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An Empirical Investigation of Trade Liberalization and Trade Patterns in South Africa

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Abstract: The study made use of the gravity model to analyze the behavior of South Africa's trade patterns at industry level. Using SIC 2-digit level data for the period 1996-2013 based on two sub-samples, 1996-2004 and 2005-2013, the study found that trade liberalization was not universally influential on trade patterns. Some industries did not exhibit significant behavior changes as a result of tariff liberalization. The results show that Agriculture, mining ores, crude oil, machinery and transport are the only industries from the selected sample of nine that are significantly influenced by trade liberalization policy. Furthermore, empirical results indicate that trade liberalization hinders extensive margins and does not encourage intensive margins.

Keywords: *Gravity model, fixed effects, extensive margins, intensive margins, tariff liberalization.*

1. Introduction

Poverty reduction, improved industry productivity and greater access to a bigger market are all expected benefits that Stigliz (2002) associates with the idea of linking economies and generating greater integration. Fiestas (2005) highlights that theory expects trade liberalization to stimulate long-run growth and to improve economic performance through strengthening the performance of industries. It is also vital to understand how the structure of trade patterns has been influenced in order to achieve these goals. Trade liberalization is viewed as a policy that can enhance productivity and innovation. The impact of spillover effects through opening up an economy is that domestic industries are then exposed to new innovation and better production methods. Increased competition is expected to boost local production and innovation, translating to improved domestic capacity and the ability to diversify both production and exports, as was highlighted by Adenikinju, and Chete (2002). Given this theoretical background it cannot be assumed that industries are homogeneous and thus are not expected to behave in the same manner under trade liberalization. By investing and understanding how each industry reacts under trade liberalization in relation to its ability to export and import, the paper seeks to add to the body of knowledge in order to better equip policy makers in their decision making. Both classical and new trade theories explain how trade patterns can be influenced within an economy. New trade theories, made popular by Krugman (1980) and Melitz (2003), developed a dynamic model of international trade, which has its foundations in the assumptions that firms within industries are not homogenous with respect to their total factor productivity, operate under monopolistic competition and offer differentiated products.

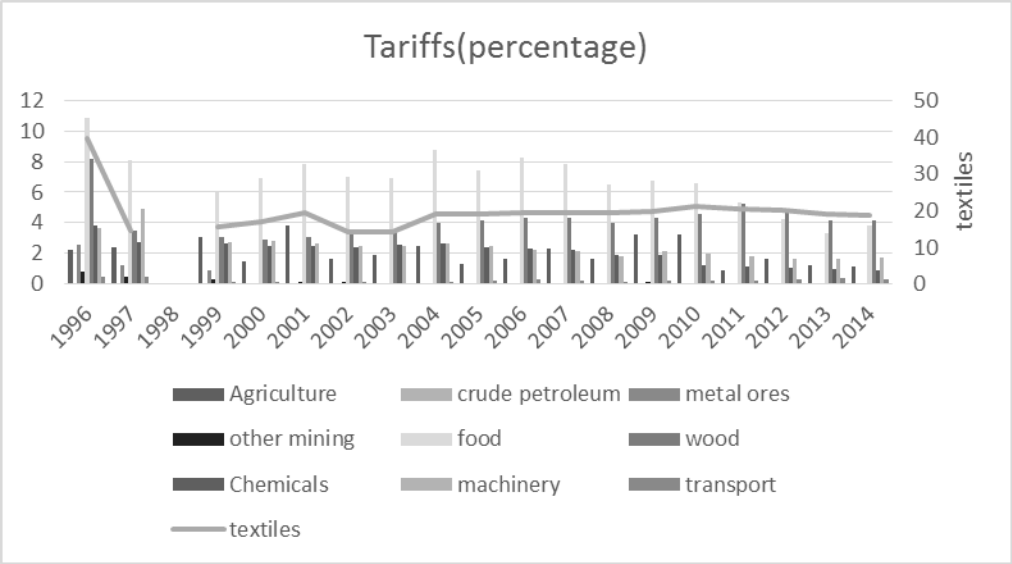
The paper based its investigation on this theoretical framework. Empirical evidence has generally looked at the influence of trade liberalization on growth in trade flows or the effect of productivity on extensive and intensive margins. Evidence in the case of South Africa shows, that imports generally increase (van der Westhuizen, 2006; Black 2001; Fedderke and Vaze, 2001). Moreover, empirical works on extensive and intensive margins demonstrate that higher demand elasticity increases the sensitivity of intensive margins while tariffs on a global scale have a greater impact on intensive rather than extensive margins (Buono and Lalanne, 2012). Chen (2013) noted that increased innovation is what drives growth in both intensive and extensive margins. Debaere and Mostashari (2010) find that on global scale tariffs can significantly influence extensive margins but that the effect is greatly reduced in relation to the global tariff's impact on trade flows. The lack of a consensus within empirical studies created a gap which the paper aimed to address with the goal of adding to the existing body of knowledge. The study thus seeks to understand how trade policy can influence trade patterns by looking at the role of trade liberalization policy and extensive and intensive margins have under the assumption of new trade theories. This is done by using the gravity model, which explains trade flows between South Africa and relevant trading partners, and how these could be influenced by trade liberalization measures. The empirical literature on South Africa has generally focused on the

