first regression. Which simply captures whether the export country is landlocked and will show whether the landlocked nations do export less or more to the EU than the maritime countries of SSA.

Further time-varying fixed effects are included in both of the regressions to control for global economic effects (Bacchetta et al., 2012, p.124)

The log-linear model is simple to interpret, the parameters of the continuous variables of the equation are the elasticities. For example, the estimated parameter of the logarithm of GDP is simply the percentage change of trade of a 1 per cent increase of GDP (Bacchetta et al., 2012, p. 106). While the percentual impact of the coefficient of the dummy variable is simply calculated by using the formula $\Delta\% = (e^\beta - 1) \cdot 100$ (Halvorsen and Palmquist, 1980).

In Regression 1 the coefficients of the variables for GDP and the size of their populations are both expected to be positive, due to the gravity model assumption of larger economies trading more. Based on the second gravity model assumption, that economies further away from each other trade less, the variable for the distance between the countries is expected to be negative. While the hypothesis of the parameter of the dummy variable *Island*, is for it to have a negative effect on the trade, due to the previously explained remoteness from other large nations and economic vulnerability. The dummies *Language* and *colony* are both assumed to be positive due to the increased insight and understanding these can generate between the countries that can have a beneficial impact on trade. Lastly the variable of concern in the first regression, *Landlocked*, which parameter is expected to be negative due to the explained issues for trade such as remoteness to ports and issues related to passing an additional border for seaborne trade. A negative and significant coefficient for the variable will show a negative effect of being a landlocked country regarding the volume of exports.

The second regression will only be conducted on the landlocked nations of SSA. It aims to understand the impact the distance to ports and the customs regulations and mandatory inspections have on the level of exports to the EU. The second regression include many of the same variables as the first, with the exception of the exclusion of the variables *Landlocked_j* and *Island_j*, since all the included export countries are landlocked. Further it includes the two additional variables: *DistPorts_j* and *BorderCompliance*. The variable *DistPorts_j* is the road distance from the capital of the export country to its relevant port. While the variable *Border Compliance* measures the time it takes for the export country to complete all of the mandatory customs regulations and inspections needed when exporting. The second regression is presented below.

Regression 2

$$\begin{aligned}\ln M_{ijt} = & \beta_1 + \beta_2 \ln GDP_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln Population_{it} + \beta_5 \ln Population_{jt} \\ & + \beta_6 \ln Distance_{ij} + \beta_7 \ln Colony_j + \beta_8 \ln Language_{ij} + \beta_9 \ln DistPorts_j \\ & + \beta_{10} \ln BorderCompliance_j + \varepsilon_{ijt}\end{aligned}$$

The hypothesis of the coefficients of the variables included in the first regression as well, GDP_{it} , GDP_{jt} , $Population_{it}$, $Population_{jt}$, $Distance_{ij}$, $Language_{ij}$ and $Colony_j$, are the same as in the first regression. While the additional variables in the second regression $DistPorts_j$ and $BorderCompliance_j$ are both expected to be negative, due to them being two of the most commonly described hindrances for the trade of landlocked nations, as explained in the background section.

5.2 Estimation issues

The OLS estimator is commonly used to estimate the gravity model, however it is important to take the shortcomings of the estimator into account when applying it to the gravity model. As pointed out by Silva and Tenreyro (2006) the gravity model run the risk of contravening with the Gauss Markov assumption of homoscedastic error terms, i.e. that the errors affecting the observations are drawn from a common distribution. This is due to the likelihood of heterogeneity in the observations. Silva and Tenreyro propose the use of the pseudo-maximum-likelihood (PPML) estimation where the model is estimated in the multiplicative form, which leads to consistency even during presence of heteroscedasticity. They see that the log-linearised gravity model can create misleading results. The reason for still choosing to estimate the gravity model in its log-linearised form is due to the simplicity of the procedure and that the results are easy to interpret. The issue of heteroscedasticity will still be minimized in the study by the use of robust standard errors (Bacchetta et al., 2012, p. 107). The use of robust standard errors will also help preventing potential issues with autocorrelation.

