



# LUND UNIVERSITY

## School of Economics and Management

### **TRADE FACILITATION AND LANDLOCKED COUNTRIES:**

#### **Does trade facilitation have an effect on landlocked countries?**

#### **Abstract:**

This paper presents a stepping stone into analyzing the effect that border barriers associated with trade facilitation have on landlocked developing countries. Using the ‘time taken to import’ as the main trade facilitation indicator, simulations show a negative effect between trade facilitation and landlocked countries. The results suggest that when it comes to landlocked countries, trade decreases by 0.19 percent for a 1 percent increase in the time delays. Understanding this effect offers important insights into how landlocked countries can increase trade by negotiating better trade deals that are focused towards improving trade facilitation with their trading partners, despite their asymmetric geographical differences.

**Keywords:** Trade Facilitation, Landlocked countries, Import procedures .

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Author: Christabel Ariekot

Supervisor: Maria Persson

## **CHAPTER 1: INTRODUCTION**

In the recent years, Regional and Bilateral Trade Agreements have been initiated to promote trade between countries and regions. However, landlocked developing countries find themselves at a disadvantage even after entering into Regional Trade Agreements due to the still existing customs and administrative barriers which not only diminish the importance of having trade partnerships, but also have potential negative effects on welfare. The existence of red tape means that countries are still unable to freely transport goods and services from one point to another across borders due to the delays, and high transaction costs involved.

This paper examines the impact that trade facilitation has on trade for landlocked countries by analyzing the effect that time delays have on imports of landlocked developing countries. Using the gravity model this study explores the relationship between trade, trade facilitation and being landlocked, and more importantly examines whether border barriers associated with trade facilitation have a stronger negative effect for landlocked countries than for non-landlocked countries. The sample includes countries from Sub-Saharan Africa comprising of all the countries in Africa except Northern African countries (Algeria, Egypt, Libya, Morocco, and Tunisia) Djibouti, Mauritania and South Africa.

The results from this study suggest that time delays are associated with a 0.19% decrease in imports for landlocked countries. This is not a surprising result because as expected, the time required to comply with import procedures increases trade costs and this lowers trade flows between countries. What this study however tries to show with the results is that as much as time delays affect trade imports, the effect is even much higher for landlocked countries.

In spite of the great number of studies that have been done concerning trade facilitation, this paper puts forward a stepping stone into a combined study of both trade facilitation and being landlocked, and what the effects on trade could be if landlocked countries engaged and negotiated a reduction of the time involved in import procedures with their trading partners.

The rest of the paper is structured as follows: Chapter 2 introduces trade facilitation, its reforms, and measures. The effects of trade facilitation on trade and even more particularly on landlocked countries are then discussed. Chapter 3 discusses the theoretical mechanism of how a lack of trade facilitation increases trade costs. In chapter 4, previous research on trade

facilitation and the costs of being landlocked are presents. Chapters 5 and 6 are the empirical part of the paper, starting first with presenting the empirical strategy, model, estimation issues and data. The results from this empirical work are then presented in chapter 6, as well as limitations and caveats to consider. Chapter 7 then concludes the paper.

## **CHAPTER 2: BACKGROUND**

### **2.1 Definition of Trade Facilitation**

There is a degree of uncertainty around the precise definition of trade facilitation. The term generally refers to measures aimed at reducing trade costs by easing the movement of goods across borders. The most commonly used definition is the one by the WTO Trade Report (2015) where they define trade facilitation as ‘the simplification and harmonization of international trade procedures.’ Here, International trade procedures are the ‘activities, practices and formalities involved in collecting, presenting, communicating and processing data required for the movement of goods in international trade.’ Similarly, the Doha Ministerial Declaration (WTO, 2001) formally refers to trade facilitation as ‘expediting the movement, release and clearance of goods, including goods in transit.’ This terminology resonates with the one given by Persson (2013), where she loosely defines trade facilitation as ‘reforms aimed at making it easier for traders to move goods across borders, with specific focus on lowering transaction costs associated with cross-border trade procedures.

Various authors such as Wilson, Mann and Otuski (2003) , Shepherd and Wilson (2009) and Milner, Morrissey, Zgovu (2008) have defined trade facilitation in much broader perspectives, including aspects such as streamlined and transparent regulatory environment, administrative procedures, customs formalities, competition policy, and technical barriers to trade. They move the focus from just behind the border practices to domestic policies and institutional structures, where capacity building plays a role. Although more simplified, the Organization for Economic Co-operation and Development (2016) includes dimensions such as product testing and impediments to labour mobility into its definition of trade facilitation.

In this paper trade facilitation is narrowly defined as the ease of movement of goods from one country to another, focusing on the challenges that landlocked countries face when engaging in International trade. The measure that is used is taken from the World Bank Doing Business

Database, which measures the time that it takes to import goods from one country to another, and this is estimated using days.

As earlier discussed, the major hindrances to trade for landlocked countries have mainly been as a result of poor domestic and transit infrastructure (Limao and Venables (1999), Raballand (2002), Carrere and Grigoriou (2008), Christ and Ferrantino (2011)), border crossing obstacles such as direct costs of transit, conflict with transit country, a lack of transparency, administrative issues and long waiting times at the crossing border (Faye, Mcarthur et al. (2004), Freund and Nadia (2011)). Although hardly ever mentioned, limited transit corridors, corruption and poor port facilities have also posed as major difficulties. The goal of trade facilitation is to provide the necessary reforms that would enable countries to smoothly trade on the International market and to address these challenges in a manner that encourages transparency, harmonization, standardization, and simplification of trade procedures (The Swedish National Board of trade, 2008).

## **2.2 Trade Facilitation reforms**

Before examining trade facilitation measures, it's important to shed light on some reforms that could be applied practically by all countries. Persson (2013) recommends that documentation requirements such as laws, procedures and other rules are published and made available to traders before they come into force, complemented by the use of information technology to ease the supply and availability of information to traders. It is also necessary to have proper training of management and staff which could greatly contribute to efficiency and productivity of customs officials. Increasing the degree of cooperation and communication between these officials and the different government agencies could encourage better coordination and, allowing traders to appeal against incorrect treatment, as well as use of audit based control measures during customs clearing could help with transparency and risk management. It is moreover important to improve weak infrastructure such as ports, airports, railways and roads. Freund and Nadia (2011) also suggest time saving techniques such as computerized container scanning, and improved security on the roads during transit.

