TIME TRENDS AND ASSOCIATIONS BETWEEN GROSS DOMESTIC PRODUCT VARIATIONS AND TRANSPORT SERVICE TRADE: EVIDENCE FROM SOUTH AFRICA

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ABSTRACT

Aim: The aim of the present paper is to analyse time trends in transport services trade and to determine associations between gross domestic product (GDP) growth and transport services trade for South Africa.

Methods: Associations between economic growth assessed through GDP as primary exposure and transport services for both exports and imports are reported for South Africa. Four indicators were used to assess transport services trade namely; percentage of commercial service exports; percentage of commercial service imports); percentage of service exports, balance of payment (BoP)] and percentage of service imports, BoP). Regressions were computed using Joinpoint statistical software to assess overtime trends for both exports and imports for transport services between 1992 and 2016. Trends in transport exports and imports services were assessed by calculating annual percentage changes (APC) using linear regression: $\text{rate}_y\ b_0+b_1\ y$ with log (rate_y) being the natural log of transport services (% of commercial service exports) in year y for example. APC in these services are reported and discussed.

Results: Significant decreases in transport service exports were observed between 1993 and 1997 (APC = -6.33 p-value <0.05) and 2011 and 2016 (APC = -4.18 p-value = <0.05). Additionally, non-significant percentage increases in transport services exports were observed between 1997 and 2001 (APC = 4.61) and 2004 and 2011 (APC = 2.3). Both a significant and non-significant increases in transport service imports was observed between 1993 and 2007 (APC =1.19 p-value <0.05) and 2010 and 2014 (APC=4.86) respectively. Additionally, non-significant percentage decreases in transport services imports were observed between 2007 and 2010 (APC=4.61) and 2014 and 2016 (APC=2.3). Though slightly different over time trends estimates in terms of the APC of observed for transports service exports and imports, BOP they were similar and comparable to commercial transport service exports and imports respectively. Overall, there was no correlation between GDP and transport service trade.

Conclusion: This study indicates that despite good ranking on the quality of infrastructure in Africa, South Africa has been experiencing a deficit transport services trade overtime. In addition, the results show that transport services trade was not trend associated with GDP growth in the time reported in the current study, as various fluctuations were observed.

Key words: Exports, imports, transport services, GDP growth, South Africa

INTRODUCTION AND BACKGROUND

Globalisation, trade liberalisation, deregulation of markets and the advent of reforms on services trade have been key drivers of the significant growth in services trade (Bas, 2014). Services trade is delivery of final services or individual components in the service production chain, across national borders, without movement of the producers or consumers (Ahmad, Kaliappan, & Ismail, 2017). In the last ten years, growth in services trade has surpassed the growth in goods or merchandise trade (Eichengreen & Gupta, 2013).

Efficient service sectors enhance economic activity and boost economic growth by providing intermediate inputs (Kandilov & Grennes, 2010). This is because services are inputs into the production of other goods and services (Hoekman & Shephard, 2017). Owing to these inter-industry linkages, the service sector contributes to growth through spillover effects (Francois & Hoekman, 2010). In addition, services trade influences countries' competitiveness level by providing crucial linkages and support to other sectors and industries in the economy (Ahmad, Kaliappan, & Ismail, 2017).

Services exports can be categorised as traditional service exports and modern service exports. Traditional service export, are characterised by low productivity and comprise travel and transport services while modern services comprise services such as insurance, business processing, communication legal and technical services etc (Eichengreen & Gupta, 2013). Transport services 'contribute to the efficient distribution of goods within and between countries and are the means through which service providers move to the location of clients and vice versa" (Hoekman & Shephard, 2017:).

Based on gross domestic product (GDP), South Africa is currently ranked the second largest economy in Africa (World Bank, 2017) and is considered as the economic hub of Africa. However, economic growth continues to be a key priority for South Africa as the economy continues to experience low growth. The services and trade sectors are key sectors identified by government as sources of potential growth. An analysis of the composition of South Africa's total exports reveals that services exports accounted for 16% of total exports and that traditional service exports made up the largest proportions (International Trade Centre, 2013). In particular, travel (tourism) and transportation accounted for 63% and 12%, respectively, of South Africa's total services exports in 2013 (International Trade Centre, 2013). The data shows that modern services exports contributed in smaller proportions compared to traditional services exports. This indicates that traditional services exports and transport services exports in particulars play an important role in South Africa's economy. The aim of this paper is to analyse overtime trends in transport services trade and to determine associations between GDP growth and transport services trade for South Africa.