Silva and Tenreyro (2006) also discusses the issue of zeroes in trade data when using the log linearised Gravity model. The likelihood of zero trade flows between countries is quite large, two small countries in different parts of the world might simply not trade at all in some years. The zeroes can also be a result of rounding errors or missing observations. This however creates issues when using the gravity model in the log-linearised form, while their proposed PPML

estimator provides a natural way to deal with zero values. The most common approach to deal with this is to exclude the years of zero trade. But this method will typically lead to inconsistent estimators of the parameters. Another way to solve the issue is to by adding an arbitrary small number instead of the zeroes. However, this risks yielding inconsistent estimates, since you cannot be sure it reflects the underlying expected values (Bacchetta et al., 2012, p.112). In this study the years of zero trade flows will be excluded, the motivation for this is that an inclusion of them by adding a small number is no guarantee for the reflection of the true values. This means the study would still risk yielding inconsistent estimates.

An additional possible issue with the estimation is the risk of non-inclusion of the multilateral resistance terms, MRTs, which is the barriers to trade countries face with all of their trading partners. One way of coping with this is to use a non-linear least squares method with created estimates of the price raising effects a second method is the use country fixed effects or country pair-fixed effects (Bacchetta et al., 2012, 106). Unfortunately, the aim of the study lead to the inability of the use of country pair fixed effects. Since this would lead to the variables of most importance being perfectly collinear with the fixed effects. The variables *Landlocked_j* and *DistPorts_j* would be absorbed by the fixed effects since they are time invariant.

Further, another issue is the one of endogeneity which occurs when variables are correlated with the error term due to unobserved characteristics which describes why a countries trade. This could also be partially redeemed by the use of country pair fixed effects (Bacchetta et al., 2012, p. 118). As mentioned, this will not be possible in the study due to the time invariant nature of the variables the study wishes to estimate.

The variable for the distance to harbours for the landlocked countries does not encompass the size and effectiveness of the closets harbour, which is a shortcoming of the study since it is probable that this can have an effect on the ease and volume of trade. Including the size and effectiveness would however highly complicate the study and is thus not included. Lastly some of the included countries are largely dependent on airborne transport, for example Botswana, as mentioned in the background section. The correlation between the distance to ports or the additional border compliance landlocked countries face with maritime trade is thus not relevant for the goods that can be shipped by airborne transport directly from landlocked countries. The assumption that the landlocked countries face a disadvantage due to their location is thus not justifiable for all of the countries.

5.3 Data

The majority of the data is collected from the CEPII Gravity database, specifically the data regarding the distance, common official languages, EU membership, GDP, GDP per capita and trade flows. Their data is collected from many sources, including institutions, researchers and the CEPII. The distance variable is defined as the distance between the most populated cities in of each country pair in km. The common language variable refers to if the countries share an official or primary language. The variable for past colonial history, in the database defined as col45, refers to if the countries shared a colonial background post 1945 (Conte et al. p. 4-7).

The data for distance to the closest port for the landlocked countries is collected from the CERDI-sea distance database. They identified the relevant ports through dividing the coastal countries in the area into grids of 100 square kilometres. The coastal cells with the highest number of shipping lines were then chosen as the relevant port for each coastal country. Lastly the landlocked countries were paired with the port with the minimal road distance to its capital city. The used data can be found in Table 5.1. (Bertoli et al., 2016, pp. 5-7).

Table 5.1: The distance to ports

Country	Distance to ports (km)
Botswana	947
Burkina Faso	971
Burundi	1365
Central African Republic	1273
Chad	1529
Eswatini	317
Lesotho	579
Malawi	1680
Mali	855
Niger	1016
Rwanda	1331
Uganda	1137
Zambia	1757
Zimbabwe	1301

Source: Bertoli et al., 2016

The data for border compliance is sourced from the World Banks doing business database from their Trading Across Borders data from 2019. The variable Border compliance is measured in hours and captures the time and cost associated with the regulations related to customs and other mandatory inspections when goods pass borders, such as phytosanitary inspections. The variable includes inspections by other agencies if these occur over 20% of the cases. Since the variable is only included in the regression with exclusively landlocked countries, all of these borders are land borders. The data is gathered through a questionnaire where contributors customs brokers and, freight forwarders and port authorities to estimate the time of customs clearance and inspections, including both documentary and physical

inspections. All doing business data is built on case study with a range of assumptions¹. For the landlocked countries of SSA only a time range of four years, 2015-2018, were available. Which led to the shorter time frame of the second regression (Doing Business Archive, 2023). The used data can be found in table 5.2.