### **2.3 Trade Facilitation measures**

The measures of trade facilitation are as broad as its definition, encompassing a large number of aspects from various authors, each proposing indicators designed to fit into the context of their discussion. The most frequently used trade facilitation measure is from The World Bank Doing Business Database (2016) which measures the time it takes and costs incurred for goods to be transported from the factory gate to the shipping port. It measures the time and cost associated with documentary compliance, border compliance and domestic transport throughout the whole process of shipment of goods. The time is measured in hours, and 1 day is 24 hours. The data are gathered through questionnaires administered to local freight forwarders, custom brokers, port authorities and traders, which are then followed up by contacting third parties and consulting public sources.

This measure has been used by several authors including Hummels (2001), Persson (2013) and Djankov, Freund and Pham (2010) to assess the effect that non-tariff barriers have on trade. Limao and Venables (1999) also use a similar approach, measuring the time it takes to transport a 40 feet standard container from the capital to the port. The shortfall of this measure however, is that it does not take into account some of the country specific unobservable factors that could affect the transportation process over time from one country to another.

Although Shepherd and Wilson (2009) use a rather different measure of trade facilitation based on various indicators including infrastructure, institutional transparency, good governance and domestic regulations, Freund and Nadia (2011) incorporate transport and administrative measures by categorizing four procedures that affect the maximum time it takes for traders to follow through with export procedures. The first category records the time it takes for an exporter to complete documentation, which could include securing the letter of credit, assembling process and fulfilling all pre-shipment inspection and clearance. The second is the inland transportation which measures the time it takes to move a good from the city to the port of exit and the time spent in waiting times for the goods to be picked up and loaded. The last two categories include customs clearance procedures and inspections as well as the ports procedures which consist of terminal handling, storage of certain items, waiting times for loading containers onto the vessel and inspection.

Almost similar to these, are measures from Wilson, Mann and Otsuki (2003), providing Port efficiency, Customs environment, Regulatory environment as well as E-business usage, as four indicators of trade facilitation. We are however restricted from adopting these measures in our study, due to the limited data available from the Sub Saharan countries, for each of these categories. A more feasible measure that we use is from the World Bank Doing Business Trading across Borders section. This measure includes the time it takes to import goods from the port to the capital of a country, the documents needed to import a 20-foot container and the costs involved in the import process. The time taken to import is measured using the number of days that goods take during transit, right from the originating country to the capital of the final country. The number of documents is simply the paperwork involved from the time that a container is to be imported from the country of origin to the final destination. This also involves clearance letters and permits to import the goods. The final indicator measures the cost involved in the import process which included documentary compliance, border compliance as well as domestic transport. Previous authors using this measure have provided evidence that a 10% reduction in relative delays increases imports by about 4%. This information is beneficial especially for landlocked countries that have to overcome more than double the challenges that their maritime counterparts face and are to a larger extent faced with various kinds of delays before and during transit.

## **2.4 Trade Facilitation and trade**

Trade involves an entire process of moving goods from one point to another, often characterized by multiple security checks and verification points. However, by streamlining regulations and laws, goods are able to move more efficiently during transit and even at the point of shipping. Engaging in trade facilitation reforms therefore reduces the 'red tape' surrounding the movement of these goods which saves time and resources for traders. This however demands that countries invest in training of staff, use automated equipment, reduce corruption at border points and enhance cooperation and communication between national agencies and authorities.

For traders to smoothly move their goods from the factory gate to the port, there has to be a level of good quality infrastructure both physical and service infrastructure. This could be in the form of improving weak, run down roads, railway and airport networks, investing in more

efficient port facilities such as storage, refrigeration and handling, improving telecommunication and internet usage, strengthening security at check points and using automated equipment for inspections such as scanners, and computerized access to information. Furthermore, efforts geared towards creating alternative transit routes could also go a long way in not only reducing monopoly power but also enabling countries to reach the nearest port. For traders, this means that their goods can arrive at the shipping point at scheduled hours, deliver goods on time, and compete much more favorably on the targeted market. This not only increases their profits on their investments but saves them the extra costs on refrigeration, storage and losses due to damaged and obsolete goods. This is especially important for time sensitive primary exports (Freund and Rocha, 2011, Persson 2013).

Transparency, which involves making trading procedures and requirements as clear as possible saves on the time required for documentation and bureaucratic paperwork. The entire process of filing out clearance documents, signatures, and letters could be made as short as possible with clear regulations being made available to traders and investors. Reforms such as providing information that is understandable and readily available to the public before they are implemented, use of the internet to supply information and using any possibly efficient channels is important to traders as it saves them time and money that would be spent on searching for information and trying to understand the various stipulations (Persson 2013). This however goes hand in hand with making clearance procedures as efficient as possible at the customs units and with agencies. Having more transparent customs procedures through less complicated systems of inspection also closes the window for corruption and reduces the need for multiple checks at border points thus saving the governments' resources that would be spent on large staff and management, and money that would be lost in corruption.

## **2.5 Trade facilitation and landlocked countries**

When it comes to landlocked countries, remoteness to the trade routes and limited access to the sea is by far the biggest challenge they face. This remoteness from the sea, more than doubles the distance for inland transportation of goods from the factory gate, to the port (Limao and Venables, 1999, Portugal-Perez and Wilson, 2009), which in turn increases the time required to move goods from one point to another. Border delays, transport coordination problems and

uncertainty create direct costs from the transit country as well as insurance costs (Limao and Venables, 1999). For most developing countries especially in Sub Saharan Africa, the very poor state of the infrastructure, limited transit corridors and dependence on primary exports, makes it even more of a challenge. Engaging in trade facilitation for developing landlocked countries therefore means that they can reduce on the time spent on moving goods especially during transit through negotiating better customs procedures at transit points with their maritime partners. The fact that traders still have to pay high fees for processing documentation, which increases time wasted when passing through foreign territory, possess huge time delays in trying to understand and comply with these rules, especially when faced with different countries that have different laws and regulations (Meyer, Fenyes et.al (2009)).

These transit delays are magnified for landlocked countries that face border crossing obstacles such as tariffs, technical costs of adopting another transit system and transparency issues at the border crossing (Raballand, 2003). A study by Stone (2001) shows that overall, 18 out of 30 landlocked countries have transport costs higher than 10% of import trade value. In Africa, 13 out of 15 landlocked countries have a transport cost burden of at least 10% with 7 countries exceeding 20%. As earlier argued by Limao and Venables (1999), transport costs are not just extra overland distance that needs to be covered by landlocked countries as they move goods from the point of origin, through transit and finally to the point of destination, but these costs are also the time delays that exist in between the import process. Their study shows that the median landlocked country has transport costs 58% higher than the median coastal economy. Sadly this is due to the non-tariff barriers such as cumbersome administrative barriers, inefficient, bureaucratic and sometimes corrupt customs procedures, and regulatory environment both domestic and in transit that have to be dealt before finally having goods at their destination. Dealing with these cumbersome administrative barriers and having more transparent import procedures is therefore what is required to ease the movement of goods through transit points, and reducing the transport costs involved in cross-border trade.