aggregate or single industry impact of trade liberalization on the magnitude of trade flows but not at how trade patterns may be influenced.

2. Industry Trends for South Africa

Applied weighted tariff averages are currently lower than the 1996 period, as may be observed in figure 1. Tariff averages have been declining over the years for most of the selected industries excepting textiles and wood. Textiles and Wood have shown the greatest resistance to declining tariffs, indicating increased concern over domestic industries that are not as competitive as foreign counterparts. Moreover, the view that these are labor-intensive industries indicates that the primary policy goal is to limit job loss. Food and agriculture are the most volatile as these exhibits the highest frequency in terms of fluctuations. Their trajectory is also not as steep, thus indicating a general resistance to tariff liberalization. Figure 1 further indicates that tariff levels are reducing at a faster rate for industries with lower product classifications than those that are more diverse. This study thus adds to the literature on trade liberalization by looking at the effect on a panel of selected industries, taking into account industry dynamics. The paper is organized as follows: section 2 examines trends in export and import flows at the industry level, section 3 covers methodology and section 4 provides a discussion regarding the analysis of the results. Section 5 provides concluding remarks and section 6 supplies recommendations based on the findings from the analysis of results.

Figure 1: Industry-Level Tariffs



Source: adapted from Wits (2015)

In examining disaggregated values of exports in table 1(a) it is apparent that during the period of 1994-1999, growth in exports was driven by manufacturing, iron and steel, machinery and fuels. These are mainly capital-intensive industries. Trade liberalization policy appears to have had a greater positive impact on capital-intensive industries with respect to exports. This could be the effect of a buildup in inventory, as the increased engagement with the international market created an immediate market for their inventories. The period 2000-2008 shows a similar level in the growth rate of exports for all but fuel, mining and manufacturing, all of which showed resilience by maintaining high growth. Remaining industries, with the exception of textiles, have similar growth rates. The years 2009 and 2012 indicate that in all but one of the selected industries, values of exports declined. South Africa is not specializing in exports, but is diversifying the export base and working on improving exports in all sectors. The diversification of the export base is in line with policies the South African government has set to shift the focus of the economy to being outward orientated, in order to improve on extensive margins. In relation to manufacturing exports, SADC, EURO and NAFTA have been the major regional blocs that import South African manufactured products, as may be observed in figure 2. The first nine years after independence were characterized by stagnant values of exports to regional blocs. The magnitude of fluctuations in demand for South African manufactured products was

minimal. The period after 2003 saw growth in the value of South African manufactured products increase significantly, with the value of exports to EURO peaking at above US$7 Billion in 2008 and to SADC peaking at close to US$10 billion in 2011. The period after 2008 was portrayed by a decline in exports to the EURO area and an increase in exports to NAFTA.

Table 1(a): Industry-Level Export Flows

Exports Year	Agriculture	Food	Fuel and mining	Manufactu -ring	Iron and steel	Machinery and transport	Textiles
1994	2365.02		2985.60	10841.34	2127.37	1866.18	164.33
1995	2386.95		4764.24	13496.94	2785.00	2478.00	238.00
1996	2504.24		5217.50	13296.41	2418.00	2636.00	255.00
1997	2601.93		5588.53	19993.27	2558.00	3321.00	273.00
1998	2486.69		4680.89	18428.73	2444.00	3334.00	230.00
1999	2475.61		4828.96	18933.20	2318.15	4056.33	235.48
2000	3270.44	2232.01	5463.78	13997.13	2757.98	4569.98	237.37
2001	3199.61	2344.65	8983.58	13732.76	2176.22	5226.50	230.74
2002	3328.53	2448.94	5375.72	14131.44	2411.33	5257.28	246.24
2003	4237.76	3126.68	9125.40	18048.46	3877.44	6544.18	298.45
2004	4661.27	3510.23	12514.55	22703.52	5649.29	7937.49	301.16
2005	5246.02	3990.25	15327.35	26073.50	5863.90	9574.11	311.60
2006	4954.96	3734.15	19972.19	27343.01	5647.88	11293.34	302.32
2007	5573.69	4213.90	25541.15	32469.06	7460.14	13411.65	332.26
2008	7036.56	5428.72	28600.93	38098.02	8859.68	16229.15	300.77
2009	6678.82	5466.60	21761.64	25216.24	5116.16	10786.59	225.60
2010	9931.54	8230.26	32156.45	39773.25	7996.85	16296.16	415.20
2011	11101.71	9012.22	41504.62	44204.45	7926.66	18970.10	447.50
2012	10498.62	8742.28	36196.61	42741.20	6699.47	19088.34	426.33
2013	11137.23	9293.84	36469.76	40244.65	6204.26	17873.22	424.22
2014	11373.57	9455.05	31666.66	42292.46	6795.60	18692.52	407.31