Table 5.2 Time to comply with border measures, hours

Country	2015	2016	2017	2018
Botswana	8	8	8	5
Burkina Faso	75	75	75	75
Burundi	59	59	59	59
Central African Republic	141	141	141	141
Chad	106	106	106	106
Eswatini	3	3	3	2
Lesotho	4	4	4	4
Malawi	85	85	78	78
Mali	55	48	48	48
Niger	48	48	48	48
Rwanda	97	97	97	97
Uganda	85	85	71	64
Zambia	78	148	148	120
Zimbabwe	88	88	88	88

Source: Doing Business Archive, 2019

In the first regression data was used from the time frame 2000-2018. The reasoning for the chosen years is to have a long time period to include many observations. While the most recent year provided in the CEPII's Gravity database is 2019, is excluded due to many missing observations. This time frame however led to the drop of two SSA countries, South Sudan and Sudan. This is due to South Sudan becoming independent in 2011 (Conte et al., 2022, p. 12) which means there is no trade data for the country preceding this year. South Sudan was excluded from the first regression but included in the second to minimise complications. A

¹ The methodology of all trading across borders data is a case study built up on range of assumptions. Regarding the export side it is assumed that each country exports new product in a shipment of the value \$50,000. The product is defined to be the one of their largest export value and it exports to the economy who imports the most of this product. Some products are excluded from the list, these are precious metal and gems, mineral fuels, oil products, live animals, residues and waste of foods and pharmaceuticals. If these are the most exported products the second most exported one is chosen. The shipment is assumed to leave from a warehouse in the largest business city of the country and the exporting firm is assumed to pay for a customs broker or freight forwarder and the mode of transport is the one that is most used to transport the chosen product. Submissions needed by governments and agencies in connection with the shipment are all assumed to be prepared and submitted during the export process (Doing Business Archive, 2023).

third SSA country that was excluded from the study is Ethiopia. This is due to an issue with the data gathering. Due to the Eritrean independence from Ethiopia in 1993 (Conte et al., 2022, p. 12) an additional variable for the distinction between Ethiopia before and after 1993 was created in the CEPII dataset. This variable was dropped during the sorting of the data which led to Ethiopia being dropped as well.

6. Empirical Results

The results of the two regressions are displayed in *Table 6.1*. Regression 1 aims to explore whether the landlocked nations of SSA export less to the EU than the maritime Sub-Saharan African countries. For this a dummy variable, *Landlocked_j*, was used. While Regression 2 is only run on the landlocked countries of SSA. In the second regression the reason for the less exports of landlocked countries, found in the first regression, is investigated through the inclusion of two variables, one for the distance to ports, *DistPorts_j* and one for the border compliance, *BorderCompliance_j*.

Table 6.1: Empirical results

Variables	Regression 1	Regression 2
<i>ln GDP_{it}</i>	0.459*** (.000)	1.269*** (.000)
<i>ln GDP_{jt}</i>	0.436*** (.000)	0.314 (.295)
<i>ln Population_{it}</i>	1.011*** (.000)	0.145 (.624)
<i>ln Population_{jt}</i>	0.374*** (.000)	.391** (.003)
<i>ln Dist_{ij}</i>	1.721*** (.000)	2.023** (.003)
<i>ln BorderCompliance_j</i>		0.454 (.296)
<i>ln Distports_j</i>		-0,697 (.425)
<i>Island_j</i>	0.301 (.249)	
<i>Language_{ij}</i>	2.106*** (.000)	0.496 (.415)
<i>Colony_{ij}</i>	0,160 (.743)	1.351* (.060)
<i>Landlocked_j</i>	-0.711*** (.000)	
Observations:	16922	992
Time FE	Yes	Yes
Robust standard errors	Yes	Yes

p statistics in parentheses * p<0.10, ** p<0.01, *** p<0.00

Regarding the first regression, both the variables for the GDP of the importing country and the exporting country were of expected signs, showing that an increase of GDP is associated with an increase of trade. Which can be explained by the previously mentioned assumptions of the gravity model that larger markets trade more. The same applies for the parameters for the population variables, they are both of expected signs, and thus also follows the gravity model assumptions.