Since landlocked countries have limited choice when it comes to transit corridors, in addition to transit border delays, they also face tremendous challenges because of the heavy dependence on sound cross-border relations with their transit neighbors. For landlocked countries to be able to move goods through the transit corridors, they are not only required to have good political

relations with their neighbors, but are also dependant on their peace and stability as well as the neighbor's administrative practices (Faye et.al 2004). Raballand (2003) argues that if there is conflict, whether military or diplomatic between a landlocked country and its transit neighbors, the latter can easily block borders or set up regulatory impediments to trade. Even where there is no direct conflict, landlocked countries are vulnerable to the political vulgarities of their neighbors. Given such circumstances it becomes of great importance for landlocked countries to have clear administrative procedures as well as an efficient regulatory environment. Although this would not entirely remove the problems of instability, it would greatly reduce the irregularities and ambiguity that surrounds transporting goods through different transit points, in different countries.

According to the UNCTAD report (1999), much of the delays that landlocked countries face also stem from a lack of coordination between the landlocked countries and transit countries, where often times goods at maritime ports lay waiting for the arrival of vehicles from maritime countries that would be willing to transport the goods inland. It can however also be argued that while the goods could be waiting to be transported inland, the vehicles also have to go through various check points to arrive at the port, and even then, they often times have to wait even days to have the goods loaded due to inspection delays, documentation, and clearance fees that have to be paid before goods can be transported. This becomes an especially huge challenge especially because after port delays have been dealt with, landlocked countries still have to go through various transit points inland, to have the goods arrive at their final destination. A reduction in the time delays at border crossings, port inspection and check points would therefore go a long way in easing the moving of goods through transit points.

### **CHAPTER 3: THEORITICAL MECHANISM**

A trade theory that reflects real costs to trade is the “new new trade” theory which introduces heterogeneity within firms and industries, competition and costs. Melitz (2003) contributes greatly to this model, introducing the effect that fixed costs have on International trade. An extension to this model by Chaney (2008) brings forth the idea that firms differ by productivity because of fixed and variable costs. These costs pose as trade barriers to not just existing firms, but also deter firms from entering into the export and import market. High entry costs, present

a dynamic situation where monopolistically competitive firms enter and exit the market, based on their productivity. This theory is supported by various authors such as Bernard and Jensen (1999), and Cleridas, Lach and Tybout (1998), whose studies highlight some of the “sunk” entry costs, which could include market research costs, product adjustment costs and distribution costs. Costs to trade are also variable costs which involve all costs that have to be incurred during the shipping process.

Although the “new new” trade theory does not directly link these costs to trade barriers at the border, it is clear that fixed costs to import and export firms create entry barriers that restrict trading opportunities both at the firm and product level. Steingress (2015) argues that due to fixed costs at the firm level, international trade will be characterized by few multi product firms selling many products. Fixed costs at the product level such as acquiring an import license, meeting a product standard or market research may hinder the introduction of products into a destination market.

In a more general sense, the effect of fixed and variable costs is assessed at both the intensive and extensive margins of trade. At the intensive margin, the focus is on the changes in the value of existing trade flows, either at the country aggregate level or overall bilateral trade. The changes here are measured by a decrease or increase in the value of a country’s trade based on how much is sold, and or at a higher price. On the other hand, the extensive margin focuses on new trade flows, where new products, new trading partners, and more trading firms emerge on the International market. Overall changes in the extensive margin are due to new trade flows being created. A reduction in fixed costs will increase the number of firms entering into the market while an increase in these costs will only deter firms from entering into the market, and thus reduce the volume of trade value. Although Chaney (2008) focuses on the fixed and variable costs, the overall theoretical prediction is that costs negatively affect International trade.

When it comes to trade facilitation, fixed costs could include the cost of entering into an import and export market, such as the cost of acquiring import and export licenses, insurance costs, costs of complying with beauractic laws and regulations in the country of origin, market research in the destination country, as well as costs of documentation needed to establish import and export firms. On the other hand, variable costs can be extended to cross-border

barriers such as transport costs, inspection costs, costs of documentation preparation during each point of transit, customs clearance and technical control costs for each shipment, port and terminal handling costs for every container, and the indirect costs of not getting products on time vary each time that import procedures are delayed. On the intensive margin, the longer the time required for trade transactions, the greater the tendency for trade volumes to be reduced. Similarly, lengthy procedures for exports and imports reduce the probability that firms will enter the import markets especially for time sensitive products, (Organization for Economic Co-operation and Development (2016)).

According to Moisé, E. and S. Sorescu (2013), harmonizing and simplifying documents has the potential of reducing trade costs by approximately 3%, and the automation of the import and export process has a 2.3% potential of reducing trade costs. They add that if trade facilitation measures were jointly applied, their cost reduction potential would reach almost 14.5% of the total trade costs for low income countries. It can also be argued that for landlocked countries, improved and efficient customs clearance procedures and inspection reduces the waiting times at border crossings and eliminates unnecessary delays during transit, enabling traders to take advantage of business opportunities in their intended markets since goods then arrive as scheduled (World Customs Organization, Njinkeu, Wilson and Fosso (2008)).

#### **CHAPTER 4: PREVIOUS RESEARCH**

Prior empirical studies addressing the impact of trade facilitation have progressively highlighted its effects on trade. However, in spite of the much knowledge regarding its significant role, many papers have written very little on the specific effect that trade facilitation has on landlocked countries. The majority of the studies hint vaguely on the topic, making very limited research available for comparison. Nevertheless, this paper provides evidence of the effects of trade facilitation on trade from a number of studies. A common feature of the empirical studies on trade facilitation is the use of the gravity based methodology to estimate the effect of various trade facilitation measures. The first measure of trade facilitation was done by Wilson, Mann and Otsuki (2003) using four indicators (port efficiency, customs environment, regulatory environment and e-business) to measure the impact of trade facilitation on bilateral trade flows in Asia Pacific region. Their findings show that intra-APEC trade could increase by 21% if members below average improved their capacity halfway to the average of all the other

members. This study indicates which of the four indicators of trade facilitation has the largest positive effect on trade flows and it help us judge how each country's performance ranks in relation to APEC's best. Using measures from the Logistics Performance Index and Doing Business data, Hoekman and Nicita (2011) assess the impact of different trade costs on International trade. Results show that a 10% reduction in costs associated with importing would increase imports by 5% and a reduction in exporting costs would increase exports by 4.8%. They compare the effects of reducing the behind-the border domestic costs to border barriers such as tariffs and find that trade facilitation would generate a larger payoff. Accordingly, domestic trade costs represent an important bottleneck for low income countries both in regards to imports (13.5%) and exports (17%). Using number of days it takes to export, Persson (2013) investigates the sensitivity of differentiated and homogenous goods to trade transaction costs on the extensive margin. Estimation results suggest that if transaction costs declined by 1%, the number of exported differentiated goods would rise by 0.6% and 0.3% for homogenous goods.

