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Trade Facilitation and Export diversification in South Africa

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Abstract

This paper uses a gravity model to investigate the impact of trade facilitation on export diversification in South Africa. This paper uses panel data of 124 countries ranging over the period 2012 – 2016. In this paper, a statistical approach called factor analysis was used to construct four new aggregate trade facilitation indicators from a wide range of primary indicators that measured many aspects of trade facilitation for each of the countries in the panel and the number of product lines exported from South Africa was used as a measure of export diversification. We include simple average import tariffs of each country, distance, GDP, population, geographical and cultural variables and regional trade agreements with South Africa. As our export diversification measure is discrete (i.e. count data), we postulate that the number of product lines exported to each country follows a Poisson distribution which follows the approach used by Dennis & Shepherd (2011) and Persson (2013). The focus of this paper is to determine the impact of on-the-border trade facilitation on export diversification. We find that border and transport efficiency contributes significantly to export diversification and the effect is confirmed when examining export diversification between countries. We also find that ocean ports, airports, custom procedures and number of days to import drive this contribution of border and transport efficiency on export diversification.

Keywords: extensive margin, trade facilitation, export diversification, gravity model, South Africa

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1. INTRODUCTION

Decreasing tariffs and trade facilitation – which can be defined as policies aimed at making trade between countries cheaper, faster and more predictable – has been a key option among policy makers to reduce trade costs. The connection between trade facilitation and export diversification is not a simple one because the export variety of a country may change not only through reforming its own trade facilitation but also through its partner's trade facilitation reforms.

Narrowly, trade facilitation can be associated with a reduction in transaction costs - other than reductions in tariffs - which occur at-the-border. However, trade facilitation should not only include these at-the-border costs but also the beyond-the-border costs such as the quality of infrastructure, availability of technology, business and political environment which all impact export diversification through the cost channel. Measures of trade facilitation can be placed in two categories: "hard" which is related to physical and tangible infrastructure which includes airports, roads, ocean ports, information and communication technologies and "soft" which is related to intangible factors such as business environment, corruption, border and transport efficiency and institutional quality.

As the impact of trade facilitation on trade has become a focus of international trade literature in recent years, many organisations have collected vast amounts of country level data on the various aspects of trade facilitation. From an econometric standing, including trade facilitation variables that measure similar aspects as explanatory variables in a model, such a gravity model, could result in multicollinearity. To avoid this issue, one could aggregate highly correlated variables into a single variable.

This leads us to this paper's first contribution to existing literature which is using factor analysis to construct four new aggregate trade facilitation indicators from 17 primary indicators. Factor analysis is a statistical modelling technique that creates a new variable through unobserved "common factors" that explains the correlation among a set of observed variables. This paper's second contribution is to contribute to the slowly growing literature focusing South Africa's export growth and export diversification. Lastly, to determine the impact of trade facilitation on export diversification in South Africa, this has had very little exposure.

This paper uses a gravity model to estimate the impact of on-the-border trade facilitation on export diversification while controlling for the other aspects of trade facilitation

on export diversification. Our export diversification measure (number of product lines exported from South Africa) is discrete; we assume that the number of product lines exported to each country follows a Poisson distribution which follows the approach used by Dennis & Shepherd (2011) and Persson (2013). Our results suggest that border and transport efficiency is important to promoting export diversification. The inclusion of a broad range of trade facilitation indicators such as information and communication technology, transport infrastructure and business environment proved to provide some unexpected results such as information and communication technology and business environment having a negative impact on export diversification and a breakdown into the transport infrastructure variable supposed the conclusion that ocean port and airport infrastructure is important to promoting export diversification in South Africa. In addition, border and transport efficiency is driven by custom procedures and number of days to import from South Africa. This proved important for determining the on-the-border costs that can be reduced to improve export diversification.

The paper is organised as follows: Section 2 reviews the existing literature. Section 3 describes the variables used to construct the derived trade facilitation indicators using factor analysis and a means of measuring export diversification. Section 4 presents econometric strategy and gravity model estimation results. Section 5 presents the key findings and concluding remarks.

2. LITERATURE REVIEW

This section briefly defines and explains the importance of trade facilitation and export diversification and reviews empirical studies on the impact of trade facilitation on trade and on export diversification.

Export diversification can be defined as the compositional change in the existing export product mix of a country, or the change in the export destinations that it serves, or the distribution of production across sectors and has been theoretically and empirically been linked with economic growth (Samen, 2010). Feenstra and Kee (2008) showed that when a country increases the variety of products it exports, the country's producers gain welfare thus presenting an opportunity to improve the country's welfare. Melitz (2003) believes that the reason behind these welfare gains stems from productivity increases in a model with heterogeneous firms. Melitz (2003) explains that when a country has opportunities and improved market access to international markets, highly productive firms will start to export and as a result of these firms entering into the international markets prices will increase and

push lower productivity levelled domestic firms out of business. This results in higher productivity in export sector and a greater variety of products being exported which came because of more opportunities and improved market access to international markets (Melitz, 2003).

Export development and diversification strategies have been a focus in many developing countries since developing countries are highly dependent on a small basket of export products - usually primary products - which in turn puts them at risk of being adversely affected by external shocks (Samen, 2010). Therefore, by broadening and diversifying the country's current export base and geographical export destinations, the country can expand and minimise volatility export revenues, upgrade value-added and boost growth by diversifying toward non-traditional exports that face higher demand and have higher income elasticity, increase terms of trade and have positive growth trends (Samen, 2010). For policy makers, a successful export diversification and development strategy should make use of various trade facilitation policies such as appropriate trade reform, adopting selective measures like subsidies and incentives to help firms' competitiveness, reducing transaction costs, creating conditions that allow local businesses to expand and improving international trade negotiations at bilateral, regional and multinational levels to open opportunities and improve market access (Samen, 2010). Therefore, welfare enhancing trade facilitation policies which are policies that reduce transaction costs of international trade such as lower transportation costs, tariffs and reduced trade barriers is the link between increased export diversification and increased average productivity (Melitz, 2003; Dennis & Shepherd, 2011).

Trade facilitation measures can be placed in to distinct categories: "hard" infrastructure which includes physical infrastructure such as ocean ports, airports, railways and information and communication technology and "soft" infrastructure which includes border and customs efficiency, government and institutional quality and transparency. This distinction allows one to compare the costs and benefits that arise from policy reform or investing along both categories. Investments in infrastructure cannot alone increase the quality of infrastructure which is aimed at reducing transportation costs because regulatory reforms also need to be put into place to ensure that trade barriers such as customs regulations, technical regulations and market access restrictions are minimised.

According to Portugal-Perez & Wilson (2010), empirical research determining the effect of trade facilitation should address these problems: the definition and measurement of trade facilitation, identifying an econometric approach to determine the effect of trade

facilitation on trade or export diversification and scenario analysis to determine the effects of improvement of trade facilitation on trade or export diversification. Empirical studies have provided many measures of trade facilitation which aim to make trade across borders faster, cheaper, safer and more predictable. These various trade facilitation measures have positive impacts on trade volumes between countries and export diversification by reducing transportation costs. This has been explored by authors such as Limão & Venables (2000), Clark, et al. (2004), Shepherd & Wilson (2006), Wilson, et al. (2003) and Lawless (2010). Limão & Venables (2000) has shown that reducing transportation costs by improving infrastructure can raise trade volumes substantially. Improving infrastructure such as ocean port facilities (Clark, et al., 2004), road network (Shepherd and Wilson, 2006), and factors such as custom regimes, port efficiency, technology, regulatory policies and standards (Wilson, et al., 2003) can reduce transportation costs and raise trade volumes.

Wilson, Mann and Otsuki (2003) were the first to make use of a gravity model to estimate the impact of trade facilitation on trade (Wilson, et al., 2003). They constructed four indicators focused was on four aspects of trade facilitation: regulation, customs, e-business and port efficiency from 13 primary variables using data collected from the WEF for the Asia Pacific Economic Cooperation (APEC) countries. They included in their gravity model the four indicators and the usual controls such as income, geography and tariffs and found that intra-APEC trade would increase by 21 percent if the APEC countries with below-average indicators improved their indicators by half of the average of all members and most of this increase in trade stems from improvements in port efficiency (Wilson, et al., 2003).