In comparison imports, as shown in table 1(b), have also been on the rise. All industries experienced an increase in imports except in the year 2009, whereupon all industries exhibited contractions. Additionally, it may be observed from table 1(b) that the growth rate of imports in selected industries increased from the year 2000. In as much as global demand for South African goods on average increased over these years, so did the demand for foreign goods by the domestic economy. South Africa as an emerging economy is exhibiting high levels of intra-industry trade. Observations from table 1(b) show that the goal of import substitution was not being achieved.

Table 1(b): Industry-Level Import Flows

Imports Year	Agriculture	Food	Fuel and mining	Manufact-uring	Iron and steel	Machinery and transport	Textiles
1994	1800.13	1339.24	405.70	17642.88	322.49	10223.92	651.06
1995	2404.00	1787.00	2860.78	20810.00	415.00	12011.00	736.00
1996	2261.00	1719.00	3168.62	20943.00	428.00	11945.00	675.00
1997	2242.00	1713.00	4205.98	21002.00	355.00	12086.00	679.00
1998	1804.00	1395.00	2842.28	19869.00	354.00	11835.00	597.00

1999	1666.65	1306.17	3068.00	18788.00	322.83	10635.00	562.27
2000	1650.29	1254.43	4536.00	18265.95	323.57	9839.32	569.38
2001	1461.22	1114.57	4312.84	17664.55	316.20	9800.44	507.30
2002	1686.99	1302.85	3918.09	18184.63	337.19	9826.94	532.72
2003	2198.63	1716.42	5042.93	24055.54	451.96	13595.00	640.17
2004	2968.07	2362.42	8193.80	32365.67	655.60	18829.87	817.79
2005	3047.69	2450.93	9254.96	37919.89	828.44	21672.15	872.16
2006	3649.23	2976.62	14732.63	44796.84	1130.89	25890.30	964.49
2007	4888.29	4128.45	17479.28	51676.35	1572.56	29795.18	1015.42
2008	5363.84	4588.64	22492.53	53893.31	1549.02	30670.04	1019.07
2009	4730.48	4163.33	14850.53	40671.14	1029.63	22201.29	905.77
2010	6295.77	5482.67	17681.80	53592.80	1344.91	29012.50	1164.86
2011	8065.81	7008.69	23776.62	64735.98	1846.35	35680.43	1421.41
2012	8398.51	7448.28	25218.07	64113.81	1707.39	35037.37	1377.21
2013	7677.50	6777.07	24556.59	64932.72	2093.28	35438.24	1367.55
2014							
	7148.34	6272.23	25495.47	60630.40	1598.15	32416.18	1343.54

Source: WTO (2015)