Turning now to the literature on trade and landlockedness, several studies have indicated that infrastructure is a large determinant of trade costs and thus a crucial area for trade facilitation. Evidence shows that countries with poor infrastructure trade less on the International market whereas the effect of improved infrastructure is increased import and export performance. One of the major challenges facing landlocked countries is poor infrastructure which could explain the low levels of trade especially in the African region. Limao and Venables (1999), use bilateral trade data for 93 countries to estimate the effect of trade costs in terms of infrastructure and geography. Trade costs are estimated by the shipping cost of a standard 40 foot container from Baltimore, and the transport costs rate on imports. The median landlocked country has only 30% of the total trade volume of the median coastal country. Improvements in a landlocked country's own infrastructure from the median to the 25<sup>th</sup> percentile increases volume of trade by 8% and improvement in transit country infrastructure increase trade volumes by 2%. Simultaneous improvements lead to an 11% increase in trade whereas the elasticity of trade flows to transport costs is -2.5. Raballand (2003), Carrere and Grigoriou (2008), all share the view that bilateral trade flows in landlocked countries are largely affected by domestic and transit country infrastructure, and as such, improvement of both own and transit country infrastructure network should be emphasized. A study by Christ and Ferrantino (2011) is more explicit in analyzing the effect of land transportation costs, time, and uncertainty on landlocked countries. Out of the four

categories of costs (Inland transport, port costs, Customs and related costs), inland costs have the largest share for the landlocked countries. The implied cost of time to export in general exceeds the price of trucking by 8.5% compared to 3.4%. Portugal-Perez and Wilson (2012) estimates the impact of aggregate indicators of ‘soft’ infrastructure and ‘hard’ infrastructure on the export performance of developing countries. Findings suggest that encouraging trade facilitation reforms through hard and soft infrastructure would improve export performance of developing countries. A similar paper by Shepherd and Wilson (2009) suggests that improving port facilities could expand trade by up to 7.5%, an equivalent of 22 billion US dollars in the ASEAN member countries. Similar to Hummels(2001), Djankov, Freund and Pham (2010) use the time it takes to move goods from the factory to the ship, providing evidence that each additional day that a product is delayed prior to being shipped reduces trade by more than 1%, which is equivalent to a country distancing itself from its trading partners by about 70 kilometers. A 10% reduction in relative delays increases exports by about 4%. This effect is however magnified for landlocked countries and time sensitive agricultural and manufacturing goods. Other studies including Faye, Mcarthur et al. (2004) have argued that distance and transport costs are not the only challenges facing landlocked countries’ trade flows. In addition to transport costs and dependence on the peace stability and cross-border relations with transit countries, high administrative burdens in the form of direct transit costs as well as burdensome paperwork, bureaucratic procedures and border crossing delays hinder the ability to meet delivery contracts. Citing an example from (Evlo, 1995), customs procedures to the Central African Republic-Cameroon border delays take up to two weeks with goods often waiting for the necessary transit information from Bangui. Njinkeu, Wilson and Fosso (2008) use the same indicators as Wilson, Mann and Otsuki (2003), to focus mainly on the impact trade facilitation has on African countries. Their findings suggest that port efficiency and service infrastructure are the factors that have a positive impact on African trade. Nevertheless, Customs and regulatory environments are key factors in accelerating trade and facilitating foreign investment. Carmignani (2015) goes beyond transports costs, to suggest a broader perspective focused on institutions and other income dynamics as the major determinants of trade flows for landlocked countries. Freund and Nadia (2011) find that a one day’s increase in inland transit delays reduces exports on average by 7%, which is a larger effect than the customs clearance, port handling and documentation, have on exports. Their findings suggest that inland transit delays are attributed to institutional aspects such as road quality,

border delays, road security and others rather than distance or geography. Emphasis on institutions not only exposes the multi-dimensional aspects of trade facilitation measures but also provides further justification for a wider range of reforms that are inclusive of not just transportation but rather deeply engaging institutional frameworks. Raballand and Macchi (2008a) find that transport prices for most African landlocked countries range from 15 to 20 percent of import costs, which is three to four times higher than in most developed countries. They add that for the case of East Africa, truckers usually lose up to four hours in reduced speed because of road conditions along some segments but spend, on average, more than one day at the border-crossing between Kenya and Uganda.

There is still a missing link between the empirical literature connecting trade facilitation and landlockedness. Moisé, E. and S. Sorescu (2013), in a short section of their paper use transit indicators which include the effect of transit formalities, transit agreements and cooperation as well import and export formalities such as procedures to establish this. Using a linear form specification, they test the effect of these indicators on an overall landlocked countries sample including Sub Saharan African countries and Asia. They also estimate the differentiated impact of transit measures on imports and exports of landlocked countries. At the overall goods trade level, they find that the most significant results are obtained for transit formalities such as procedures, required forms and documents, and if these were streamlined, this would reduce trade costs by 2.3%. On the other hand, improving transit agreements and cooperation (national regulations of the transit country, or alternatively within the framework of a regional agreement), would reduce trade costs by 1.9%. Automation of import and export procedures would reduce costs by 1.7%. A shortfall of this transit analysis is it assumes that a landlocked country uses a single transit country, which is not the case. Other than this study, no studies have been found showing this direct effect, and with this paper, the hope is that more research will be directed towards the specific impact that trade facilitation has on landlocked countries.

## **CHAPTER 5: EMPIRICAL STRATEGY**

A Poisson Pseudo Maximum likelihood (PPML) estimator first suggested by Santos Silva and Tenreyro (2006) is used to estimate the effect of trade facilitation on landlocked countries, with a baseline model including the main explanatory variable as the interaction variable between the trade facilitation variable and landlockedness, together with standard gravity model

variables. This model is combined together with the ‘remoteness’ model first introduced by Baier and Bergstrand (2009), which controls for multilateral resistance. Also as additional specifications, other trade facilitation indicators are used separately as robustness checks to show if the effect of trade facilitation on landlocked countries is maintained under different indicators.

## 5.1 Empirical Model

One of the most well-known models for assessing bilateral trade flows is the gravity model. Many researchers have utilized this model to measure the effect of various variables on trade flows. Different modifications have however been made to the original intuitive gravity model which has allowed for additional independent variables to be added. This study uses a modified version of the gravity model, based on the conceptual framework proposed by Anderson and van Wincoop (2003).