Portugal-Perez & Wilson (2010) drew on this approach of Wilson, Mann and Otsuki (2003) to create trade facilitation indicators which were used to determine the impact of trade faciliation on export performance. They used a statistical modelling technique called factor analysis to create four derived trade facilitation indicators from 18 primary variables which were used in a gravity model with the typical controls and found that infrastructure was the driving trade facilitation indicator for improving trade between countries. Apart from factor analysis, Iwanow & Kirkpatrick (2009) constructed trade facilitation indicators by applying a simple average to primary indicators to investigate how improving trade facilitation will improve trade in African counties. Another approach used by Francois & Manchin (2007) constructed indicators on infrastructure and institutional quality using principal components from various primary variables. However, even though the indicators produced were robust determinants of export performance, they were difficult to interpret.

We will draw on this methodology used by Wilson, Mann and Otsuki (2003) and Portugal-Perez & Wilson (2010) to derive our trade facilitation indicators and not only collected the WEF variables used by Wilson, Mann and Otsuki (2003) and Portugal-Perez & Wilson (2010) but also recent indicators available for the period 2012 – 2016. In addition, we will draw on the factor analysis approach adopted by Portugal-Perez & Wilson (2010) to construct our trade facilitation indicators. Using a simple average will not allow us to properly weight the effect of each primary variable in our indicators and as a result we may not be able to determine the driving factors within each indicator. Using principal components to create trade facilitation indicators will provide us with the surety that our indicators are robust determinants of export diversification; however, interpreting them will prove difficult.

As the focus of this paper is on the impact of trade facilitation on export diversification, we need to review literature on the measure of export diversification. Matthee & Santana-Gallego (2017) in an attempt to determine the determinants of export diversification in South Africa measured export diversification as the number of product lines exported from South Africa to other countries which was collected from the United Nations' Commodity and Trade Database (UNCOMTRADE) for 2012. Other measures of export diversification includes the increase in the number of exporting firms (Lawless, 2010; Persson, 2013; Dennis & Shepherd, 2011), the number of export destinations served by product and by the number of products exported by destination (Beverelli, et al., 2015).

These measures of export diversification and trade facilitation have been used to study the impact of trade facilitation on export diversification. Such studies include works from Feenstra & Ma (2014) who examined the link between trade facilitation and export variety for a broad cross-section of countries. They used port efficiency as their measure of trade facilitation and found that port efficiency contributes to export diversification. Lawless (2010) used a Melitz-style model to show that reducing trade costs raises export diversification by increasing the number of exporting firms. Debaere and Mostashari (2010) using probits with country and good effects show that tariff reductions have a small but significant positive impact on the extensive margin. Dutt, Mihov and Van Zandt (2013) showed that the World Trade Organization membership increases export diversification by 25%. Beverelli, et al (2015) analysed the impact of trade facilitation on export diversification and measured export diversification by the number of export destinations served by product and by the number of products exported by destination.

Persson (2013) tested whether trade facilitation affects export diversification by counting the number of 8-digit products that are exported from developing countries to EU countries and used this as a dependent variable their gravity model estimation. Persson (2013) used the number of days required to export a good as a proxy for export transaction costs and found that reducing transaction costs by 1% would increase export diversification by 0.6%. Persson (2013) uses a Poisson estimation strategy due to the fact that the dependent variable which is the number of exported products takes the form of non-negative count data which is similar to the approach by Dennis & Shepherd (2011).

Making use of the methodology of Wilson, Mann and Otsuki (2003) and Portugal-Perez & Wilson (2010) to construct our trade facilitation indicators will allow us to efficiently focus on the on-the-border import costs while still controlling for the other aspects of trade facilitation which have proved to have an impact on export diversification. This will contribute substantially to existing literature in that most empirical papers have used one measure of trade facilitation which does not completely represent the various aspects of trade facilitation and the interrelationship between these indicators. Furthermore, this paper will use the number of product lines as a measure export diversification which is similar to the approach used by Persson (2013), Dennis & Shepherd (2011) and Matthee & Santana-Gallego (2017).

In terms of the econometric approach to investigate the impact of trade facilitation on export diversification, we will mark use of a Poisson estimation strategy due to the fact that the dependent variable which is the number of exported product lines takes the form of non-negative count data which is similar to the approach by Persson (2013) and Dennis & Shepherd (2011). Estimating using OLS will result in biased estimates as zero values will be considered missing, which will lower the amount of observations and not be very representative as some countries may export nothing from South Africa in some years and we still need to capture this result. As we have a panel dataset of 124 countries over the period 2012 – 2016 which can allow us to not only to determine the impact between countries but also across time which contributes substantially to the literature as most empirical papers, unlike Portugal-Perez & Wilson (2010), contain only one year of data making their analysis represent only static impacts as opposed to impacts of trade facilitation on export diversification across time. Lastly, most of the empirical papers focus on bilateral trade between all countries or on a specific group of countries. This paper attempts to do this for a specific country, South Africa, to determine the impact of trade facilitation on South Africa's export diversification.

3. CONSTRUCTING TRADE FACILITAION INDICATORS USING FACTOR ANALYSIS AND MEASURING EXPORT DIVERSIFICATION

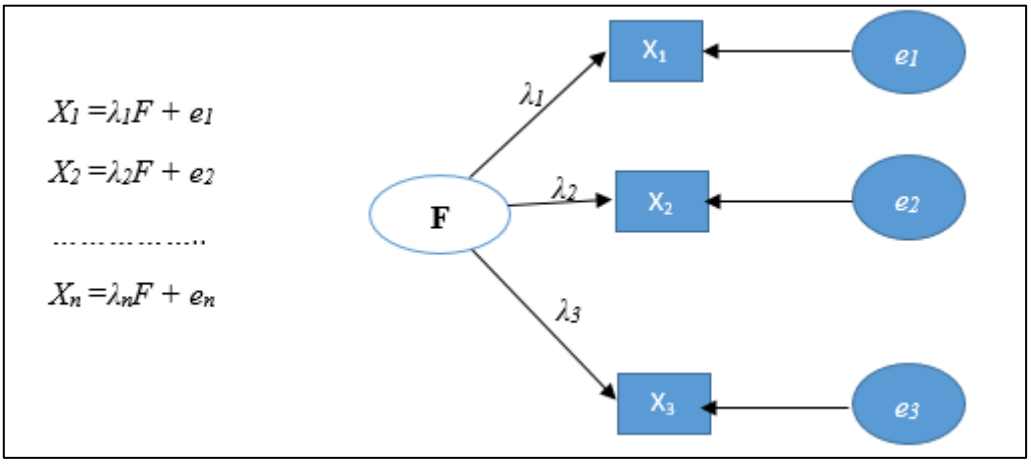
This section will provide our approach to constructing trade facilitation indicators, provide a measure of export diversification and determine the relationship between trade facilitation and export diversification for South Africa.

Constructing the Trade Facilitation Indicators

There are several approaches to constructing aggregate indicators from primary variables. The easiest method to construct an aggregate indicator is by creating a simple average of the primary variables, however, this lies on the assumption that each of the primary variables' holds equal importance and will be equally weighted in the indicators. Another approach, called Principal component analysis which transforms the data to a new coordinate system such that the largest variance by any given projection of the data comes to lie in the first coordinate or principal component, the second largest variance lies in the second coordinate and so on (Portugal-Perez & Wilson, 2010). This approach was adopted by Francois & Manchin (2007) to construct infrastructure and institution indicators.

Another approach, called factor analysis which unlike principal component analysis that attempts to "explain" correlations between some observed variables (X_1, X_2,…, X_n) through the linear combination of a few unobserved random factors (Fs). For the single factor, F, the model below explains the process:

Figure 1: Constructing Trade Facilitation Indicators using Factor Analysis



Source: *Portugal-Perez & Wilson (2010)*

where $\lambda_1, \lambda_2, \ldots, \lambda_n$ are the loading factors associated with respective observed variables X_1, $X_2, \ldots, X_n$. The procedure produces an estimation of the factor loadings which provides information on the correlation between the common factor (F) and each variable and the weight each factor holds in the common factor; the larger the factor load, the more important the variable and the larger its weight in the common factor. The procedure also produces an estimate of the common factor which gets retained as the derived/aggregate indicator. This approach was used by Portugal-Perez & Wilson (2010) to create trade facilitation indicators to determine the impact of trade facilitation on export performance and this approach will be adopted in this paper to also create trade facilitation indicators.