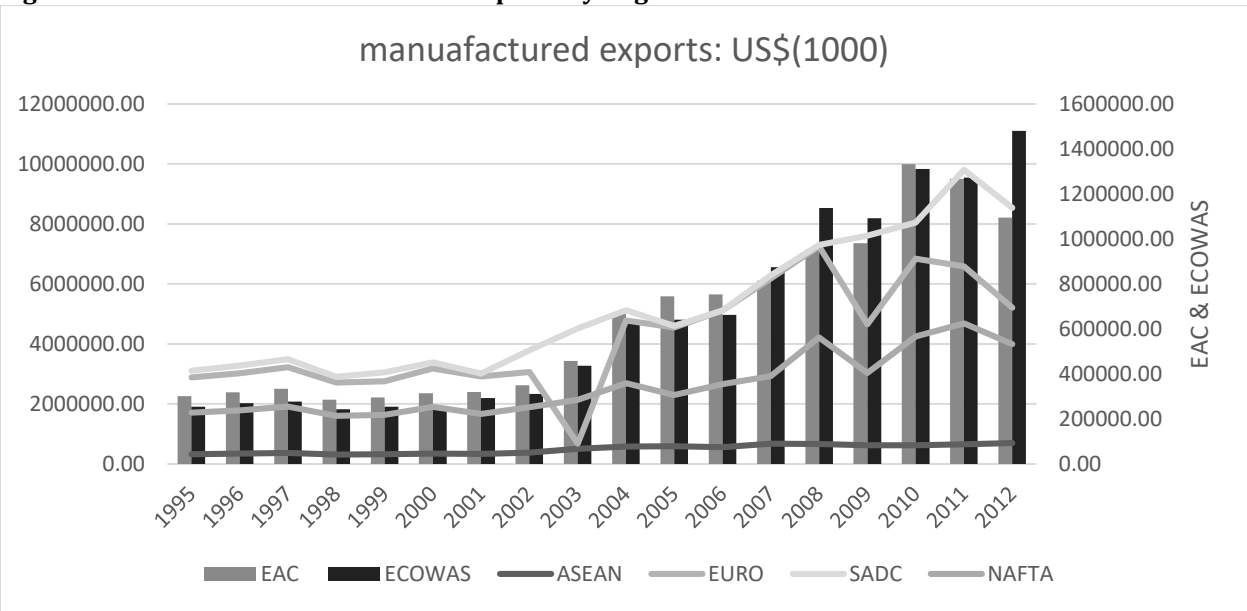
As shown in Table 1, manufacturing, machinery and equipment and textiles are the industries that consistently have negative net export values. This could be the result of excess domestic demand, consumer preferences or lack of competitiveness within these industries. This may also be an indication that local firms are not able to increase their production capacity. The lack of competitiveness in these industries highlights the high production costs that exist within the domestic economy relative to foreign firms. The high production costs hinder the expansion capabilities of the firms in these industries as this will result in firms experiencing decreasing returns to scale. One reason that can be applicable to the South African economy is the high cost of some of the factors of production required by these industries. Scarce factors of production will result in higher prices explaining the Samuelsson Stapler theory (Appleyard, Field and Cobb 2008: 136). Another consideration is product differentiation, which is subject to consumer preferences. The high imports within these industries can be attributed to choices made by the domestic market. On the other hand, the automotive industry has expressed fluctuations in terms of positive and negative net exports. The automotive industry experienced negative net exports during periods when the rand exchange rate depreciated. This indicates that foreign demand for automotive products is sensitive to the exchange rate, with the depreciation of the rand resulting in an increase in imports. The reason for this could be linked to the depreciation of the domestic currency (Rand) and reduced competitiveness from the EURO area.

3. Methodology

The gravity model is an adaptation of the gravity equation, an equation derived by Jan Tinbergen (Feenstra & Taylor, 2014). The gravity equation is based on the principle of gravity. The gravity equation explains trade patterns that exist between trading partners. The model explains trade flows between trade partners, how these could influence the level of intensive margins in relation to trade partners and also, to some extent, extensive margins. The gravity equation is necessitated by the assumption of monopolistic competition in explaining international trade. The assumption of monopolistic competition is the foundation of the relevance of the gravity equation. The gravity equation is therefore able to explain trade patterns that also involve intra-industry trade. Anderson and Wincoop (2003, p170) note that the gravity model has received good reviews in its ability to provide a link between trade flows, economic and institutional variables. Furthermore, Kanda and Jordaan (2010) found that when analyzing bilateral effects of trade, the gravity model is applicable to ex-post analysis as compared to the Computable general equilibrium model, which is more applicable to ex-ante analysis. Furthermore, trade liberalization does not encourage intensive margins but is expected to hinder

extensive margins. This lies in contrast to the views adopted by Melitz (2003), Debaere and Mostashari (2010) and Chen (2013).