A Poisson Pseudo Maximum likelihood estimator is used together with the remoteness model, to estimate the effect of trade facilitation on landlocked. The baseline model of this paper is made up of a Trade Facilitation variable which is measured by the time it takes to import goods from one country to another, as well as the main variable of interest being the Interaction between the trade facilitation indicator and landlockedness. Other standard gravity model variables including GDP of the partner and reporter, Population of countries, the bilateral distance between them, dummy variables for common official language, common colonizer and landlockedness are also included to the model.

The gravity model is estimated in logarithm form as follows:

EQUATION (1)

$$\begin{aligned}
 M_{ijt} = & \beta_1 + \beta_2 \ln GDP_i_t + \beta_3 \ln GDP_j_t + \beta_4 \ln POP_i_t + \beta_5 \ln POP_j_t + \beta_6 \ln DIST_{ij} \\
 & + \beta_7 ComLang_{ij} + \beta_9 Common Col_{ij} + \alpha_1 \ln TF_{ijt} + \alpha_2 Landlock_{ij} \\
 & + \alpha_3 \ln TF_{ijt} * Landlock_{ij} + \epsilon_{ij}
 \end{aligned}$$

Where  $M_{ijt}$  is imports to the importing country  $i$  from exporting country  $j$  at time  $t$ . The explanatory variable of interest is the  $TF_{ijt} * landlock_{ij}$ , which is interaction variable between Trade Facilitation and landlockedness. This variable measures the effect that trade facilitation

has on landlocked countries. It is given by the product of the Trade Facilitation variable and the landlockedness dummy. The variable will show what the effect is for landlocked countries when the number of days it takes to comply with import procedures increases. The  $TF_{ijt}$  is the Trade Facilitation variable. This indicator used is the time taken to comply with import procedures, measured by the number of days when importing goods from country  $j$  to country  $i$  at time  $t$ . Other explanatory variables include the importing and exporting countries' GDP and, their respective Population, bilateral distance between countries  $i$  and  $j$  measured in kilometers, dummy variables for landlockedness,  $Landlock_{ij}$ ,  $ComLang_{ij}$  for common official language, and  $CommonCol_{ij}$  for common colonizer, each taking the value of 1 if a country is landlocked and 0 if not, shares the same language and common Colonizer, respectively.  $E_{ijt}$  is the disturbance term.

The dependent variable is annual trade values of imports of country  $i$ , measured in US dollars. Trade value is affected by the explanatory variables on the right hand side of the equation. The study used import data instead of export data, as import data tends to be more accurate especially for developing countries, since for revenue purposes, countries are more vigilant on monitoring imports more closely.

Gross Domestic Product of both the importing and exporting country are used to measure the economic mass. These variables are expected to have a positive effect on the dependent variable. A large economic mass is a good indication of the trading capacity of the country and thus increases trade value.

Population of both the importer and exporter is used to estimate the market size of each country. Market size greatly affects International trade, and countries with large population are expected to consume a lot more imports and to trade more with outside partners, to cover demand from the local market. The coefficient for trade is expected to have a positive sign for the population coefficient.

Distance is included to measure the bilateral costs of trade and it is calculated in kilometers. Countries that have large bilateral distances between them are likely to trade less, than countries that are closer together. A negative sign is expected, as distance increases transportation costs that negatively affect the level of International trade between countries.

Common official language is a dummy variable equal to unity for country pairs that share a common official language. Countries that share a common official language are expected to trade more with each other, as communication costs are minimized. Likewise, Common Colonizer is a dummy variable equal to unity if countries  $i$  and  $j$  were colonized by the same colonial power. It is expected that countries that share the same colonial power have common administrative characteristics that ease cross border trade, thus allowing them to trade more with each other. It also represents the extent to which countries are culturally different. These variables are included to control for individual characteristics of countries. Both variables are expected to have a positive sign.

The landlocked variable is a dummy equal to unity if a country is landlocked or not. Countries that are landlocked are the most negatively affected in terms of higher transportation costs when moving goods across borders. Transportation costs increase as goods have to move through different transit points and this negatively affects the trade flow. The expected sign on this coefficient is therefore negative.

The Trade facilitation variable measures the time that it takes to import goods. The time is measured by days, where the more days it takes to import goods, and move them from the originating country to the destination, the higher the trade costs. Delays have a negative effect on trade value, and thus we expect a negative sign on this coefficient.

To capture the effect that trade facilitation measures have on landlocked countries, an interaction variable between landlocked and trade facilitation variables, is included. This is the most important variable of the analysis. The trade facilitation variable, which is measured by time taken to import, is interacted with the landlockedness variable. The expected sign on this interaction variable is negative. This is because we expect that the as time taken to comply with import procedures increases, the trade costs increase and this has a negative effect on trade flows. What this variable shows is that the negative effect of time delays is even larger for countries that are landlocked, because of the time it takes to go through various border barriers during the import process.

**Table 1: Summary Statistics for Key Variables**

VARIABLES	(1) mean	(2) Standard deviation	(3) min	(4) max
Trade Value	1.893e+07	1.118e+08	0	2.887e+09
GDPReporter	2.732e+10	7.094e+10	1.344e+08	5.685e+11
GDPPartner	2.591e+10	6.639e+10	1.344e+08	5.685e+11
Pop Rep	2.476e+07	3.368e+07	1,341	1.775e+08
Pop Part	2.152e+07	3.120e+07	84,600	1.775e+08
Distance	2,964	1,810	8.023	12,954
Days to import	40.19	15.80	15	95

## 5.2 Estimation Issues

The study uses a Poisson Pseudo-Maximum Likelihood estimation model, which was first suggested by Santos Silva and Tenreyro (2006). This estimator has an advantage over the Ordinary Least Squares Estimator because it maintains consistent estimates even under the original multiplicative form of the equation. Under OLS, the estimator would be biased due to the logarithmic nature of the error term causing a problem of heteroskedasticity. It is not possible to deal with this kind of heteroskedasticity under OLS by simply applying a robust covariance matrix and therefore choosing an estimator that is able to deal with it is a much viable option. The Poisson estimator is able to estimate equation (1) in its original multiplicative form without causing any bias. In addition, Poisson includes observations for which observed trade flows are zero. Under the OLS model, these observations are dropped out because of the log of zero is undefined. This is very important for our dataset because zero trade flows do not necessarily imply missing values and losing these trade values would mean that a lot of information is excluded.