Traditionally, the factor analysis approach requires a first explanatory phase to identify the variables that are the most correlated with one another, dropping variables that are not highly correlated and grouping them accordingly. However, in this paper we have based our selection of variables on theoretical expectations and assumptions. We pool 17 primary variables collected from the WEF's Global Competitiveness Report and selected indicators associated with trade facilitation which were available for at least 100 countries for the period 2012-2016. As a result of the primary variables being of various scales and units, we re-scaled each indicator on a continuous 0 to 1 scale - with values close to 1 indicating more advanced along the measurement dimension - which will be used in our factor analysis procedures.

We perform the factor analysis procedure on each sub-group of variables that have variables that are highly correlated with each other. The factor analysis indicates four sub-groups of primary variables (1) *Information and communications technology (ICT),* which is the degree to which an economy uses ICT to improve efficiency, productivity and reduce transaction costs; (2) *Physical infrastructure,* which measures the quality and level of development of ocean ports, airports, roads and rail infrastructure; (3) *Border and Transportation efficiency,* which is the degree of efficiency of customs procedures and domestic transportation that is reflected in the cost, time and number of documents required to import from South Africa; (4) *Business and government environment*, which is the level of institutional quality for businesses and government. Table 1 presents the factor loadings and amount of variation explained by each primary variable for each derived indicator. The reported factor loadings will be used to construct a single estimated factor for each group, which will represent our trade facilitation indicators. Table 2 presents the descriptive statistics on the primary and synthetic trade facilitation indicators and the country which has the lowest and highest performance for the respective indicator in the panel.

Table 1: Factor Loading of the derived Trade Facilitation Indicators

Information and Communications Technology					
Cumulative Variance			**Rotated factor loadings**		
Factor	**Variance**	**Proportion**	**Variable**	**Factor1**	**Uniqueness**
ICT	1.757	0.626	Availability of latest technologies	0.814	0.095
			Firm-level technology absorption	0.645	0.101
			Gov't procurement of advanced tech products	0.297	0.467
			Individuals using Internet	0.768	0.357
Physical Infrastructure					
Cumulative Variance			**Rotated factor loadings**		
Factor	**Variance**	**Proportion**	**Variable**	**Factor1**	**Uniqueness**
Infrastructure	2.358	0.849	Quality of roads	0.782	0.195
			Quality of railroad infrastructure	0.644	0.408
			Quality of port infrastructure	0.818	0.212
			Quality of air transport infrastructure	0.814	0.224
Business Environment					
Cumulative Variance			**Rotated factor loadings**		
Factor	**Variance**	**Proportion**	**Variable**	**Factor1**	**Uniqueness**
Business Environment	2.341	0.513	Public trust in politicians	0.885	0.031
			Irregular payments and bribes	0.451	0.019
			Ethics and corruption	0.698	0.002
			Favouritism in decisions of gov't officials	0.758	0.077
			Transparency of gov't policymaking	0.541	0.275
Border and Transport Efficiency					
Cumulative Variance			**Rotated factor loadings**		
Factor	**Variance**	**Proportion**	**Variable**	**Factor1**	**Uniqueness**
Border and Transport Efficiency	1.350	0.737	Number of documents to import	0.370	0.486
			Number of days to import	0.216	0.586
			Burden of customs procedures	0.765	0.316
			Prevalence of trade barriers	0.762	0.395

Source: *Author's Calculations*

Table 2: Descriptive Statistics of Primary and Derived Trade Facilitation Indicators

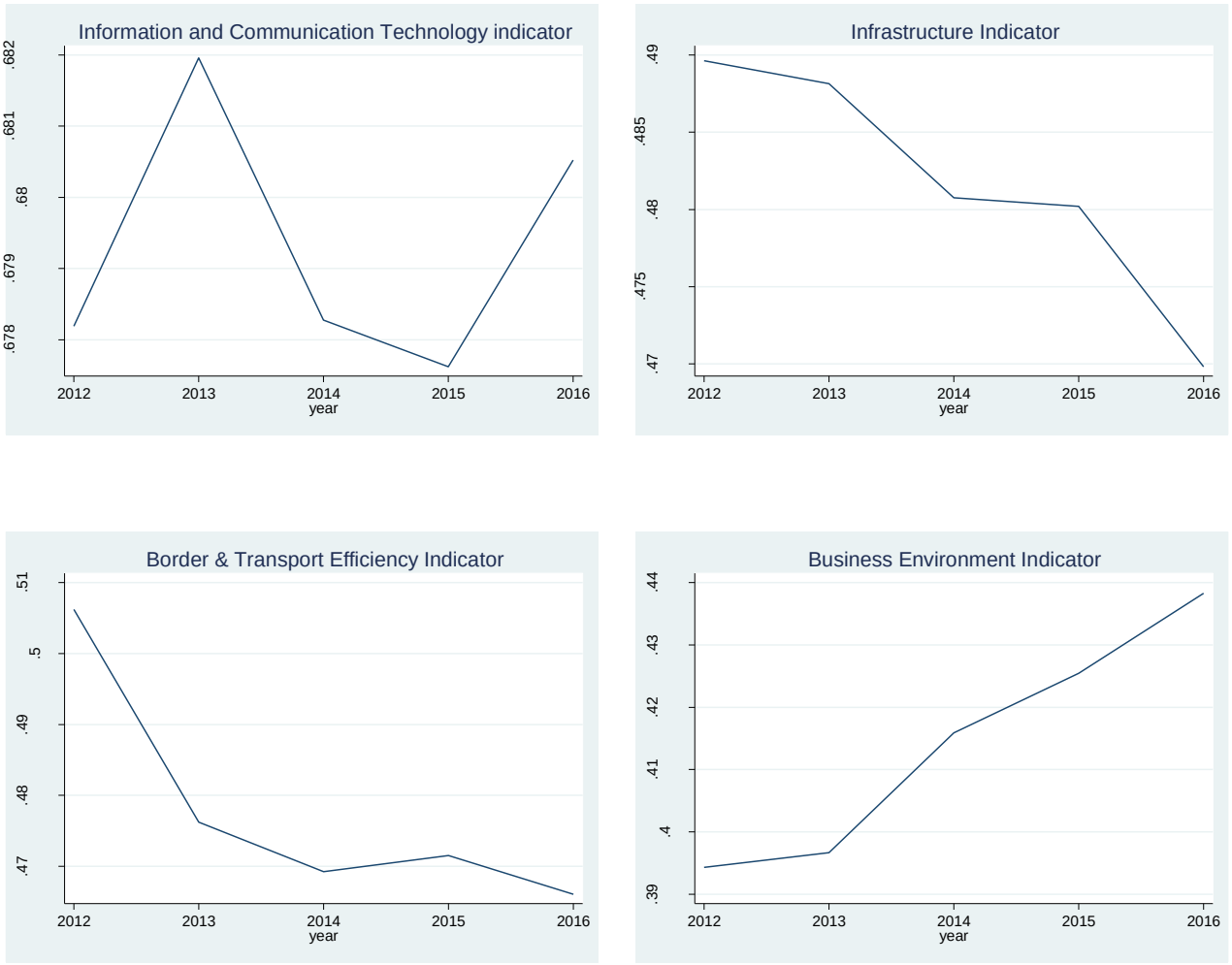
VARIABLES	Mean	SD	Lowest Performance	Min	Highest Performance	Max
Information and Communications Tech. Indicator	0.685	0.156	Liberia	0.345	Finland	1
Availability of latest technologies	0.639	0.168	Myanmar	0.176	Sweden	1
Firm-level technology absorption	0.531	0.188	Myanmar	0	Sweden	0.973
Individuals using Internet	0.434	0.291	Bangladesh	0.003	Norway	0.981
Gov't procurement of advanced tech products	0.413	0.131	Venezuela	0.052	Norway	0.828
Infrastructure Indicator	0.487	0.213	Haiti	0.014	Hong Kong	1
Quality of roads	0.493	0.228	Rep. of Moldova	0	Singapore	0.986
Quality of railroad infrastructure	0.375	0.243	Lebanon & Suriname	0	Switzerland	0.996
Quality of port infrastructure	0.53	0.201	Kyrgyzstan	0.012	Hong Kong	0.998
Quality of air transport infrastructure	0.558	0.199	Bosnia Herzegovina	0.091	Hong Kong	1
Border & Transport Efficiency Indicator	0.487	0.159	Argentina	0.006	Hong Kong	1
Number of documents to export	0.682	0.17	Venezuela	0.050	New Zealand	1
Number of days to export	0.968	0.051	Suriname	0	New Zealand	1
Burden of customs procedures	0.504	0.172	Venezuela	0.028	Hong Kong	1
Prevalence of trade barriers	0.489	0.139	Argentina	0.055	New Zealand	0.935
Business Environment Indicator	0.397	0.213	Hungary	0.002	Singapore	1
Public trust in politicians	0.336	0.21	Brazil	0.033	Singapore	0.989
Irregular payments and bribes	0.44	0.255	Mauritania	0	New Zealand	1
Ethics and corruption	0.418	0.221	Venezuela	0.082	Singapore	1
Favouritism in decisions of government officials	0.388	0.187	Venezuela	0.033	Sweden	0.983
Transparency of government policymaking	0.54	0.158	Italy	0.170	Singapore	1