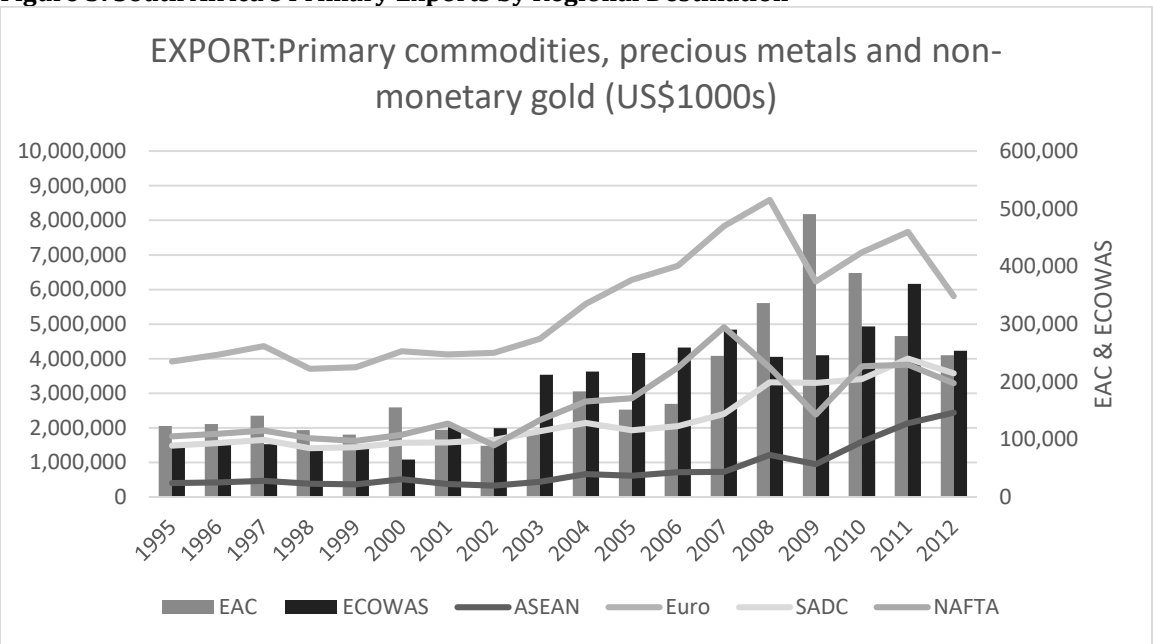
Figure 2: South Africa's Manufactured Exports by Regional Destination



Source: UNCTAD 2014

A breakdown of exports shows that the EURO area is the prevalent destination for primary commodities and precious metals. The high demand by EURO is driven by specialization as a result of comparative advantage. The EURO area has a comparative disadvantage in the production of primary commodities and precious minerals. In relation to the EURO area, South Africa has a comparative advantage in the production of primary and precious materials. The comparative advantage is driven by the different factor endowments between the two trading partners. South Africa is labor-intensive whilst the EURO area is capital-intensive.

Figure 3: South Africa's Primary Exports by Regional Destination



Source: UNCTAD 2014

NAFTA and SADC are behind the EURO area with regards to the acquisition of South African exports of primary commodities and precious metals. The demand for primary products from SADC has increased over the years and resulted in it being second after the EURO area in 2011 and 2012. This can be attributed to the strengthening of the SADC bloc by converting it into a free trade area and South Africa, being the dominant player, has benefitted greatly from the regional bloc. In relation to SADC economies, South Africa has an absolute advantage in terms of resources and factors of production. With the majority of countries in the region being classified as low income, but on the other hand a significant number of countries in SADC are resource rich in nature. According to Twerefou (2009:1) over half the world's reserves in minerals, such as diamonds and gold, are found in South Africa. The growth of South African exports to SADC could be a factor of the infancy stage of development of the other member states within SADC, which may not be in line with traditional trade theories.

The Gravity Model May be Expressed as Follows:

Log (bilateral $trade_{ij}$)=$\alpha + \beta \log(demo) + \beta(demod) + \gamma \log(Trade\ factors) + \gamma(trade\ factorsd)$ 1

Where demo represents a vector of demographic factors between trading partners expressed as nominal values, Trade factors represents a vector of factors that affect international trade expressed as nominal values, while demo and trade factors represent the variables expressed as dummy variables. The variables expressed in their nominal values will be logged. The augmented model is expressed as follows:

$$\log T_{ij} = \beta_o + \beta_1 \log(inc_i Inc_j) + \beta_2 \log(Pop_i pop_j) + \beta_3 \log dis_{ij} + \beta_4 devl_{ij} + \beta_5\, bord_{ij} + \beta_6 Intgr_{ij} + \beta_7\, ECOWAS_j + \beta_8 EAC_j + \beta_9 NAFTA_j + \beta_{10} EU_j + \beta_{11} \log exch_{ij} + \beta_{12} tarf_t + \beta_{13} dtar_t + \mu_{ij} \quad .....2$$

Using Standard Industry Classification 2-digit data from the World Bank's data bank for the period 1996-2013, the two subsamples were analyzed using a semi-log model and log-linear model.