The coefficient of the variable Distance is not of expected sign, it surprisingly shows a positive effect on the distance between the nations and the amount of trade. It can be interpreted that if the distance increases with 1 % percent it is related to a 1,721 percentage increase of trade. This result could be an error due to the small sample. However, after consultation with the supervisor of the study, Maria Person, the result turns out to be common when estimating the SSA trade relationship with the EU with the gravity model. An explanation could be that some of the biggest import countries for the EU in SSA are geographically far from the EU, in 2022 the three biggest import nations to the EU in the region was Nigeria, South Africa and Angola (Trading Economics, 2022). Two of these countries, Angola and especially South Africa lie very far from the EU, in the southern regions of Africa. Thus, the assumption of the gravity model, that countries trade less when the further they are situated from one another, might be false for this sample.

Regarding the Dummy variable Language it shows that the African countries trade more with countries they share an official language with which is in line with the hypothesis. The coefficient of the dummy variable Colony shows an insignificant impact of colonial background and the amount of trade. Similarly, the variable Island does not show a significant relationship on the amount of trade.

The variable of the most importance of this regression is dummy variable for Landlocked countries. The variable is of expected sign and displays a negative relationship between the magnitude of exports. It shows that the Landlocked countries on average exports $(e^{-0.771} - 1) \times 100 \approx -53.7$ percent less than the average for coastal economies. This result is in line with the literature on the subject and shows the grave impact the geographical location has on landlocked countries. This confirmation of the less exports of the landlocked countries of the region confirm the need for policies and reforms to improve the trade opportunities of the landlocked countries of SSA.

Regarding the second regression the coefficient for the variable for the GDP of the importer displays a positive relationship between trade and the GDP of the importing country. While the relationship between trade and the GDP of the exporter was shown to be insignificant. The coefficient for the variable distance is, just as in the first regression, positive. It displays that an increase of the distance of one percent is expected to mean a 2 percent increase in trade. Neither of the dummy variables for former colonies or a common official language were statistically significant.

The two variables of most importance in the second regression, *BorderCompliance_j* and *DistPorts_j*, were both found to be statistically insignificant. A probable reason for the low significance of the results of the second regression is the much smaller sample over only a four-year period and the loss of data due to years of zero trade flows. This displays the need for more longitudinal data measuring the time it takes to trade to be able to estimate this issue with reliable results.

7. Conclusions

The first question the study sought to answer was: *Do the landlocked countries of SSA export less to the EU than the maritime countries of the region?* The first regression supported this statement, the landlocked countries exported on average around 53.7% less than the countries with coastal access. This finding confirms the grave disadvantage of landlocked economies in the region regarding trade.

The result regarding the lower level of exports of landlocked countries in the SSA region found in this study is similar to the global rate found by Limão and Venables (2001) in their gravity model analysis. They concluded that the global trade of landlocked countries is 40% of the median coastal economy, estimated with the same levels of income and distance. Compared to the situation in central Asian economies, found by Raballand (2003), the situation of landlocked economies in the SSA regions seems to be less grave than in these economies. Regarding central Asian landlocked economies, Raballand found that they trade 80% less than the maritime nations of the region. However, these two estimates are in regard to total trade, compared to this study which exclusively estimated the exports to a specific region, the EU. Nonetheless it gives an approximate view of the trade disadvantage of the region compared to the central Asian economies and the world.

Secondly, the study sought to estimate the impact of two of the most argued reasons for the more limited trade of landlocked countries by answering the question: *Is the disadvantage due to time consuming border measures or the distance to ports?* However, the second regression of this study was unable to find significant results regarding these two factors. The assumed reason for the lack of significant results is the small sample used in the second regression. The time frame for the second regression only consisted of a time range of four years. The time frame was chosen based on the available data for border compliance in the region. This lack of data along with the drop of the observations with zero trade flows led to a very small sample. Thus, there is still reason to believe these variables could have an effect, even if the study was

unable to detect any. Using the by Silva and Tenreyro (2006) proposed PPML estimation method would be suggested for a recreation of the study, to be able to keep the observations with zero trade flows and thus allow for a larger sample.