METHODS

Data sources

Four indicators were used to assess transport services trade namely; of commercial service exports percentage of commercial service imports; percentage of service exports in BoP and percentage of service imports in BoP. "Transport services percentage of commercial service exports and imports covers all transport services (sea, air, land, internal waterway, space, and pipeline) performed by residents of one economy for those of another and involving the carriage of passengers, movement of goods (freight), rental of carriers with crew, and related support and auxiliary services and do not include government services" (WTO, 2017). Data on

transport services trade and gross domestic product (GDP) annual growth for South Africa was obtained from the World Banks's world development indicators' database from 1993 to 2016.

Data analysis

Trends in transport exports and imports services were assessed by calculating annual percentage changes (APC) using linear regression: $\log \left(rate_y\right) = b_0 + b_1 y$ with log ($rate_y$) being the natural log of transport services (% of commercial service exports) in year y for example. The APCs and p-values were calculated using the formula: $\left(e^{b1} - 1\right) \text{ X } 100$ from the Joinpoint Regression Program, version 4.3.1.0 in order to account for the size of the changes in exports and imports over time. A p-value less than 0.05 presents a statistically significant change. In addition, the trend associations between GDP annual growth and transport export and import services were computed by plotting standardised trends.

RESULTS

Table 1 shows Joinpoint Regression slope estimates for transport services exports and import between 1992 and 2016.

Table 1: Joinpoint regression slope estimates for transport services exports and imports between 1992 and 2016

Transport services (% of commercial service exports)				
Parameter	Parameter Estimate	Standard Error	Test Statistic (t)	Prob > |t|
Intercept 1	133.675045	38.756436	3.449106	0.006236
Slope 1	-0.065421	0.019432	-3.366727	0.007161
Slope 2 - Slope 1	0.110537	0.036353	3.040642	0.012449
Slope 3 - Slope 2	-0.169251	0.068701	-2.463583	0.033471
Slope 4 - Slope 3	0.146860	0.062320	2.356545	0.040189
Slope 5 - Slope 4	-0.065402	0.017224	-3.797067	0.003503
Transport services (% of commercial service imports)				
Parameter	Parameter Estimate	Standard Error	Test Statistic (t)	Prob > |t|
Intercept 1	-19.892585	5.266225	-3.777390	0.002304
Slope 1	0.011824	0.002634	4.489223	0.000609
Slope 2 - Slope 1	-0.075058	0.056242	-1.334550	0.204928
Slope 3 - Slope 2	0.110692	0.062811	1.762295	0.101499
Slope 4 - Slope 3	-0.133877	0.062811	-2.131411	0.052714
Transport services (% of service exports, BoP)				
Parameter	Parameter Estimate	Standard Error	Test Statistic (t)	Prob > |t|
Intercept 1	131.213807	39.038331	3.361153	0.007228
Slope 1	-0.061902	0.019573	-3.162613	0.010114
Slope 2 - Slope 1	0.110189	0.036618	3.009180	0.013136
Slope 3 - Slope 2	-0.171426	0.069201	-2.477227	0.032698
Slope 4 - Slope 3	0.145487	0.062773	2.317655	0.042944
Slope 5 - Slope 4	-0.065120	0.017350	-3.753402	0.003763
Transport services (% of service imports, BoP)				
Parameter	Parameter Estimate	Standard Error	Test Statistic (t)	Prob > |t|
Intercept 1	-22.410044	5.067517	-4.422293	0.000689
Slope 1	0.013067	0.002534	5.155909	0.000185
Slope 2 - Slope 1	-0.077204	0.054120	-1.426539	0.177286
Slope 3 - Slope 2	0.111428	0.060441	1.843567	0.088155
Slope 4 - Slope 3	-0.135192	0.060441	-2.236748	0.043457