To account for unobserved heterogeneity that could exist between countries and their trading partners, it is important to address multilateral resistance. It is assumed that countries that are closer together are more likely to trade more with each other than countries that are further apart. An example of this would be of Australia and New Zealand being ‘forced’ into trading more with each other, given that they are further away from the rest of the world. To control for this, two estimation methods are commonly used, one of them being the fixed effect estimator that includes importer and exporter dummies to capture counter specific characteristics (WTO\_UNCTAD, 2013). However, one limitation of this estimation model is that for some bilateral time-invariant variables, this may not be the best method due to perfect collinearity.

For this study, we therefore use ‘Remoteness’ which was first introduced by Baier and Bergstrand (2009). The remoteness model shows that bilateral trade between countries  $i$  and  $j$  depends on the level of bilateral trade costs relative to multilateral trade costs and multilateral trade costs relative to world trade costs (WTO\_UNCTAD, 2013). This means that countries that are closer together would more likely prefer to trade with each other, and those that are remotely close would consider trading less due to the trade costs involved in trading. This is however not always the case with International trade and thus controlling for it is very important. The advantage with using the ‘Remoteness’ model is that it addresses the problem of perfect collinearity that arises when using importer and exporter dummy variables by linearizing the multilateral resistance terms. The variable is calculated by taking a country’s average weighted distance from its trading partners divided by the partner’s GDP relative to the world trade. This calculated for both the importer and exporter country.

Several robustness checks are also done using two alternative trade facilitation indicators; documents needed to import and costs to import.

### **5.3 Data and Sample**

The study uses a sample consisting of 43 Sub-Saharan countries (see Appendix) and excludes South Africa, Djibouti and Mauritania as well as North African countries such as Morocco, Tunisia, Egypt, Libya and Algeria. The selection of this sample was based on factors such as

the degree of homogeneity of their level of economic growth, colonial influence, cultural and religious diversity, as well as geographical location. The study focuses on imports to the 43 sample countries in Sub-Saharan countries over the period 2006-2014. The time period is chosen because it is the longest time period for which consistent trade import data could be found for these countries.

The sample countries are at more or less similar levels of economic growth, much of which has been influenced by the quality of their institutions, colonial influence, and culture. These countries have faced similar colonial powers that established common official languages, systems and influenced the way that they developed past their colonial times. It is statistically evident that these countries share similar challenges such as poor infrastructure, corruption and low levels of technology, all of which affect their economic growth and International trade. Having this level of homogeneity allows us to compare these countries much easier, without having to control for a large number of unique factors for each individual country.

On the other hand, the North African countries have achieved a greater level of economic growth and are culturally and religiously different. Similarly, South Africa, which has faced the longest colonial period of all the African countries, can be considered unique, given the distinct historical and colonial challenges that have not only shaped their diverse culture but also influenced a greater level of economic development above the other Sub-Saharan countries. Including these countries would require controlling for individual characteristics that have influenced their level of trade. Other countries that were excluded from the sample were because of a lack of registered trade data over long periods of time.

In most recent studies, Trade Facilitation has been measured using various indicators. This study uses the time it takes to import, as the measure of trade facilitation. The time is measured in the days that it takes for goods to be moved from the country of origin, to the final destination. Data for this indicator is taken from the World Bank's Doing Business Database (2016). The Doing Business database records the time and cost associated with the logistical process of importing and exporting goods. It measures the time and cost associated with documentary compliance, border compliance and domestic transport throughout the whole process of shipment of goods. The time is measured in hours, and 1 day is 24 hours. The data

are gathered through questionnaires administered to local freight forwarders, custom brokers, port authorities and traders, which are then followed up by contacting third parties and consulting public sources. To ensure consistency in data collection for the period over which the study is done, data after 2014 is excluded from the study because in 2015, the Doing Business database uses a new approach to measuring the trade process, where they now consider the product of comparative advantage for each economy when measuring export procedures and focus on a single very common manufactured product for import procedures. Changes in methodology are aimed at increasing the economic and policy relevance of the indicators, reflecting actual directions and volumes of trade. These changes however do not render our choice of data source and methodology irrelevant.

The rest of the standard gravity model variables are obtained from standard sources. Trade data for bilateral trade flows is obtained from the International Trade Statistics Import/Export Data found in the United Nations Comtrade Database (2016). GDP and Population data are obtained from the World Bank Development Indicators database (2016). Data for Bilateral distance between countries and other variables such as common language and common colonizer are obtained from the CEPII Geodistance Database (2016).

## **CHAPTER 6**

### **6.1 Empirical results**

The regression analysis using the gravity model to investigate the effect of trade facilitation on landlocked countries was generally successful. The model was run using Poisson Pseudo Maximum likelihood estimator, and controlling for multilateral resistance using the remoteness model. Table 2 shows the regression results and standard errors of running equation (1) as the baseline model.

**Table 2: Baseline Model Results.**

	(1)
VARIABLES	Baseline Model
ln_gdp (Reporter)	0.525***

	(0.0719)
ln_gdp (Partner)	0.730***
	(0.0812)
ln_distance	-0.767***
	(0.0425)
ln_population Reporter	-0.193***
	(0.0685)
ln_population Partner	-0.140*
	(0.0811)
landlocked	0.833
	(1.472)
Common language	-0.437**
	(0.183)
Common colonizer	0.666***
	(0.167)
ln_Trade Facilitation	0.759***
	(0.288)
ln_Trade Facilitation*landlocked	-0.198
	(0.403)
ln_remoteness	-0.0990
	(0.0761)
ln_remoteness2	0.501**
	(0.210)
Constant	-10.09***
	(3.029)
Observations	7,427

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Robust standard errors in parentheses

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

The coefficient for the GDP of the importing country is of the expected sign, showing a highly significant effect on trade, with coefficients (0.525). This is not surprising, as we expect that the larger the GDP of a country, the larger its economic mass, and therefore a large market and trading potential for the country. It can therefore be interpreted from the results that GDP of the reporter increases imports by 0.5 percentage points for a 1 percent increase in GDP. Similarly, the GDP of the exporting country is also of the expected positive sign, indicating that a large economic mass increases trading potential. The Partner's GDP coefficient is larger with (0.730) highly significant points. The coefficient shows that trade increases by 0.7 percentage points when the GDP of the partner increases by 1 percent.

The coefficient for distance is also as expected with a negative sign. It was expected that an increase in distance negatively affects trade, as it increases transportation costs which in turn increases the costs of trade. The result shows that trade decreases by 0.7% as the bilateral distance between increases.

Results for the population coefficients show negative signs. The population of the importing country has a negative effect on trade, with a highly significant coefficient (-0.193) and a less significant coefficient for the Partner's Population of (-0.140). This is a rather surprising result since we expected that population does have a positive effect on trade as it increases the market potential and demand for goods.