***Source**: Author's Calculations*

Figure 2 shows the evolution of the trade facilitation variables over the period 2012 – 2016. Average ICT showed small fluctuations between 2012 and 2016, however, there is a slight improvement of the indicator over the period. Average infrastructure ranges between 0.47 and 0.49 and shows a small declining trend over the period. Average border and transport efficiency ranges between 0.46 and 0.51 and shows a small decline over the period. Average business environment ranges between 0.39 and 0.44 and shows a small increase over the period.

Noticeably, the evolution of these variables over time is incrementally small, however, we can see that there is a trend in these variables even though it is very small.

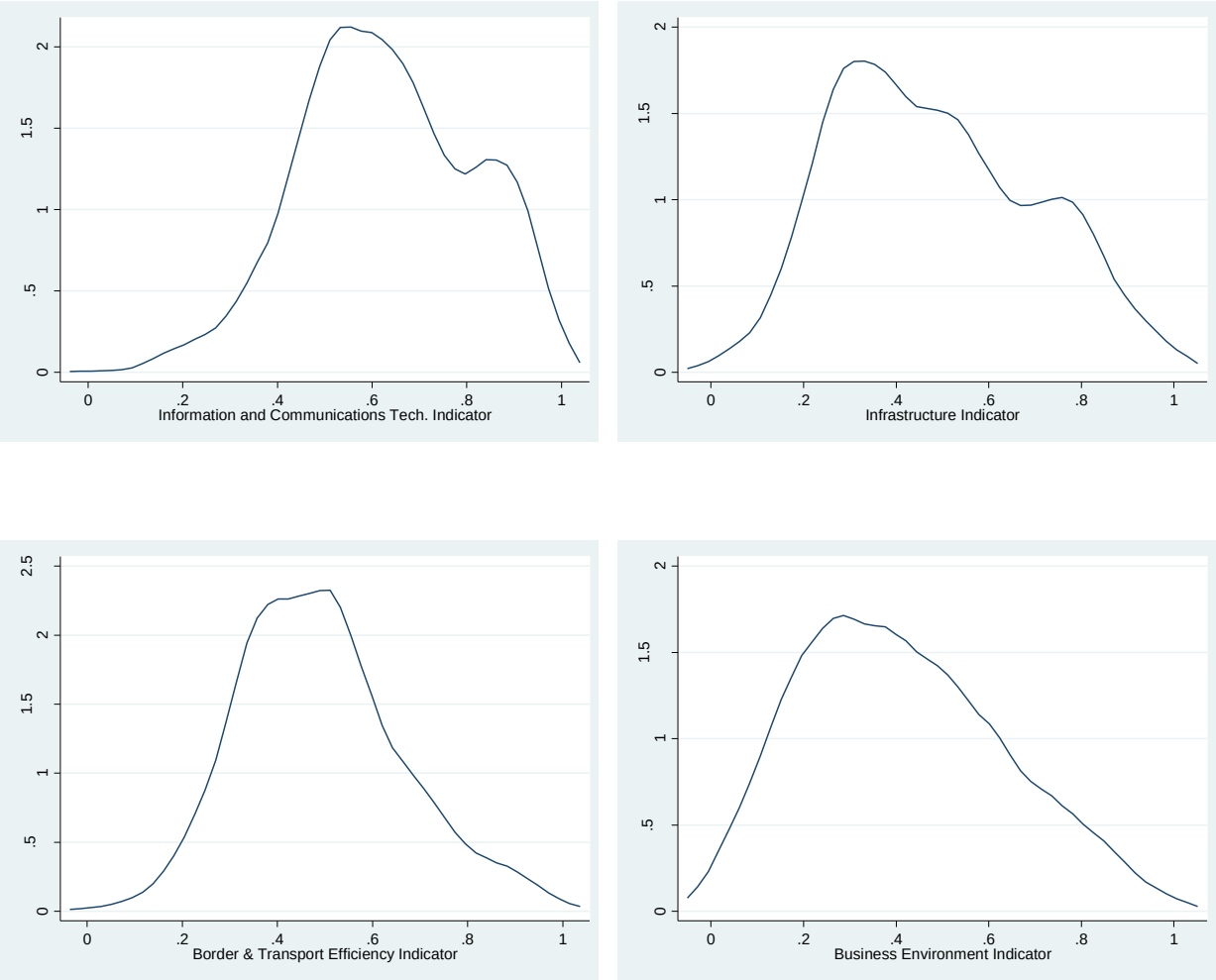
Figure 2: Average trade facilitation indicators for each year, 2012 - 2016



Source: *Author's Calculations*

Figure 3 shows the distribution of the trade facilitation variables over the period 2012 – 2016. ICT seems to be heavily distributed between 0.4 and 1 suggesting many countries have relatively high levels of ICT. Infrastructure is concentrated between 0.2 and 0.8 but peaking at 0.3 suggesting that a large amount of countries have average levels of infrastructure. Border and transport efficiency looks the most normally distributed compared to the rest and peaks at around 0.5 suggesting a good amount of variation in border and transport efficiency among the countries. Business environment seems to be skewed to the left suggesting that majority of countries have low levels of business environment.

Figure 3: Kernel Density plot of each trade facilitation indicator, 2012 - 2016



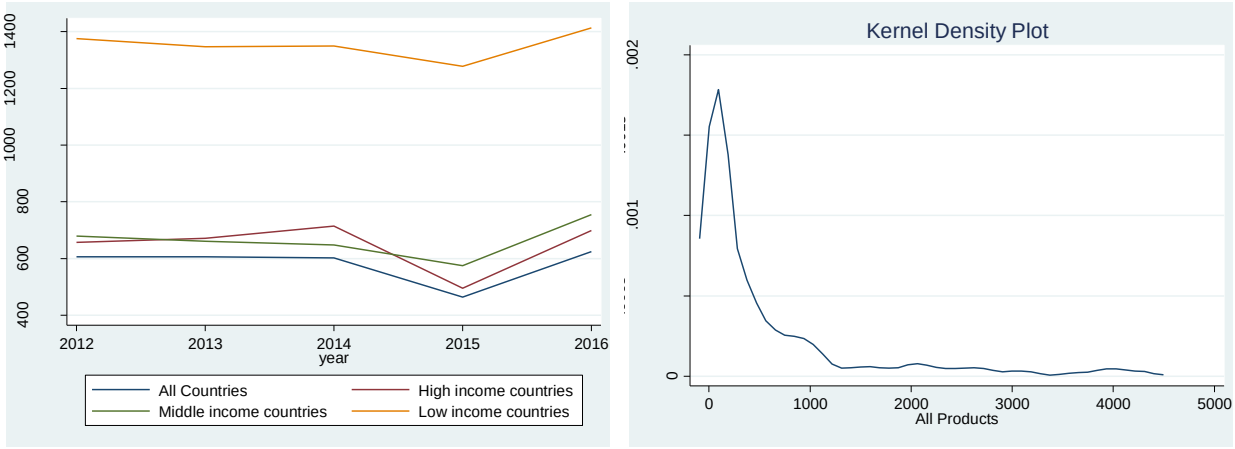
Source: *Author's Calculations*

Measuring export diversification

The most obvious way to measure export diversification is to count the number of products exported for each country each year. However, this is not a simple task because individual products identified in trade data are categorised under many distinct categories. For that reason; South African exports has been disaggregated by product from 2012-2016 and was sourced from the United Nations' Commodity and Trade Database (UNCOMTRADE) which provides data on the trade of products disaggregated by product up to Harmonised System 6-digit level (HS6) and in that way, we can count the number of product lines being exported from South Africa. In this paper, export diversification means an increase in the number of product line country exports, similar to the approach in Dennis & Shepherd (2011), Persson (2013) and