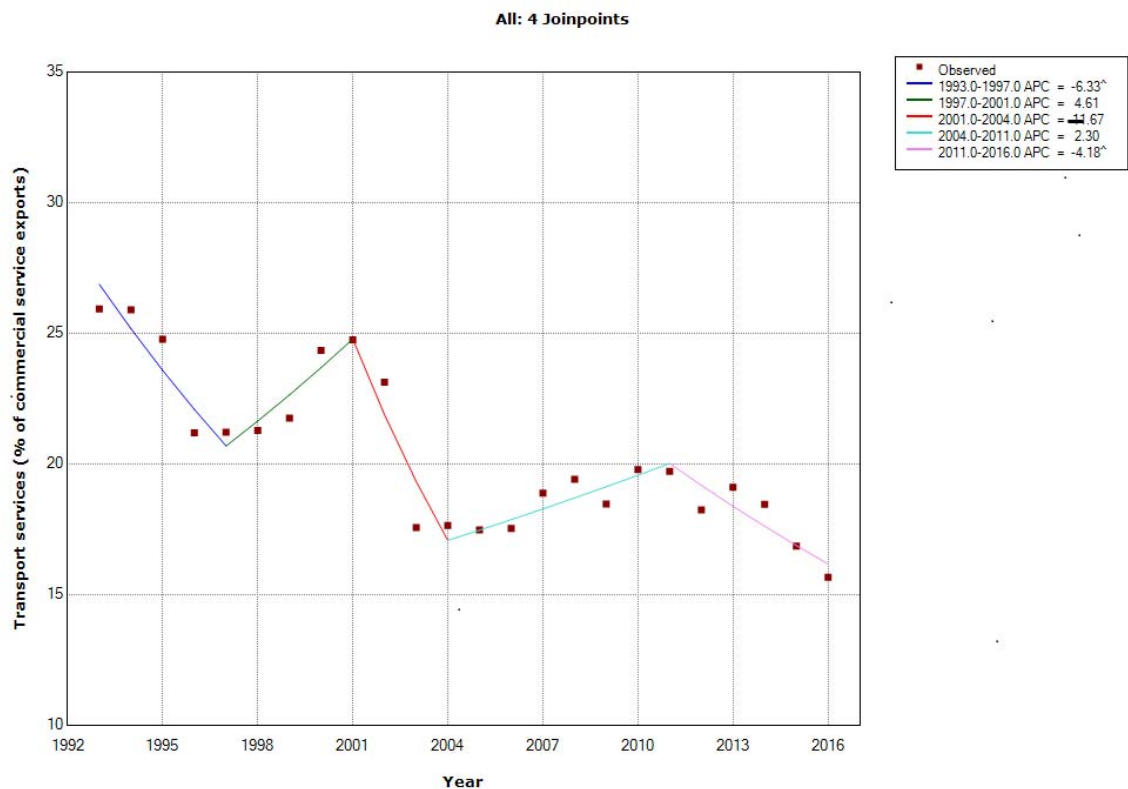**Transport services (% of commercial service exports)**

Figure 1: Transport services (% commercial services exports) between 1992 and 2016

Figure 1 presents over time trends between 1992 and 2016 in transport services as a percentage of commercial services exports. The figure shows periods of constant value lasting 3 years, 4 years, 3 years, 4 years, and 5 years followed by a 5-year decline. Statistically significant decreases in transport service exports were observed between 1993 and 1997 (APC = -6.33 p-value <0.05) and 2011 and 2016 (APC = -4.18 p-value = <0.05) (see Table 1). Additionally, non-significant percentage increases in transport services exports were observed between 1997 and 2001 (APC = 4.61) and 2004 and 2011 (APC = 2.3) (see Table 1). The overall trend suggests an overtime decreases in commercial transport service exports.