4. Results and Discussion

Results obtained from the gravity model indicate that trade flows for some of the selected industries will be influenced by trade liberalization. These industries are Agriculture, crude oil and natural gas, mining ores, machinery and transport equipment. Policy changes to tariff levels will influence the flow of trade, be it exports of imports, and thus influence trade patterns of South Africa and relevant industry partners.

Table 2: Results of the Agriculture Industry

sample	Imports 1996-2004		Imports 2005-2013		Exports 1996-2004		Exports 2005-2013	
	Model 1[1]	Model 2[2]	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Log income	0.006	-0.346	0.034*	1.097	0.081***	0.02	-.0285**	-0.266
Log population	0.017	-0.712	-0.022	-3.773	-0.382***	-1.312	0.1485**	1.364
Log distance	-0. 186	1.054	-0.138	-2.096	0.672***	2.027	-0.212**	-3.032
development			0.069*	11.463	0.044	-4.066***	-0.377**	-4.418***
Border dummy	-0.279***	-0.882	-0.124	-12.89***	0.388***		-0.044	2.074
Integration dummy	-0.017	0.233	-0.052	-9.238**	-0.039*	-0.41	0.118*	-1.047
ECOWAS	0. 308*	0.011	-0.066	-10.361***	-0.012	-2.38***	0.041	-1.421*
EAC	0. 026	0.284	0.024	1.926	-0.0617*	-0.67	-0.064*	0.712
Nafta			0.024	5.415*	-0.831***	-6.69	-0.088*	-1.886
EU	-0.062	-3.266	0.035	-5.45	-0.834***	-6.415	0.227	1.347
Exchange rate	-0.001	-0.014	0.0005	0.03	-0.002***	-0.02	0.0001	0.0001

[1] Semi- log model
[2] Double log model

tariff	-0 .015	-0.345	-0.003	-0.122	0.006	-0.183	0.001	-0.028
Tariff liberalis dummy	-0 .017	-0.733*	-0.019**	-0.527	-0.0004	-0.801*	0.0008	-0.074
Interaction dummy	-1.3e-11	8.0e-10	5.5e-11**	2.5e-09***	3.3e-11	9.2e-10	1.6e-11**	2.9e-10*
constant	1.01	33.66	0.174	85.112	4.225***	32.823	-1.802*	-9.311
Country 2	-0.233*	-9.662***	-0.103**	-12.472***	-0.173**		0.093***	2.058***
Country 3			-0.135*		-0.582***		0.133*	
Country 4					-0.377***		0.144*	
Country 5					-0.567***		0.327**	
Country 7					-0.672***		0.301**	4.536*
Country 8					0.344***	4.03*		
Country 9	0.439***		0.866***				0.075*	
Country 10							-0.327*	-0.796*
Country 11					-1.379***		0.630**	
Country 12							-0.372**	-1.88***
Country 13	-0 .4***	-2.838**			-0.574***		0.238**	
Country 14					0.277***		-0.11**	-1.799*
Country 15								-0.899*
Country 16		-4.485**			-1.013***		-0.335*	
Country 17	-0 .119*			-8.62*			0.241**	
Country 19			0.205***					
Country 20					-0.886***		0.352**	
Country 21				11.268*			-0.09*	
Country 22					-0.929***		0.242**	
Country 23	-0 .491*							
Country 24		-5.903***					0.708***	5.471*
Country 25				15*	-0.099**		-0.320**	-1.075**
Country 26			-0.138*	-2.597*	-0.539***		0.148**	
Country 27					0.084**			
Country 28				14.516*	-0.1**		-0.275*	
Country 30				-2.614*				
Country 31	0.194**			10.395*	-0.13***			
N	181	181	277	254	210	189	277	255
R2	0.89	0.87	0.94	0.76	0.732	0639	0.889	0.737
F	35.198	28.428	97.259	18.828	12.697	8.024	53.563	16.926
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*p<0.05			**p<0.01			***P<0.001		

Results obtained show that for agriculture, trade liberalization lowers the responsiveness of both exports and imports to changes in the determinants of trade flows. The movement towards lower elasticity levels limits the impact of the efforts of economic policy. In addition, the effects of trade liberalization lower the ratio of agriculture trade flows in relation to the total bilateral trade of trading partners. What has also been observed, is that under trade liberalization the number of significant trading partners is lower than when trade liberalization is not significant, indicating a reduction in extensive margins.