The lack of trade of the landlocked countries of SSA was further proved in this study, but to truly understand the trade inhibiting factors and recognise to what extent they are affecting the trade in the region further research needs to be done. The time it takes to comply with border measures is often explained as one of the reasons for the trade disadvantage but the lack of data on variable hinders research on the aspect, thus the area is not only in need of further research, but further data collection is needed as well.

Despite the lack of significant results in the second regression, the first regression demonstrates the need to facilitate the trade of the landlocked countries. Reforms and investments to facilitate intra African trade is needed for the landlocked countries to access maritime transport. Building efficient transport corridors for the landlocked countries could partially solve the issue. Thus investments such as the EU-Africa Global Gateway Package are important. This package supports the development of multi country transport infrastructure by investing in the building of strategic corridors and harmonising regulatory framework (European Commission, 2022c). Such investments are utterly important for the landlocked countries to realise their trade potential and such policies should be expanded.

Regarding the time-consuming border measures, the harmonisation of the trade procedures along with free trade agreement or even customs unions could favour the trade of landlocked countries. Since these would minimise the time-consuming and costly intra African border crossings. As seen in section 5.3 the three countries with the least time consuming border crossings are Lesotho, Eswatini and Botswana, whom all are a part of the Southern African Customs Union, SACU. These three countries can therefore pass through their neighbouring partner countries with coastal locations, Namibia, and South Africa, much more efficiently due to substantially limited trade barriers (Southern African Customs Union, 2023). The completion of the implementation of the African Continental Free Trade Area, AfCFTA, could have a similar effect and ease the international trade of landlocked countries in the region. The AfCFTA aims to eliminate trade barriers in the entire African continent, this would eliminate the issues related to crossing an intra-African border to access seaborne transport. (African Continental Free Trade Agreement, 2023) Such an agreement could hopefully minimize the time it takes to cross borders for landlocked countries, thus facilitate the trade of landlocked countries.

8. References

African Continental Free Trade Agreement. (2023). About the AfCFTA, Available online: <https://au-afcfta.org/about/> [Accessed 2023-05-18]

Arvis, J., Ojala, L., Wiederer, C., Shepard, B., Ray, A., Dairabayeva, K., and Kiiski T. (2018) Connecting to Compete 2018: Trade Logistics in the Global Economy. *The World Bank*. Available online: <https://openknowledge.worldbank.org/server/api/core/bitstreams/628a4f9d-7faa-54bf-97b0-f6080c6d46cd/content> [Accessed 2023-03-15]

Bacchetta, M., Beverelli, C., Cadot, O., Fugazza, M., Grether, J.M., Helble, M., Nicita, A., Piermartini, R. (2012). A Practical Guide to Trade Policy Analysis. *World Trade Organisation, United Nations*. Available online: https://www.wto.org/english/res_e/publications_e/wto_unctad12_e.pdf [Accessed 2023-01-22]

Baier, S., and Standaert, S. (2020). Gravity models and Empirical Trade. *Oxford Research Encyclopedia of Economics and Finance*, Available online: <https://doi.org/10.1093/acrefore/9780190625979.013.327> [Accessed 2023-01-10]

Bertoli, S., Goujon, M., and Santoni, O. (2016) The CERDI-seadistance database. *Études et Documents*, vol. 7, Available online: http://cerdi.org/production/show/id/1791/type_production_id/ [Accessed 2023-03-05]

Buvik, S., and Takele, B. (2019) The role of national trade logistics in the export trade of African countries. *Journal of Transport and Supply Chain Management*, vol. 13, Available online: <https://jtscm.co.za/index.php/JTSCM/article/view/464> [Accessed 2023-02-10]

Costa, D. (2022). Landlocked country. *Encyclopaedia Britannica*. Available online: <https://www.britannica.com/topic/landlocked-country> [Accessed 2023-03-22]

Conte, M., Cotterlaz, P., and Mayer, T. 2022. The CEPII Gravity Database. CEPII, working Paper, Available online:

http://www.cepii.fr/DATA_DOWNLOAD/gravity/doc/Gravity_documentation.pdf [Accessed 2023-02-03]

Doing business archive (2019) Trading across borders data. *The World Bank*.