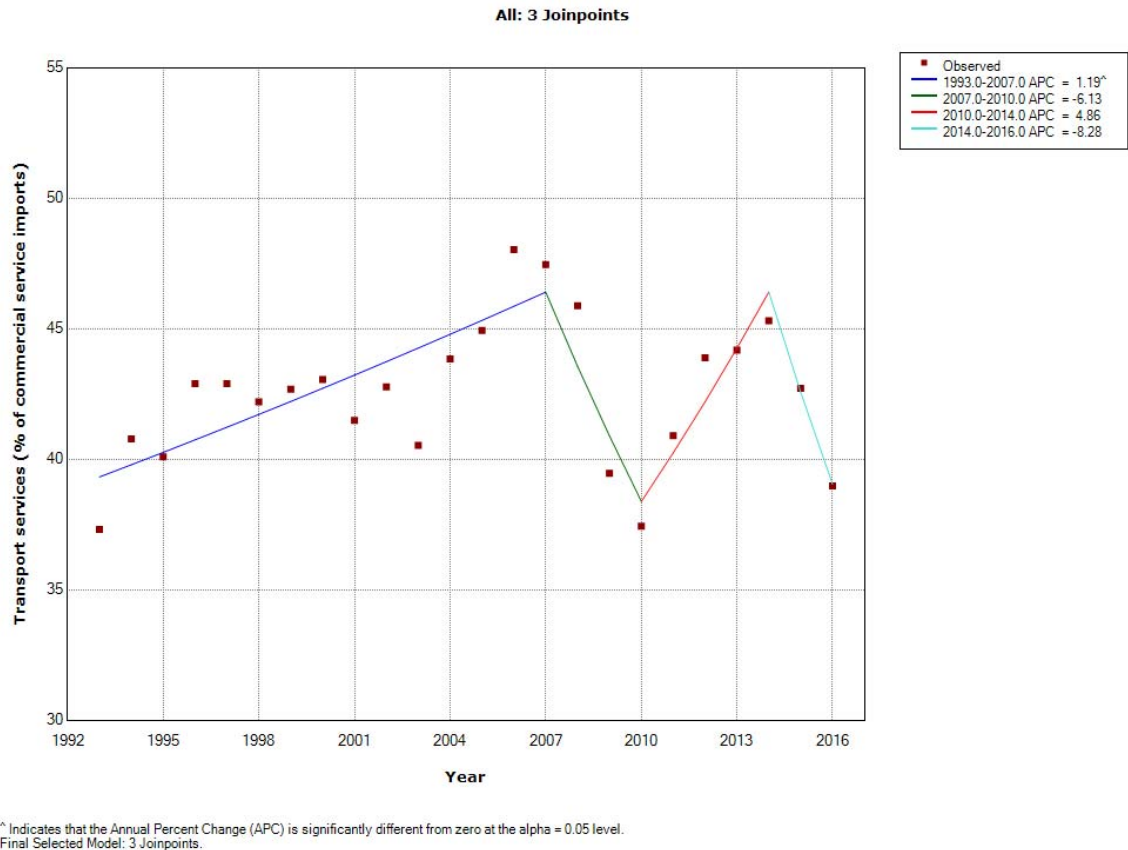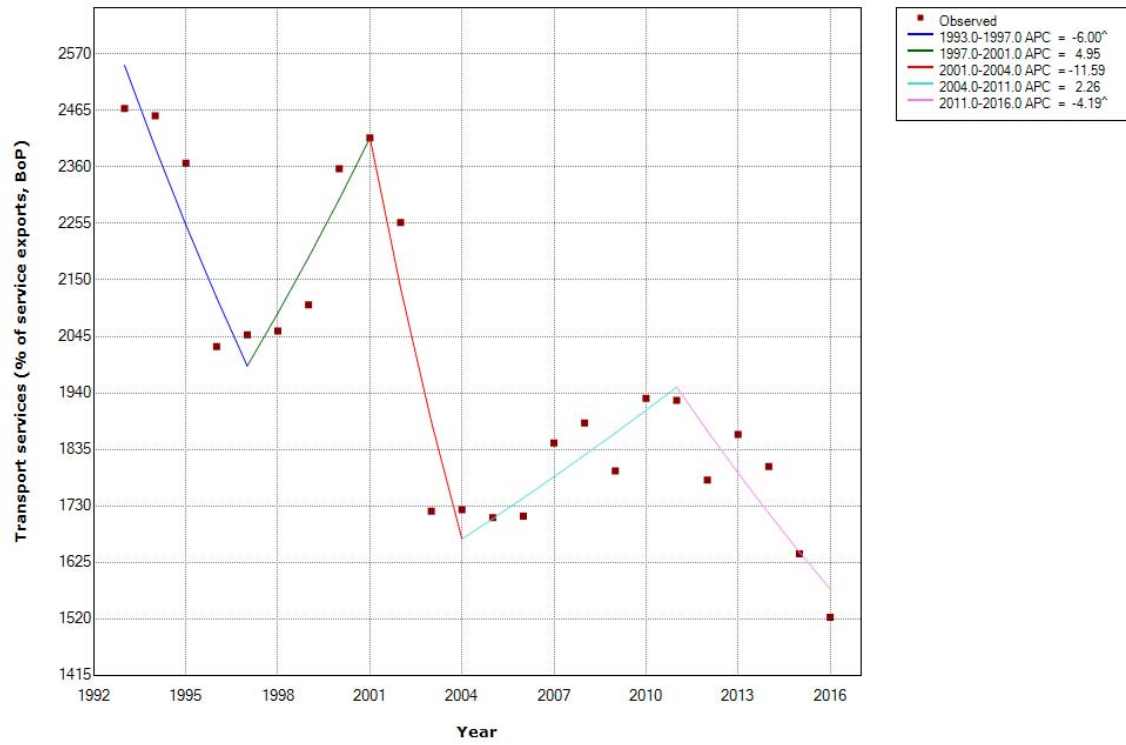**Transport services (% of commercial service imports)**