Matthee & Santana-Gallego (2017). The limitation to this approach to measuring export diversification is that it treats all products the same which means that we consider the number of manufacturing product lines exported to one country equal to the number of animal product lines exported to another country. Furthermore, export restrictions are expected to be different for heterogenous and homogenous goods and this is not captured in the export diversification measure used in this paper. However, this can be an area for further research. Figure 4 shows the average number of product lines over the period 2012 – 2016 and distribution of the number of product lines.

Figure 4: Average export diversification per year and distribution of export diversification, 2012 - 2016



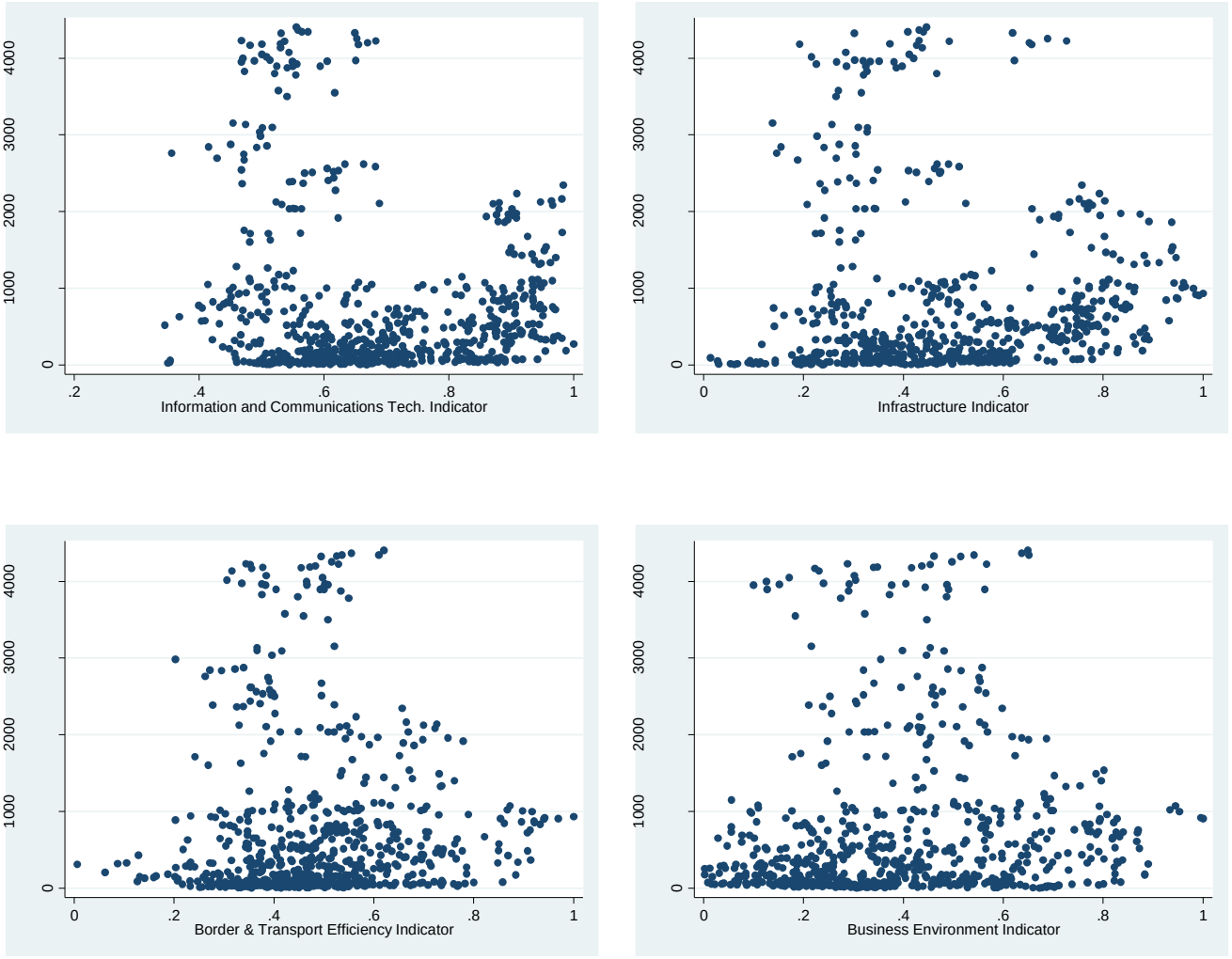
***Source**: Author's Calculations*

From figure 4, the average number of product lines for all countries remained fairly constant between 2012 and 2014, followed by a substantial decline in 2015 and a sharp increase in 2016 overshooting the 2012 and 2014 level of product lines. The visible decline came about due to many factors including decline in commodity prices for the main mining products exported by South Africa, closing of mines, a contraction in manufacturing sector and labour unrest which resulted in a decline in exports. A further decomposition of the average number of product lines reveals that low-income countries import on average vastly more than middle and high-income countries and middle-income countries on average import slightly more than high-income countries. The number of product lines is highly skewed toward the lower end of the distribution suggesting that a large number of countries import only a small variety of product lines and very few countries import a vast variety of products from South Africa.

Linking trade facilitation and export diversification for South Africa

According not only to trade theory but also the empirical evidence presented in the literature review, lower trade costs should be associated with higher levels of export diversification. Figure 5 shows scatterplots of the four trade facilitation indicators against the number of product lines exported from South Africa over the period 2012 - 2016.

Figure 5: Trade facilitation indicators against total number of product lines exported from South Africa, 2012 -2016



Source: Author's own calculations

A commonality between the scatter plots for the respective trade facilitation indicators against total number of products exported, show a concentration of points below 1000 products that generally extend the entire range of the indicator. This suggests that South Africa exports

a small variety of goods to majority of its importers and these importers all vary in their degrees of trade facilitation. However, as the export variety increases we find that these importers are clustered on the lower end of the scale. This suggests that South Africa exports large varieties of goods to importers with low levels of trade facilitation. Southern African countries have trade facilitation indicators clustered below 0,6 for all levels of export variety and Southern African countries import the largest product range.

4. TRADE FACILITATION AND EXPORT DIVERSIFICATION: MODEL ESTIMATION STRATEGY AND RESULTS

This section provides the description of the data, model estimation strategy and the estimation and results.

Data

The panel dataset includes 124 countries between 2012 and 2016. Trade facilitation factors used to construct our four trade facilitation indicators were sourced from the World Economic Forum (WEF) Global Competitiveness Report. Export diversification/Number of imported products lines from South Africa were sourced from the United Nations' Commodity and trade Database (UNCOMTRADE).

The standard gravity variables including distances between importing country and South Africa, common language and regional trade agreements which were sourced from the CEPII Gravity dataset. Economic variables; real GDP in current US$ and the total population of the country were sourced from the World Bank's Development Indicators (WDI),

Model Estimation strategy

The empirical method to investigating the determinants of international trade flows between countries - based on Isaac Newton's Law of Gravitation (1697) - postulates that trade between two countries can be compared to the gravitational pull between the two countries. The model hypothesises that trade between two countries are positively related to the size of the countries and negatively related to the distance between the two countries.