Available online: <https://archive.doingbusiness.org/en/data/exploretopics/trading-across-borders> [Accessed 2023-03-01]

Doing business archive (2023) Trading across borders methodology. *The World Bank*.

Available online: <https://archive.doingbusiness.org/en/methodology/trading-across-borders> [Accessed 2023-03-16]

European Commission (2022c) EU-Africa: Global Gateway Investment Package.

Luxembourg Publication of the European Union, 2022-11-28, Available online:

https://ec.europa.eu/commission/presscorner/detail/en/fs_22_871 [Accessed 2023-05-19]

European Commission (2022a) Generalised Scheme of Preferences. Available online:

https://policy.trade.ec.europa.eu/development-and-sustainability/generalised-scheme-preferences_en [Accessed 2022-12-02]

European Commission (2018). Strengthening the EU's partnership with Africa, Available

online: https://ec.europa.eu/commission/presscorner/detail/en/fs_19_6307 [Accessed 2023-02-10]

European Commission (2022b) Economic Partnerships, Available online:

https://policy.trade.ec.europa.eu/development-and-sustainability/economic-partnerships_en [Accessed 2022-11-19]

European Commission (2021). *The European Union and Africa: Partners in Trade*. Available

online: https://trade.ec.europa.eu/doclib/docs/2022/february/tradoc_160053.pdf [Accessed 2022-11-03]

Faye, M.L., McArthur, J.W., Sachs, J.D., and Snow T. (2004). The Challenges Facing Landlocked Developing Countries. *Journal of Human Development* vol. 5 no. 1 pp. 31-68,

Available online: <https://www.tandfonline.com/doi/full/10.1080/14649880310001660201>
[Accessed 2023-02-15]

GSP hub (2023) About the EU GSP, Available online: <https://gsphub.eu/about-gsp> [Accessed 2023-01-11]

Halvorsen, R., and Palmquist, R. (1980). The Interpretation of Dummy Variables in Semilogarithmic Equations. *The American Economic Review*, vol. 70 no.3 pp. 474-475, Available online: <https://www.jstor.org/stable/1805237?seq=1> [Accessed 2023-03-10]

Hayashikawa, Masato (2009). Trading Out of Poverty: How aid for trade can help. *OECD Journal on Development*, vol. 10 no. 1, Available online: <https://www.oecd.org/dac/aft/43242586.pdf> [Accessed 2023-04-13]

Larouche-Maltais, Alexandre (2022) Why is the transit of goods so expensive in Central Africa? Why is the transit of goods so expensive in Central Africa?, *UNCTAD Transport and Trade Facilitation Newsletter* vol. 94, no. 7 June, Available online: <https://unctad.org/news/why-transit-goods-so-expensive-central-africa> [Accessed 2023-05-19]

Limão, N., and Venables, A.J. (2001). Infrastructure, Geographical Disadvantage, Transport Costs, and Trade. *World Bank Economic Review*, vol. 15 no. 3, pp. 451-479, World Bank, Washington DC. Available online: <http://hdl.handle.net/10986/17438> [Accessed 2023-03-27]

MacKellar, L., Wörgötter, A., and Wörz, J. (2000) Economic Development Problems of Landlocked Countries. *Transition Economics series 14*, Institute for Advanced Studies Available online: https://www.researchgate.net/publication/5112526_Economic_Development_Problems_of_Landlocked_Countries [2023-03-16]

McDonald, B. (2009). Back to Basics: Why Countries Trade. *Finance and development* vol. 46, no.4, Available online: <https://www.imf.org/external/pubs/ft/fandd/2009/12/basics.htm> [Accessed 2023-03-13]

Organisation for Economic Co-Operation and Development [OECD] (2005) Trade and Structural Adjustment. OECD Publishing, Paris. Available online: <https://doi.org/10.1787/9789264064591-en> [Accessed 2023-04-23]

Persson, M. (2012) From Trade Preferences to Trade Facilitation: Taking Stock of the Issues. *Economics*, vol. 6, no.1, Available online: <https://doi.org/10.5018/economics-ejournal.ja.2012-17> [Accessed 2023-04-20]