Figure 2: Transport services (% of commercial services imports) between 1992 and 2016

Figure 2 presents over time trends between 1992 and 2016 in transport services as a percentage of commercial services imports. Both a significant and non-significant increases in transport service imports was observed between 1993 and 2007 (APC =1.19 p-value <0.05) and 2010 and 2014 (APC=4.86) respectively. Additionally, non-significant percentage decreases in transport services imports were observed between 2007 and 2010 (APC=4.61) and 2014 and 2016 [APC=2.3]. Overall trend indicates over time fluctuations in commercial transport service imports. A comparison of export and import trends shows that exports generally decreased and imports increased between 1992 and 2002. Between 2002 and 2016 exports generally decreased and imports fluctuated.

**Transport services (% of services exports and imports of BoP)**

Figures 3 and 4 present overtime trends for transport services (% of services exports, BoP) and transport services (% of services imports, BoP) respectively. Though slightly different over time trends estimates in terms of the APC of observed for transports service exports and imports, BoP they were similar and comparable to commercial transport service exports and imports respectively (Figure 1 and 2).

Figure3: Transport services (% services exports of BoP) between 1992 and 2016
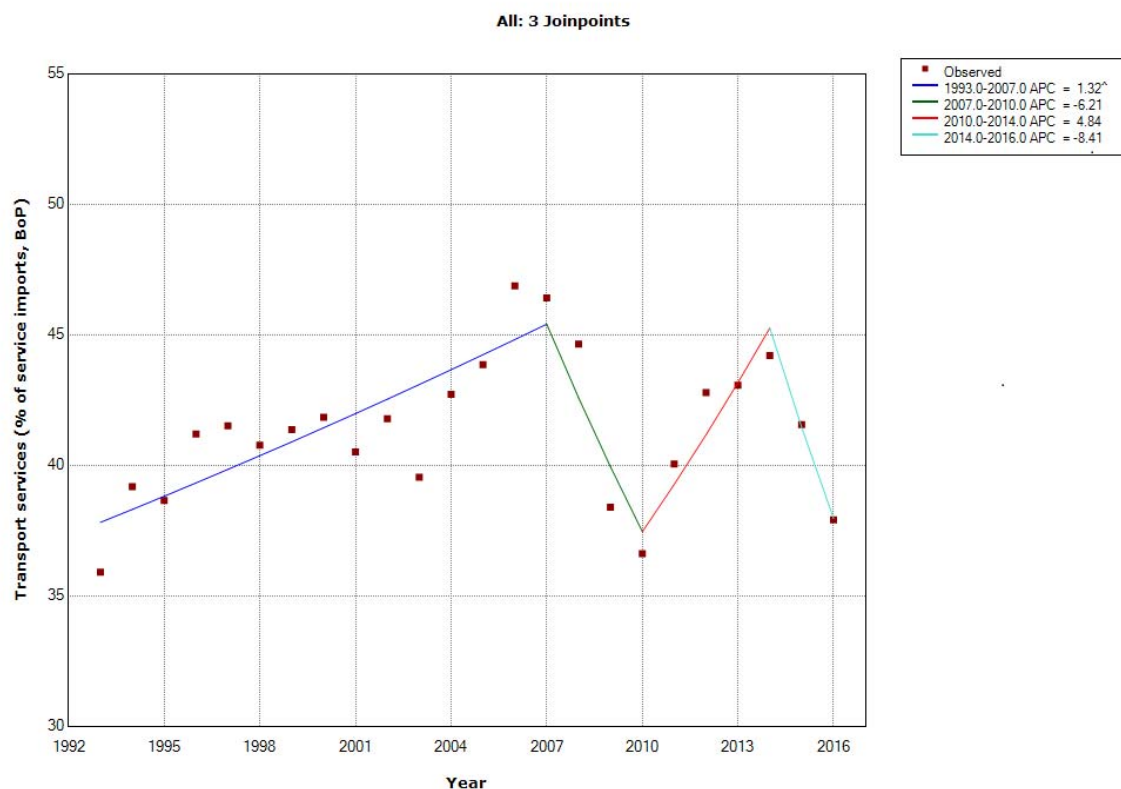
Figure 4: Transport services (% services imports of, BoP) between 1992 and 2016