Table 3: Results of the Crude Oil and Natural Gas Industry

sample	Imports 1996-2004		Imports 2005-2013		Exports 1996-2004		Exports 2005-2013	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Log income	0.027	-1.9	-0.0824	0.1	-0.009	-0.702	-0.006	-1.577*
Log population	0.123	10.216	0.654*	1.405	0.042	4.593	-0.036	3.894
Log distance	-1.1289	-3.757	-0.837*	-1.88	-0.485	-11.375	0.053	-4.482
development	-0.353		0.363***	-6.5	-0.171		-0.029	-8.319
Border dummy	-2.617	-0.786	1.04		-1.361		-0.121	2.206
Integration dummy	-0.017	0.677	0.836*	4.939	-0.003	-0.432	-0.039	2.092
ECOWAS	-0.335	5.065	1.353***	3.251	-0.307*	9.439	0.0001	6.086
EAC	-0.085	-2.36	0.059	4.903*	-0.072*	-0.859	-0.006	2.967
Nafta			1.597**	0.551		13.941	-0.109	-0.272
EU	0.058	4.836**	1.243**	8.306	-0.095	8.318	-0.108	1.805
Exchange rate	0.00004	0.072	-0.0006	-0.01	0.0004	0.018	0.0002	0.037
tariff			-0.386	28.245			0.309	45.767
Tariff liberalis dummy			-0.02	1.09*			-0.002	1.089
Interaction dummy			7.0e-12	-4.2e-11			3.0e-11***	3.2e-10
constant	4.758		-13.179*	-43.95	3.551	-44.195	1.220	-24.042
Country 2		11.595**	1.231***	7.207**				4.986
Country 4		-8.943**	0.759*		-0.151*			
Country 5			1.438*					
Country 9			0.549*					
Country 11			3.359*					
Country 13				9.719***				
Country 14				6.758*				
Country 16			2.016*					
Country 17		6.176*						
Country 19							-0.063*	
Country 20			1.77*					
Country 21								
Country 23								
Country 24			1.472*					
Country 25								
Country 26								
Country 28								
Country 30								2.967*
Country 31			-1.303*	-5.835*				
N	248	137	277	194	248	204	277	246
R2	0.644	0.702	0.703	0.765	0.671	0.668	0.362	0.693
F	10.956	9.507	15.775	14.681	12.331	11.15	3.786	13.1
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*p<0.05			**p<0.01			***P<0.001		

Results from the crude oil and natural gas industry show that trade liberalization improved the level of elasticity of imports in the sub-sample 2005-2013. This made trade flows more sensitive to changes in the determinants, therefore aiding the impact of policy instruments in trying to support industry development both domestically and internationally. The trade liberalization variable does not influence the number of

significant trading partners but resulted in a change in the significant trading partners. In this case, trade liberalization does not aid-intensive margins but encourages a shift in trading partners.

Table 4: Results of Mining Ores Industry

sample	Imports 1996-2004		Imports 2005-2013		Exports 1996-2004		Exports 2005-2013	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Log income	0.0006	2.866	0.041	0.353	-0.062***	1.812	0.005	5.291*
Log population	0.008	-29.469	-0.215	-13.164	0.537***	-21.549	-0.025	-24.929*
Log distance	-0.024		0.278	5.072	-2.913***	18.65	0.032	1.771
development	-0.016		0.541		-1.711***		0.064	
Border dummy	-0.013	70.14	0.036	-2.351	-6.361***	8.289	0.018	-54.702*
Integration dummy	-0.00004	0.013	-0.212	8.781	0.038**	-2.289	-0.025	-18.449**
ECOWAS	0.028	87.187	-0.082		-1.631***	-9.246	-0.0096	-16.921**
EAC	-0.004	96.979	0.16*	11.046	-0.005		0.012	
Nafta		141.38	0.13	32.015	-0.211***	17.235	0.014	11.058
EU	0.023	100	-0.3		0.477***		-0.035	
Exchange rate	-0.0001	-0.17*	-0.002**	-0.233**	0.0013**	-0.034	0.00003	-0.023
tariff	0.002	-0.269			0.045***	-1.587		
Tariff liberalis dummy	0.001	-1.02			0.025**	-0.779		
Interaction dummy	1.2e-09	2.8e-06			5.5e-11	5.2e-09		
constant	-0.106	796.48263	3.065	399.70293	11.506***	495.229	0.331	588.73*
Country 2					-2.414***			
Country 3					1.466***			
Country 4					-0.384***			
Country 5				11.19*	-0.941***			
Country 6								55.659*
Country 7					1.256***			
Country 8					-0.789***			
Country 9					-1.571***			
Country 10					-1.454***			
Country 11								
Country 12					-1.475***		0.119*	15.759***
Country 13				11.553*	1.004***			
Country 14					-1.155			69.688*
Country 15					-1.646***			
Country 16								
Country 17			-0.3567*		-2.027***			
Country 19					-3.325***			
Country 20					0.603***			
Country 21		21.708*			1.78***			65.023*
Country 22								9.15*
Country 23					3.177***			
Country 24					0.7008***			14.166**
Country 25					-1.453***			
Country 26					1.107***			
Country 27					-2.6***			