Our benchmark estimation is based on the following gravity model of international trade:

$$X_{ijt} = \beta_0 + \alpha_1 ln(ICT_{it}) + \alpha_2 ln(Infrastucture_{it}) + \alpha_3 ln(Border\_Transport_{it}) + \alpha_4 ln(Business\ Environment_{it}) + \beta_1 ln(1 + t_{ijt}) + \beta_2 ln(Y_{it}) + \beta_3 ln(P_{it}) + \beta_4 ln(D_{ij}) + \beta_5 Landlocked_i + \beta_6 Border_{ij} + \beta_7 Comlang_{ij} + \beta_8 EU_{it} + \beta_9 WTO_{it} + \beta_{10} SADC_{it} + \varepsilon_{ijt}$$

Equation 1

where i represents the importing country, j represents South Africa, t represents the period between 2012 and 2016, X_{ijt} represents the number of product lines imported from South Africa in year t. The independent variables have been categorised into four groups: (1) *Trade facilitation and regulation variables*, which include information and communication technology, physical infrastructure, border and transport efficiency and business environment indicators and the simple average tariff in the importing country; (2) *Economic variables*, which include the real GDP of the importing country and the population of the importing country to control for the level of demand for South African export products in the importing country; (3) *Geographical and cultural variables*, which affect the trade costs, these include the distance between the importing country and South Africa, dummy variables to indicate a landlocked importing country, has common land border with South Africa and whether the importing country has English as an official language; (4) *Regional trade agreements*, which control for whether the importing country belongs to the European Union (EU), World Trade Organisation (WTO) or Southern African Development Community (SADC).

Our benchmark empirical strategy (equation 1, presented above) is to determine the impact of trade facilitation on export diversification. Our focus will be on the on- the-border trade facilitation indicators that will represent the costs to import from South Africa. However, we will control for the other trade facilitation measures in our estimation strategy because they are important factors, could have an impact on export diversification and to ensure our estimation on export costs is unbiased.

As our export diversification measure (number of products exported) is discrete, we assume that the number of products exported to each country follows a Poisson distribution. The fact that our dependent variable is a discrete means that OLS estimation would provide biased estimates. Besides the fact that we have a discrete dependent variable, we also have a large amount of zero values in our dependent variable which could cause some over-dispersion which could be accounted for in a negative binomial estimation. We will check the robustness of our model (Poisson) against OLS and negative binomial.

Estimation and results

The estimates of our benchmark Poisson model excluding the other trade facilitation indicators are presented in column 1 of Table 3. The coefficients can be interpreted as elasticities and mostly have the expected signs. Border and transport efficiency has a positive significant coefficient suggesting that a 10% increase in border and transport efficiency is associated with a 0.48% increase in export diversification. These results suggest that trade facilitation which should reduce import trade costs has the potential to improve export diversification. In terms of the standard gravity model variables; tariffs, population, distance and landlocked have expected negative signs and are significant at the 1% significance level. GDP, common language and belonging to the EU has an expected positive coefficient and are significant at the 1% and 5% levels. The remaining standard gravity model variables; border, WTO and SADC membership are not significant.

Tariffs have a negative impact on export diversification which makes intuitive economic sense, in that an increase in tariffs would increase transport costs and thus decrease export diversification. In terms of export diversification, a positive coefficient on GDP and negative coefficient suggests that wealthier countries and countries with smaller population sizes import a larger variety of goods from South Africa, on average. Countries that are further away incur higher transport costs to import and hence distance has a negative impact on export diversification. Countries that are landlocked will on average import 6.7% less than a non-landlocked country, this suggests that transport costs increase if a country is landlocked. Countries sharing the same land border have no impact on export diversification. Countries that shares English as its official language with South Africa will on average import 10.2% more than a country that that does not share a common language to South Africa. This makes sense, in that, it will be harder to negotiate or promote trade if both parties do not share the same language and could result in additional trade costs for example, hiring a translator. Finally, among the regional trade agreements, only EU membership has a positive impact on export diversification whereas WTO and SADC membership has no impact.

Table 2: Poisson Regression Results for the Benchmark Model

VARIABLES	(1) Product lines	(2) Product lines	(3) Product lines	(4) Product lines	(5) Product lines
Ln(Border_Transport)	0.048***	0.049***	0.050***	0.053***	0.039***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Ln(Infrastructure)		0.090***	0.107***	0.127***	0.080***
		(0.013)	(0.014)	(0.014)	(0.015)
Ln(ICT)			-0.115***	-0.139***	-0.077**
			(0.030)	(0.030)	(0.031)
Ln(Business Environment)				-0.041***	-0.031***
				(0.007)	(0.007)
Ln(1+Tariff)	-1.132***	-1.189***	-1.188***	-1.185***	-1.235***
	(0.160)	(0.160)	(0.160)	(0.160)	(0.160)
Ln(GDP)	0.036***	0.038***	0.042***	0.045***	0.035***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Ln(Population)	-0.188***	-0.063*	-0.015	0.052	-0.163***
	(0.034)	(0.037)	(0.038)	(0.038)	(0.043)
Ln(Distance)	-1.047***	-1.226***	-1.252***	-1.327***	
	(0.298)	(0.269)	(0.258)	(0.247)	
Landlocked	-0.676***	-0.566**	-0.515**	-0.466**	
	(0.258)	(0.228)	(0.217)	(0.204)	
Border	-0.830	-0.901	-0.877	-0.888	
	(0.669)	(0.601)	(0.577)	(0.551)	
Common Language	1.018***	0.930***	0.917***	0.904***	
	(0.230)	(0.205)	(0.195)	(0.185)	
EU	0.751**	0.719***	0.745***	0.757***	
	(0.301)	(0.269)	(0.257)	(0.244)	
WTO	0.059	0.281	0.382*	0.466**	
	(0.264)	(0.236)	(0.226)	(0.213)	
SADC	0.737	0.623	0.588	0.518	
	(0.601)	(0.541)	(0.518)	(0.494)	
Observations	668	668	668	668	667
Number of countries	124	124	124	124	123
Note:					Country and time fixed effects

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From the results in column 1 of table 3, we can see that border and transport has a positive impact on export diversification. However, our benchmark model may contain some omitted variable bias due to the fact that there is other trade facilitation variables that we need to control for in order to ensure an unbiased coefficient on border and transport efficiency.

Column 2 – 4 presents the regression results for the successive inclusion of the other additional trade facilitation indicators: infrastructure, ICT and business environment, respectively.

Column 2 controls for infrastructure by including it as an additional independent variable. The coefficient on infrastructure shows that improving of infrastructure will increase export diversification. The coefficient on border and transport efficiency increases by 0.001 when we control for infrastructure. Column 3 controls for infrastructure and ICT. The coefficient on ICT is negative and significant suggesting that increase in ICT will decrease export diversification. However, this is not consistent with the expectations of ICT and its impact on export diversification which should be a positive effect of ICT on export diversification. This result could stem from the fact that South Africa exports a large variety of products to countries with low levels of ICT such as neighbouring Southern African countries or there may be some substitution effect in that increases in ICT would result in countries shifting toward importing less mining and agricultural products from South Africa and importing more technological products from other countries. The coefficient on border and transport efficiency increases by 0.001 when we control for infrastructure and ICT. Column 4 controls for infrastructure, ICT and business environment. The coefficient on business environment is negative and significant suggesting that business environment will decrease export diversification. This goes against the expectation that improving the business environment will increase export diversification. However, this result could again stem from the fact that South Africa is exporting a vast variety of products to countries with relatively low levels of business environment. The coefficient on border and transport efficiency increases by 0.003 when we control for infrastructure, ICT and business environment.

All the other variables in the regressions (columns 2-4) do not deviate far from those in the benchmark model (column 1). With every inclusion of more trade facilitation variables, in columns 2-4, our variable of focus, border and transport efficiency's coefficient increased. This suggests that the omission of these trade facilitation indicators biased our coefficient on border and transport efficiency downward from our benchmark model in column 1. Controlling for the other trade facilitation indicator proved to be important in removing bias in our border and transport efficiency variable.