The coefficients for the common language and common colonizer coefficients also behave in opposite directions. The Common Colonizer coefficient is positively highly significant with (0.666) and this is as expected since countries that have a common colonizer are more likely to trade more with each other, given the common already established institutions, and culture. On the other hand, the coefficient for common official language has a negative sign, showing that trade decreases by 0.3%.

We expected that having a landlocked status is negatively related to imports. The coefficient for landlockedness, although not statistically significant, has a positive effect on trade, with 0.833 percentage points. The result suggests that trade imports for landlocked countries, trade is increased by more than 0.8 percentage points because of their landlockedness. This result is however not significant.

Most surprising of all results however is the coefficient for Trade Facilitation, which was expected to be negative. However, as shown in table 2, the coefficient is of a positive sign, with coefficients (0.759) indicating that when time delays at the border increase by 1 percent, trade increases by 0.7 percent for non-landlocked countries. The expectation however was that the effect would be of the opposite sign with trade decreasing with addition time delays at the border. A possible explanation for this surprising positive result could be that, given the small sample size of this analysis and limited time variation between countries, it is possible that a significant number of countries that are large enough to affect the results still continue to trade with each other even when the number of days it takes to comply with import procedures increases. In this case, it could be that even though the larger share of the countries with high import value has to incur large trade costs they still continue to trade with their trading partners no matter the length of time it takes to go through with the import process and this is reflected in our results. In addition to the small sample size, the time frame that is used in this analysis does not offer much variation over time that could be used to compare effects over a long period of time. It is possible that with larger countries trading more and more with each other, the time it takes to import increases in the beginning but later with improved and well implemented import procedures, this time decreases over time.

Another explanation could be that there are omitted explanatory variables in the model that could have biased the effect that trade facilitation has on trade imports. It is possible that factors such as Regional and Bilateral trade agreements could greatly affect how much countries import and export goods with each other. Countries that are under Bilateral and Regional trade agreements usually tend to continue; if not increase trade no matter the time it takes to comply with the trade procedures. It is therefore possible that even though we expect that countries that face longer time delays during import procedures will trade less with each other, due to Regional Trade Agreements, this effect will may prevail. This is especially difficult to control for in our model because it comes to Sub-Saharan African countries, disentanglement of these effects would be required due to the overlap of membership to Regional Trade Agreements that exists between countries.

On a positive note however, the results for the most important coefficient are of the expected sign. The interaction variable measures the effect that trade facilitation has on landlocked

countries, and this is the core of our analysis. As expected, the coefficient is negatively associated with trade, with coefficient of (-0.198). This is not surprising because as explained earlier, landlocked countries face much longer delays as they go through various transit countries which in turn increase border barriers and delays. According to the results in table 2, 1 percent increase in the time delays at the border reduces trade by 0.19 percent. One way that this result could be additionally useful for our analysis would be in estimating the full effect of Trade Facilitation on landlocked countries by giving the difference that trade facilitation makes for landlocked and non-landlocked countries. This would be simulated by taking the sum of both the trade facilitation variable and the interaction variable and with the expectation of a negative effect of trade facilitation for non-landlocked countries, the effect on landlocked countries would be a larger negative coefficient. In this case however, the results of both the interaction variable and trade facilitation are of opposite signs. This however does not take from our main result that shows that for landlocked countries, import delays negatively affect trade.

The remoteness variable for the importer country is negative associated with trade, while the exporter's country is positively associated with trade. As the level of remoteness increases by 1 percent, the trade value decreases by 0.099 percent. This result is as expected since countries that are further part from each other are less likely to import from each, while countries that are closer are more likely to engage in international trade with each other. This result is however not statistically significant.

## **6.2 Robustness checks**

Results for robustness are presented in table 3, columns (1) – (3).

Under alternative specifications, robustness checks are separately carried out using two additional trade facilitation indicators. The first indicator is the 'documents to import' variable. This coefficient captures the cost and time associated with the documentary requirements of all government agencies of the origin economy, the destination economy and any transit economies. The aim is to measure the total burden of preparing the bundle of documents that will enable completion of International trade for the goods (World Bank's Doing Business Database (2016)). In this simulation, the 'time to import' variable in the baseline model is

replaced with the “documents to import” indicator and results from this regression are presented in column (1) of table 3. It is interesting to see that the Trade Facilitation coefficient remains positive with a high significant estimate of (1.965). This result can be interpreted as a 1 percent increase in the documents needed to import, increasing trade by 1.9 percent. A possible explanation for this result could be same as for the time delays, where a small sample size could mean that countries continue to trade more with each other even when the number of documents is increases. Omitted variables such as the effect of RTAs could also be a possible explanation for these strange results.

On the other hand, we have a highly significant coefficient for the interaction variable with a negative estimate of (-0.209). This result can be interpreted as the number of documents having a negative effect on imports for landlocked countries, decreasing imports by 0.2%. This result is good for our analysis as it shows that for landlocked countries, the burden associated with documentary compliance weighs negatively on trade imports. This is not surprising because as the number of documents required for the import process increases, the costs for acquiring and compiling documents, research and verification at the border increases with every border crossing that goods have to go through. Since for landlocked countries, these border barriers are increased, these costs are also expected to be higher, and this discourages trade imports, thus the negative effect on trade,

The second trade facilitation indicator that is used is, ‘cost to import’ variable. The variable is regressed in a separate regression as by running a Poisson regression, replacing the ‘time to import’ with the ‘costs to import’ variable. Results obtained from this regression continue to be surprising for the Trade facilitation coefficient, showing a positive effect of the cost to import on trade. The results show that trade increases by 0.8 percent when the costs to import increase. On the other hand however, the interaction variable maintains a negative effect on trade, with estimates (-0.130). This result can be interpreted as the costs of imports reducing trade by 0.1% for landlocked countries. The result is however not statistically significant.