Trend associations between transport services trade and GDP variation

Trends for transport services as a percentage of commercial services imports and transport services as a percentage of services imports, of BoP show similar patterns (See Figures 2 and 4). Both increased between 1993 and 1994 followed by a slight decrease in 1995 and an increase between 1996 and 2001. This suggests that government provided services are trend associated with non-government provided services. In 2001, GDP grew while transport services imports decreased. Between 2001 and 2016 both experienced fluctuations. Figure 5 shows no correlation between transport services as a percentage of commercial services exports and transport services as a percentage of services exports, BoP) on one hand and GDP growth on the other hand. Between 1993 and 1996, GDP growth increased while transport service exports decreased. In 1998, when GDP decreased, transport services exports remained constant. Between 1998 and 2001, transport services exports increased before declining in 2002 and remaining relatively constant. From 2001, GDP variation experienced more fluctuations, peaking in 2006 and experiencing a substantial decline in 2009.
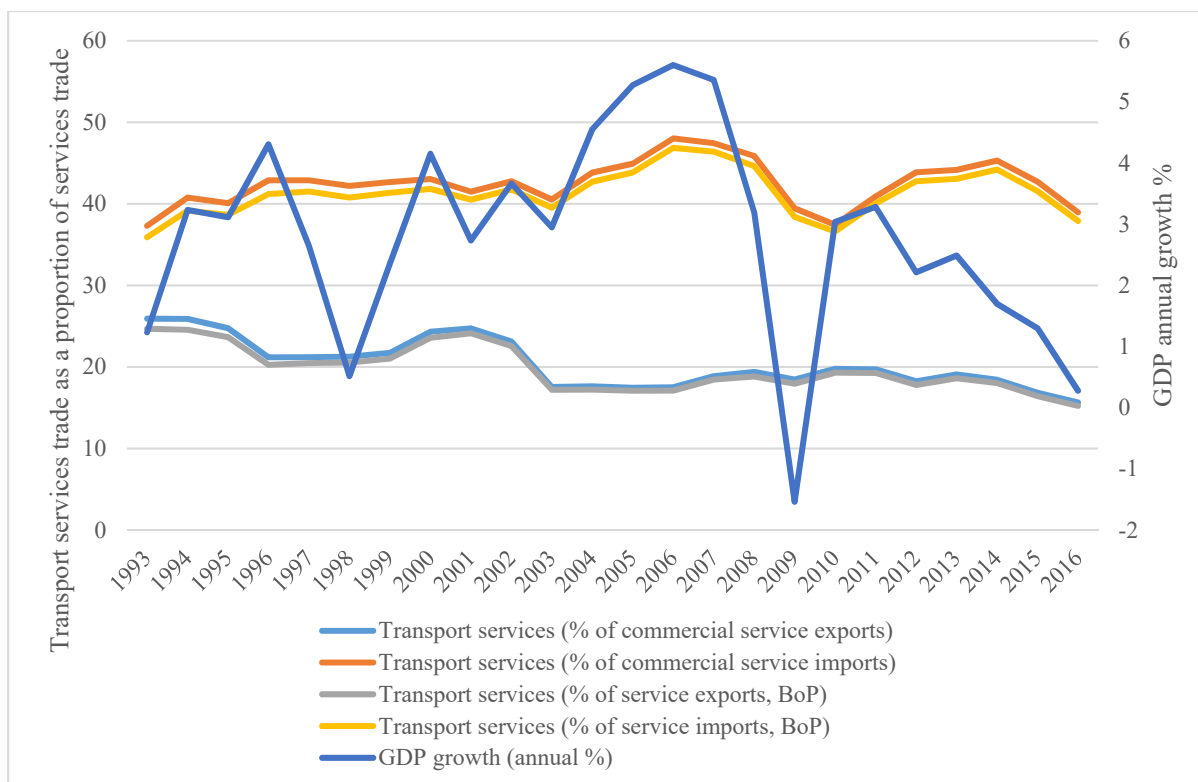
Figure 5: Trend associations between transport services trade and GDP variation