Column 5 presents results of the regression on the benchmark model with all four trade facilitation variables with fixed effects. The two-dimensional fixed effects specification controls for both time and country-specific characteristics, this allows us to account for unobserved cross-country heterogeneity. From column 5 we see that the coefficient on border

and transport efficiency, though still highly significant, has decreased to 0.039 suggesting that when controlling for time and within country variation, a 10% increase in a country's border and transport efficiency will increase export diversification by 0.39%. Infrastructure still has a positive and significant impact on export diversification and ICT and business environment still has a negative and significant impact on export diversification. Tariffs have a negative impact on export diversification and wealthier countries with small population sizes have a positive impact on export diversification.

As mentioned previously, it is important to check the robustness of our model (Poisson) against OLS and Negative binomial. Traditionally, OLS is always used as a benchmark model especially when it comes to gravity model frameworks. However, given the fact that we have count data it would be better to use a Poisson model as OLS would produce biased estimators. The Negative binomial model is similar to the Poisson model however, it corrects for over-dispersion problems that could arise to excess zero values in the dependent variable. Table 4 presents the regression results of the Poisson, OLS and NB to check the robustness.

Table 4: Checking the Robustness of Poisson Regression Results against Ordinary Least Squares (OLS) and Negative Binomial (NB)

	Poisson	**OLS**	**NB**	**Poisson**	**OLS**	**NB**
VARIABLES	(1) Product lines	(2) Product lines	(3) Product lines	(4) Product lines	(5) Product lines	(6) Product lines
Ln(Border_Transport)	0.053***	28.919	0.052	0.039***	9.900	0.036
	(0.012)	(27.228)	(0.046)	(0.012)	(27.874)	(0.043)
Ln(Infrastructure)	0.127***	97.593***	0.204***	0.080***	57.407	0.166***
	(0.014)	(35.296)	(0.043)	(0.015)	(41.701)	(0.041)
Ln(ICT)	-0.139***	-103.913	-0.140	-0.077**	-79.296	-0.188**
	(0.030)	(87.905)	(0.104)	(0.031)	(93.291)	(0.094)
Ln(Business Environment)	-0.041***	-6.719	-0.034	-0.031***	-10.897	-0.030
	(0.007)	(13.750)	(0.022)	(0.007)	(14.235)	(0.021)
Ln(1+Tariff)	-1.185***	-982.799**	-1.202*	-1.235***	-831.201*	-1.134*
	(0.160)	(425.543)	(0.628)	(0.160)	(466.137)	(0.587)
Ln(GDP)	0.045***	51.706***	0.206***	0.035***	29.645	0.134***
	(0.008)	(20.054)	(0.040)	(0.008)	(24.478)	(0.041)
Ln(Population)	0.052	91.433***	0.183***	-0.163***	-310.269**	0.120**
	(0.038)	(28.323)	(0.044)	(0.043)	(129.769)	(0.053)
Ln(Distance)	-1.327***	-754.515***	-1.118***			
	(0.247)	(122.039)	(0.191)			
Landlocked	-0.466**	53.595	-0.124			
	(0.204)	(87.466)	(0.130)			
Border	-0.888	557.224**	0.048			
	(0.551)	(248.081)	(0.376)			
Common Language	0.904***	500.754***	0.569***			
	(0.185)	(81.946)	(0.125)			
EU	0.757***	257.427**	0.272*			
	(0.244)	(112.884)	(0.163)			
WTO	0.466**	233.184***	0.667***			
	(0.213)	(90.271)	(0.136)			
SADC	0.518	1,340.753***	1.343***			
	(0.494)	(223.948)	(0.340)			
Observations	668	668	668	667	668	667
Number of countries	124	124	124	123	124	123
Note:				Country and Time fixed effects	Country and Time fixed effects	Country and Time fixed effects

Standard errors in parentheses

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

Column 1-3 of table 4 reports the regression results for the model presented in equation 1 and column 5-6 reports the regression results for the same model but with country and time

fixed effects. Comparing the results in column 1-3, we can see that OLS has very big coefficients and standard errors, however, we see that the even though the coefficients are very large the signs of the coefficients are similar to the Poisson regression. In comparison the NB is very similar to the Poisson not only in sign but also in size of the coefficients, however, it is important to note that the standard errors for the NB is larger than the Poisson for some variables and smaller for others. The same results prove true for column 4-6. Therefore, we can say that over-dispersion does not seem to be a problem due to the fact that the coefficients and signs are very similar.

Unbundling the effects of trade facilitation measures on export diversification

We can push the data further to attempt to unbundle the effects of specific trade facilitation measures on export diversification. As our focus is on-the-border trade facilitation because these variables should more accurately capture the effect of trade costs on export diversification. Other trade facilitation indicators; ICT, infrastructure and business environment should increase export diversification as the indicators improve. However, there is no way to isolate the effect these variables have on growth, productivity and overall development within the country which could influence the on-the-border transport costs.

Within the infrastructure indicator – which is a construction of four variables including road, railway, ocean port and airport quality – there is evidence to suggest that ocean port and airport infrastructure has a considerable positive influence on export diversification. Column 1 of table 5 includes port and airport infrastructure in our benchmark gravity model. Ocean ports and airport infrastructure is negative and ocean port infrastructure is significant. This is an expected result because we expect ocean port and airport infrastructure to be highly correlated with the aggregate infrastructure indicator hence the negative signs on ocean ports and airports. However, the fact that ocean port is significant indicates that it is the most significant factor in driving infrastructure which is consistent with the results found by Clark, et al. (2004) and Wilson, Mann and Otsuki (2003) that port efficiency has a significant positive impact on trade and export diversification, respectively.

Table 5: Poisson Regression Results– Unbundling Trade Facilitation indicators

VARIABLES	(1) Product lines	(2) Product lines	(3) Product lines
Ln(Border_Transport)	0.052***		
	(0.012)		
Ln(Number of documents to import)		-0.030	-0.011
		(0.028)	(0.028)
Ln(Number of days to import)		0.382	0.638**
		(0.268)	(0.271)
Ln(Burden of customs procedures)		0.080***	0.048***
		(0.014)	(0.015)
Ln(Prevalence of trade barriers)		0.013	0.012
		(0.010)	(0.010)
Ln(Infrastructure)	0.205***	0.177***	0.213***
	(0.051)	(0.053)	(0.053)
Ln(Quality of port infrastructure)	-0.048*	-0.033	-0.066**
	(0.028)	(0.028)	(0.029)
Ln(Quality of air transport infrastructure)	-0.037	-0.034	-0.099***
	(0.033)	(0.035)	(0.036)
Ln(ICT)	-0.135***	-0.103***	-0.052
	(0.030)	(0.031)	(0.032)
Ln(Business Environment)	-0.042***	-0.049***	-0.039***
	(0.007)	(0.007)	(0.007)
Ln(1+Tariff)	-1.159***	-1.189***	-1.280***
	(0.162)	(0.164)	(0.164)
Ln(GDP)	0.045***	0.047***	0.036***
	(0.008)	(0.008)	(0.008)
Ln(Population)	0.043	0.086**	-0.183***
	(0.039)	(0.041)	(0.049)
Ln(Distance)	-1.329***	-1.393***	
	(0.248)	(0.241)	
Landlocked	-0.479**	-0.455**	
	(0.206)	(0.198)	
Border	-0.901	-0.912*	
	(0.553)	(0.536)	
Common Language	0.902***	0.884***	
	(0.186)	(0.179)	
EU	0.748***	0.732***	
	(0.246)	(0.237)	
WTO	0.455**	0.506**	
	(0.215)	(0.208)	
SADC	0.522	0.479	
	(0.497)	(0.481)	
Observations	668	667	666
Number of countries	124	124	123

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Column 2 includes ocean port and airport infrastructure and all the variables included in the border and transport efficiency to determine the variables driving the effect of border and transport efficiency on export diversification. Included in the border and transport efficiency variable is: number of documents to import, number of days to import, burden of customs procedures and prevalence of trade barriers and the results in column 2 show that only the burden of customs procedures is positive and significant. This suggests that custom procedures is the driving indicator behind border and transport efficiency and that improving custom procedures will increase export diversification, this is consistent with results found by Wilson, Mann and Otsuki (2003) and Feenstra & Ma (2014). Infrastructure remains positive and significant whereas its components ocean port and airport infrastructure is negative and insignificant.