**Table 3: Results for Robustness**

VARIABLES	(1) Docs to import	(2) Cost to import
ln_gdp	0.419*** (0.0715)	0.385*** (0.0775)
ln_gdp2	0.751*** (0.0834)	0.718*** (0.0812)
ln_dist	-0.811*** (0.0419)	-0.778*** (0.0458)
ln_population Rep	-0.245*** (0.0727)	0.00170 (0.0750)
ln_population Part	-0.140* (0.0815)	-0.148* (0.0797)
landlocked	4.858*** (1.208)	0.700 (2.937)
Common language	-0.416** (0.186)	-0.667*** (0.185)
Common colonizer	0.697*** (0.174)	0.917*** (0.174)
ln_TradeFacil2	1.965*** (0.485)	
ln_Trade Facil*landlocked 2	-2.029*** (0.542)	
ln_remoteness	-0.119* (0.0688)	-0.121 (0.0844)

ln_remoteness2	0.490** (0.207)	0.511** (0.218)
ln_TradeFacil3		0.881*** (0.137)
ln_Trade Facil*landlocked 3		-0.130 (0.369)
Constant	-8.268*** (2.958)	-13.19*** (3.397)
Observations	7,427	7,427

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Robust standard errors in parentheses

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

### 6.3 Limitations and Caveats

A huge challenge with estimating the effects of Trade Facilitation is usually determining the ‘appropriate’ measures that reflect the true needs of a particular region. As earlier highlighted, there are various measures that have been proposed by various authors that are expected to enhance trade flows. Notwithstanding the limited data available for each of these measures when it comes to Sub-Saharan Africa, this paper confines itself to using only three trade facilitation indicators. It is therefore important to note that there could be better indicators of trade facilitation that could be used to show a much more accurate impact of trade facilitation on trade and landlocked countries in Sub-Saharan Africa. Further research is encouraged using a broader set of indicators.

It is also worth noting that in this study, heterogeneous factors that could bias results such as corruption, level of infrastructure, effectiveness of institutional structures within different countries, differentiation of products whereby some products are generally much more difficult to clear and import than others, are not accounted for. The obvious reason for this omission is the limited data available for these countries. Factors such as corruption and effectiveness of institutional structures are generally difficult to measure, especially in developing countries.

Level of infrastructure is also almost impossible to account for, given the broad sample size that has a far from similar state of infrastructure.

More data could lead to further work concentrated on the form of specification required to give a much more precise impact. In this paper, the specification used has several sources for error, with only the dummy variable of landlockedness interacted with trade facilitation, used to determine the effect. Further research could be done, to include other variables that affect both landlocked countries and trade facilitation, to establish a stronger effect. In their estimation of the effect of trade facilitation measures on landlocked countries, Moïsé, E. and S. Sorescu (2013) use a transit analysis, where they investigate the effect that transit indicators have on trade for landlocked countries. The issue with the approach however is the limited data available for most Sub-Saharan African countries. They mention that when it comes to transit formalities for example, there seems to be sufficient information published on procedures, required forms and documents; such documents and procedures are reviewed periodically, but in contrast to transit fees and charges, their review seems to take place less frequently (every two years at best). West African countries seem to have physically separate transit facilities at all entry points where trade can transit. The situation is rather different in the Southern Africa sub-region where there are either no physically separate border crossing facilities at all, or such facilities exist only at large transit entry points.

Last but not least, it is also important to consider that the effect of trade facilitation especially in Sub-Saharan Africa is likely to be biased when Regional Trade Agreements (RTAs) are not controlled for. The effect of RTAs has become increasingly difficult to measure, given the overlap that exists between member countries. This study therefore foregoes controlling for this effect, as this requires a disentangling of effects of each of the RTAs, a task that would be considered rather difficult, given limited data of these effects from the individual countries. It is also important to take into account the deeper meaning of trade to the partners involved in these trade agreements, which among other factors would be that the formation of Regional trade Agreements are of much more importance than increasing trade.

## **SUMMARY AND CONCLUSION:**

This study set out with the aim of assessing the effect that trade facilitation has on landlocked countries, adding to the literature from prior studies on the empirical effect of trade facilitation. Using a sample of 43 Sub-Saharan African countries over a period of 9 years, the results show that the effect of time delays does indeed have a negative effect on the imports of landlocked countries. Landlocked countries are faced with large negative effects as the number of days taken during the import process increase. The results from this study show that time delays are associated with a 0.19% decrease in imports for landlocked countries. This is not a surprising result because, and the time required to comply with import procedures increases trade costs increase and this lowers trade flows between countries. What this study however shows is that as much as time delays affect trade imports, the effect is even much higher for landlocked countries.

These results are a step further into highlighting the great role that trade facilitation plays in increasing trade and even so for landlocked countries. Without going into deep empirical detail of how these effects are considered in the context of regional Trade Agreements, the results have important implications for developing landlocked countries that still have a gap between realizing any significant results when they negotiate trade deals with their non-landlocked counterparts. Efforts geared towards reducing delays during import procedures are highly desirable for all countries if the gains from trade and trade agreements are to be realized.

The paper however raises the possibility to further investigate the effect of trade facilitation on landlocked countries with the appropriate amount of data, larger sample and a broader set of indicators. One interesting consideration would be further research into internal trade and trade margins, where the focus is not limited to how much landlocked countries are able to import from each other, after the formation of Regional Trade Agreements, but also determining the volume of trade with the rest of the world. Heterogeneous factors such as corruption, level of infrastructure, and the effectiveness of institutions could also be considered when making further studies.

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## APPENDIX

**SAMPLE COUNTRIES (SUB-SAHARAN COUNTRIES):** Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Congo, Democratic Republic of Congo, Côte d'Ivoire, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sao Tome and Principal, Seychelles, Sierra Leone, Somalia, Swaziland, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe

**Figure 1:**

**Sub-Saharan Landlocked countries.**



Source : <http://www.mapsofworld.com/africa/thematic/landlocked-countries.html>

[World Map](#) / [Africa Map](#) / [Thematic Maps](#) / Landlocked Countries in Africa

**Table 4: Key Variables and Sources.**

No.	Variable	Data source
1.	Trade Flows (Imports)	United Nations Comtrade Database-International Trade Statistics-Import/Export Data <a href="https://comtrade.un.org/">https://comtrade.un.org/</a>
2.	Trade Facilitation Indicators	World Bank's Doing Business indicators <a href="http://www.doingbusiness.org">http://www.doingbusiness.org</a> <i>Doing Business</i> records the time and cost associated with the logistical process of exporting and importing goods. Under the new methodology introduced this year, <i>Doing Business</i> measures the time and cost (excluding tariffs) associated with three sets of procedures—documentary compliance, border compliance and domestic transport—within the overall process of exporting or importing a shipment of goods.
3.	Gross Domestic Product (GDP) And Population	World Development Indicators. <a href="http://www.worldbank.org/">http://www.worldbank.org/</a> World Development Indicators (WDI) is the primary World Bank collection of development indicators, compiled from officially recognized international sources. It presents the most current and accurate global development data available, and includes national, regional and global estimates.
4.	Distance, Common Language, Common Official Colonizer	CEPII's distances measures: The GeoDist database GeoDist makes available the exhaustive set of gravity variables used in Mayer and Zignago (2005). GeoDist provides several geographical variables; in particular bilateral distances measured using city level data to assess the geographic distribution of population inside each nation.