DISCUSSION

The aim of the present paper was to analyse time trends in transport services trade and to determine associations between GDP variation and transport services trade for South Africa. The focus has been to assess whether South Africa's exports and imports of transport services have been significantly increasing or decreasing over time. In addition, the study investigated whether trends of transport services trade and GDP growth are associated over time. The results revealed that South Africa's share of transport services imports surpassed exports in the period between 1992 and 2016. In addition, the results also showed no correlation between transport services trade and GDP variation.

South Africa's transport services exports declined overall between 1993 and 2016. This is similar to global trends that have seen a decline in traditional services exports; travel and transportation services in particular and a rise in modern services exports (Sahoo & Dash, 2017). An analysis of the key players in global services trade showed that developed countries, in terms of percentage of GDP, are the major importers and exporters of services. In 2013, developed countries accounted for 66% of the trade in services (Ahmad, Kaliappan, & Ismail, 2017), indicating that developing countries are lagging behind and are underutilising export potential in this dynamic sector. This is partly the reason why developing countries, including South Africa, incur deficits on the services account compared to surpluses on the merchandise accounts.

The limited growth in exports of transport services could be attributed to barriers to entry. Services markets are characterised by significant barriers to entry, usually regulatory barriers resulting in monopolistic or oligopolistic market structures.

It is well documented that services trade is the new engine of growth. The results of the present study show that South Africa's GDP growth fluctuated between 1992 and 2016. However, despite GDP growth peaking in 2006, export growth remained constant in the same period. This may indicate that export demand for transport services is influenced by external factors to the domestic economy. GDP of the destination country was found to be positively associated with transport services exports (Covaci & Moldovan, 2015). This means that the importing market's economic performance influences its propensity to import transport services more that the exporting country's growth. Pain and Van Welsum, (2004) found that services demand increases in response to increases in income in the rest of the world.

Transport services export demand is also influenced by the demand for manufactured goods. Increased demand for manufactured goods induces increased demand for transport services (Eichengreen & Gupta, 2013; Lodefalk, 2012). Hoekman and Shephard, (2017) highlighted that the transport sector is essential for the production and export oof good. Factors such as trade restrictions on the transport sector have been shown to negatively impact manufacturing exports. Countries can increase their share in global trade by suppling efficient transportation servies that enable inputs to be processed and valued added by specialised firms located in different countries.

Transport services exports are significantly influenced by the quality of domestic infrastructure particuarly thetransport infrastructure; road, rail airportst and sea ports sustain the rapid growth of services exports (Eichengreen, Gupta, 2013; Sahoo, Dash, 2012).

The liberalisation of services has been slow owing to the governments' uncertainty over the impact of liberalisation on competitiveness and growth, particularly of developing countries. Contrary to this, empirical evidence shows that services liberalisation improves productivity in the manufacturing sector and helps improve a country's competitiveness in global value chains (Arnold, Javorcik , & Mattoo, 2011; Fernandes & Paunov, 2012). Governments of developing countries should facilitate the liberalisation of services trade in order to improve the gains accrued from services trade.

CONCLUSION

The results of this study highlight that South Africa has been experiencing a deficit transport service trade overtime. In addition, the results show that the variation of transport service trade as a percentage of GDP was not trend associated with GDP variation in the time reported in the current study, as various GDP fluctuations were observed. In order to address the deficit in transport service trade we recommend that the South African government consider the effects of current policies and market conditions on the transport services. Additionally, the impact of other determinants on service trade should be taken into consideration when formulating policies to improve services exports. A limitation of this study is that it does not provide inferences into causal relationship between GDP variation and transport services trade. Future research can explore causality between these variables. Future research should also focus on the determinants on transport service trade for South Africa in order to deduce the possible drivers that should be targeted to improve transport services exports.

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