Column 3 includes time and country-specific fixed effects of the regression in column 2. When controlling for time and within country variation we find that not only is the custom procedures significant but now the number of days to import is also positive and significant. This tells us that improving custom procedures and lowering the amount of days to import will increase export diversification. This result is consistent with the finds of Persson (2013) that improving the number of days to import will improve export diversification. We also find that infrastructure is positive and significant and ocean port and airport infrastructure is negative and significant.

Alternative country samples

Thus far we have included all countries in our model. However, it is important to confirm that our results hold when using an approach that can take account of the differences in conditions faced by different countries according to their level of income. Column 1 of Table 6 represents the estimates – based on the World Bank country income groups – on upper-, middle- and lower-income countries. To account for the different income levels, we have included an interaction term between border and transport efficiency and dummy variable for income level containing high, middle and low-income categories to determine the marginal effect of border and transport efficiency on the three country income groups.

Column 1 of table 6 presents the results of the interaction term of border and transport efficiency and income level. The coefficient represents the responsiveness of effect of border and transport efficiency if a country is of low, middle or high income on export diversification. Border and transport efficiency for low and high-income countries is positive and significant

but positive and insignificant for middle income countries. High income countries experience a larger increase in export diversification for a given 10% increase in border and transport efficiency compared to lower income countries.

Table 6: Poisson Regression Results for Income Level and Excluding Outliers

VARIABLES	(1) Product lines	(2) Product lines
Ln(Border_Transport)		0.068***
		(0.017)
Ln(Border_Transport)*Low Income	0.054**	
	(0.023)	
Ln(Border_Transport)*Middle Income	0.001	
	(0.014)	
Ln(Border_Transport)*High Income	0.227***	
	(0.034)	
Ln(Infrastructure)	0.076***	-0.017
	(0.015)	(0.027)
Ln(ICT)	-0.066**	-0.170***
	(0.031)	(0.052)
Ln(Business Environment)	-0.031***	-0.037***
	(0.007)	(0.009)
Ln(1+Tariff)	-1.197***	-2.062***
	(0.160)	(0.206)
Ln(GDP)	0.034***	0.025**
	(0.008)	(0.010)
Ln(Population)	-0.156***	-0.474***
	(0.043)	(0.073)
Observations	667	570
Number of countries	123	106
Note:		Excludes top 10% of most diversified observations

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Another issue relates a small amount of countries that import a large variety of products from South Africa. These would be considered outliers or influential data that could be driving the dynamics that primarily affect the countries that import a relatively smaller variety of products. To examine this, column 2 of Table 6 excludes the top 10% of the most diversified countries from the sample. When removing the top 10% of most diversified countries border and transport efficiency remains positive and significant, infrastructure is insignificant and ICT

and business environment still showing unexpected negative signs but significant. Therefore, removing the top 10% of most diversified countries does not change our coefficient on border and transport efficiency much and it still holds that improving border and transport efficiency will increase export diversification.

Endogeneity

We need to be cognisant of the fact that our measures of import costs experienced by importing countries may be endogenous, such as trade facilitation measures being driven by factors not included in our model. To ensure no endogeneity exists; firstly, we will use 4-year lags of GDP, as this measure would be exogenous with respect to present levels of export diversification. The results of this regression are presented in column 1 of table 7 and the coefficient on border and transport efficiency is significant and does not differ much from our baseline model.

Table 7: Poisson Regression Results with GDP lag and exclusions

VARIABLES	(1) Product lines	(2) Product lines	(3) Product lines	(4) Product lines
Ln(Border_Transport)	0.041***	0.040***	0.065***	0.058***
	(0.012)	(0.013)	(0.015)	(0.019)
Ln(Infrastructure)	0.062***	0.074***	0.034	-0.142***
	(0.015)	(0.016)	(0.022)	(0.043)
Ln(ICT)	-0.025	-0.051	-0.112***	0.065
	(0.030)	(0.037)	(0.041)	(0.066)
Ln(Business Environment)	-0.030***	-0.027***	-0.023***	-0.047***
	(0.007)	(0.007)	(0.008)	(0.009)
Ln(1+Tariff)	-1.438***	-1.356***	-1.507***	-2.561***
	(0.160)	(0.181)	(0.193)	(0.453)
Ln(GDP)		0.036***	0.035***	0.424***
		(0.008)	(0.009)	(0.027)
$Ln(GDP)_{4\text{-year lag}}$	-0.116***			
	(0.012)			
Ln(Population)	0.168***	-0.185***	-0.387***	-0.469***
	(0.055)	(0.048)	(0.061)	(0.114)
Observations	667	635	608	506
Number of countries	123	117	112	93
Note:		Excludes counties that share a border with South Africa	Excludes countries belonging to SADC	Excludes all African countries

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Secondly, we will attempt to remove endogeneity by excluding various sub-groups which result in endogeneity. This would include countries that share a common land border with South Africa because we could expect that export diversification would be higher with countries that share a land border due to low transport costs. Another exclusion can be countries belong to the Southern African Development Community (SADC) which should also have higher export diversification due to trade agreements between members of this regional trade agreement. And finally, excluding all other African countries due to their proximity to South Africa and ease in which trade between these countries can occur.

Column 2 excludes countries that share a common land border; this includes SACU members, Botswana, Lesotho, Swaziland and Namibia and Zimbabwe and Mozambique. The coefficient on border and transport efficiency is positive and significant. Infrastructure is

positive and significant, ICT is insignificant and business environment is negative and significant. Column 3 excludes not only countries that share a common land border but also SADC members. The coefficient on border and transport efficiency is positive and significant. Infrastructure is insignificant; ICT and business environment is negative and significant. Column 4 excludes countries sharing a common land border, SADC members and all other African countries. The coefficient on border and transport efficiency is positive and significant. Infrastructure is negative and significant, ICT is insignificant and business environment is negative and significant.

5. KEY FINDINGS AND CONCLUDING COMMENTS

This paper set out to investigate the impact of trade facilitation on export diversification in South Africa. This was done by making use of a panel of 124 countries ranging over the period 2012 – 2016, using a statistical approach called factor analysis was used to construct four new aggregate trade facilitation indicators from a wide range of primary indicators that measured many aspects of trade facilitation for each of the countries in the panel and the number of product lines exported from South Africa was used as a measure of export diversification. We included simple average import tariffs of each country, distance, GDP, population, geographical and cultural variables and regional trade agreements with South Africa. As our export diversification measure is discrete, we assume that the number of product lines exported to each country follows a Poisson distribution which follows the approach used by Dennis & Shepherd (2011) and Persson (2013). The focus of this paper was to determine the impact of on-the-border trade facilitation on export diversification.

The results reported in the previous section shows that the data supports the main argument of this paper, specifically that international transport costs negatively impact the South African export diversification. Accordingly, better trade facilitation presents policy options that could seem to have the opportunity to boost export diversification. Improvements to customs procedures and number of days to import from South Africa show the most significant positive effect on export diversification. Furthermore, transport infrastructure such as ocean ports and airports also show a significant positive effect on export diversification. These variables are trade facilitation measures that affect trade more than the other trade facilitation measures such as ICT, internal transport infrastructure and internal business environment. This is due to the fact that improvements in ICT, internal transport infrastructure

and business environment will increase trade through the improvement of an economy's GDP whereas the on-the-border trade facilitation measures affect trade more directly.

To conclude, this paper attempts to provide policymakers with information about the efficiency of interventions in border and transport efficiency but also in the other three areas of trade facilitation in South Africa. Areas for further research could delve into specific reform plans covering costs and benefits and further investigation into the effect of trade facilitation aid on export diversification. Furthermore, the results presented only tackled the impacts of trade facilitation on export diversification, without investigating their impact on productivity, growth and overall development which is linked to export diversification. Thus far, evidence from empirical studies suggests trade facilitation can impact each of these positively. Since data on trade costs are being updated on an annual basis, it is our hope that future research will use this available data to construct panel data consisting of many years to aid in identifying and controlling for unobserved cross-country heterogeneity and to delve into the dynamics of the export diversification process.

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