Raballand, G. (2003). Determinants of the Negative Impact of Being Landlocked on Trade: An Empirical Investigation Through the Central Asian Case. *Comparative Economic Studies* vol. 45, no. 4, pp. 520–536, Available online: <https://doi.org/10.1057/palgrave.ces.810003> [Accessed 2023-03-12]

Silva, S., and Tenreyro, S. (2006) The Log of Gravity. *The Review of Economics and Statistics*, MIT Press, vol. 88, no. 4, pp. 641-658, Available online: <https://ideas.repec.org/a/tpr/restat/v88y2006i4p641-658.html> [Accessed 2023-01-09]

Southern African Customs Union (2023) What is SACU?, Available online: <https://www.sacu.int/show.php?id=471> [Accessed 2023-05-17]

Statistics Botswana (2022). International Merchandise Trade Statistics. Available online: <https://www.statsbots.org.bw/sites/default/files/publications/IMTS%20December%202022.pdf> [Accessed 2023-04-02]

Trading Economics (2022). European Union Imports By Country. Available online: <https://tradingeconomics.com/european-union/imports-by-country> [Accessed 2023-02-11]

United Nations.(2023a) *About Landlocked Developing Countries*. Available online: <https://www.un.org/ohrlls/content/about-landlocked-developing-countries> [Accessed 2023-01-12]

United Nations (2023d) About Small Island Developing States. Available online:

<https://www.un.org/ohrlls/content/about-small-island-developing-states> [Accessed 2023-03-02]

United Nations. (2023b). List of LLDCs. Available online:
<https://www.un.org/ohrlls/content/list-lllcs> [Accessed 2023-01-12]

United Nations (2023c) List of least developed countries. Available online:
<https://unctad.org/topic/least-developed-countries/list> [Accessed 2023-01-22]

United Nations Conference on Trade and Development. (2019). Economic Development in Africa Report 2019. United Nations Publications. Available online:
<https://unctad.org/publication/economic-development-africa-report-2019> [Accessed 2023-03-08]

United Nations Conference on Trade and Development. (2021). Economic Development in Africa Report 2021. *United Nations Publications*. Available online:
https://unctad.org/system/files/official-document/aldcafrica2021_en.pdf [Accessed 2023-03-10]

United Nations Conference on Trade and Development. (2022). Economic Development in Africa Report 2022. *United Nations Publications*. Available online:
https://unctad.org/system/files/official-document/aldcafrica2022_en.pdf [Accessed 2023-03-14]

United States Institute of Peace (2023). Independence of South Sudan.
<https://www.usip.org/programs/independence-south-sudan> [Accessed: 2023-02-16]

World Bank (2009) Air Freight: A Market Study with Implications for Landlocked Countries. Available online: <https://www.worldbank.org/en/topic/transport/publication/air-freight-study> [Accessed 2023-03-19]

World Bank (2023b.) Data: Sub-Saharan Africa. Available online:
<https://data.worldbank.org/country/ZG> [Accessed 2023-04-01]

World Bank (2023a) Least developed countries: UN classification. Available online:

<https://data.worldbank.org/country/XL> [Accessed 2023-02-07]

World Bank (2022) Logistics performance index: Overall (1=low to 5=high) - Sub-Saharan Africa. Available online:

<https://data.worldbank.org/indicator/LP.LPI.OVRL.XQ?locations=ZG> [Accessed 2022-03-01]

World Integrated Trade solution (2023). Botswana trade. *World bank*. Available online:

<https://wits.worldbank.org/CountrySnapshot/en/BWA/textview> [Accessed 2023-02-14]

World Integrated Trade Solution (2020a) Sub-Saharan Africa Trade Summary 2020 Data.

World bank. Available online:

<https://wits.worldbank.org/CountryProfile/en/Country/SSF/Year/2020/Summary> [Accessed 2023-02-14]

World Trade Organisation (2020). World Trade Statistical Review 2020.

Available online: <https://doi.org/10.30875/0a4fef8-en>

Yang, C., and Chang, Y. (2019) Crucial factors influencing international logistics operations for African landlocked countries – A case study of Burkina Faso. *Maritime Policy and Management*, vol. 45 no. 8 pp. 939-956, Available online:

<https://www.tandfonline.com/doi/epdf/10.1080/03088839.2019.1606464?needAccess=true&role=button> [Accessed 2023-05-22]