Country 28					-1.194***			8.914**
Country 30					-3.481***			-9.443**
Country 31			0.1674**		1.941***			51.489*
N	247	52	277	74	248	52	277	75
R2	0.146	0.85	0.162	0.606	0.571	0.907	0.423	0.823
F	0.939	5.937	1.422	3.338	7.322	17.957	5.396	10.955
Prob>F	0.5759	0.00	0.072	0.0002	0.00	0.00	0.00	0.00
*p<0.05			**p<0.01			***P<0.001		

The findings from the mining ores sector show that trade liberalization improves the ratio of ore exports to total export bilateral trade for the trading partners. Improvements in this ratio indicate that ore exports improved, thus signifying enhanced competitiveness. Under trade liberalization the results show that 27 of the 31 trading partners are significant, whereas in sub-sample 2005-2013, when the trade liberalization variable is not significant, this number drops drastically. This means trade liberalization does encourage extensive margins.

Table 5: Results of Machinery Industry

sample	**Imports 1996-2004**		**Imports 2005-2013**		**Exports 1996-2004**		**Exports 2005-2013**	
	Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Log income	0.007	-0.456	-0.055	-0.762	0.088**	0.534**	-0.073**	-0.353**
Log population	-0.094	1.191	0.036	3.78	-0.261*	-1.577*	0.29*	1.057
Log distance	0.75	-1.821	-0.091	-6.668	1.324*	2.114	-0.552**	-2.522**
development	0.296	-3.1	-0.31***	-4.753***	0.862*		-0.715*	-2.696
Border dummy	0.95	-1.268	-0.658**	-7.09*	2.808*		0.085	0.74
Integration dummy	-0.057	-0.233	0.073	1.015	0.065*	0.139	0.046	-1.299*
ECOWAS	0.102	-5.309***	-0.478***	2.085	0.599***	-1.736	-0.003	0.824
EAC	0.07	0.342	-0.616***	0.513	0.121**	0.385	0.014	0.264
Nafta			-0.165	3.035		-3.96*		0.025
EU	-0.012	-0.745	-0.364	2.644	-0.401***	-4.767*	0.368*	0.761
Exchange rate	-0.0006	0.0004	0.001	0.043	-0.001	-0.012*	0.003*	0.003
tariff	0.007	0.125	-0.008	-0.151	-0.003	0.003	-0.003	0.032
Tariff liberalis dummy	-0.061**	-0.345	0.009	0.211	-0.015	-0.098	0.002	0.042
Interaction dummy	9.1e-12	3.4e-11	2.1e-12	1.2e-11	8.9e-12	4.3e-11	6.8e-12***	8.5e-12
constant	-3.806	-3.210	3.04	-41.253	-7.444**	12.261	-1.305	2.929
Country 2			-0.598***	-3.899**	1.124*	-1.646*		0.712**
Country 3					-0.784*		-0.317**	-1.581**
Country 4						-1.781*	0.489***	1.292*
Country 5					0.515*			
Country 7					-0.393***	-1.676***	0.495*	
Country 8					0.631***	2.825***		
Country 9		-2.938***	-0.568***		0.967**			-1.529***
Country 10					0.854**			
Country 11						-6.607*		
Country 12					0.768**			

Country 13							0.536**	
Country 14			-0.261*	-3.97*			-0.33***	-1.748***
Country 15			0.125*		0.962**	0.761*		
Country 16						-4.695*		
Country 17					1.04*			
Country 18							-0.721***	-3.784***
Country 19		-3.825***	-0.744***	-4.557***	1.658*		-0.134**	-0.529*
Country 20					-0.386**	-4.962**		
Country 21					-1.54*			
Country 23								
Country 24					-0.341**	-3.206*	0.446*	
Country 25					0.806**			
Country 26					-0.552*		-0.361***	-2.108***
Country 27		-1.997***			1.227*			
Country 28					0.513*			
Country 30					1.739*			
Country 31				3.349*				-2.276*
N	247	238	277	272	248	215	277	257
R2	0.439	0.629	0.777	0.676	0.767	0.615	0.81	0.821
F	4.28	8.895	23.242	13.658	18.08	8.454	28.429	27.947
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*p<0.05			**p<0.01			***P<0.001		

With regards to machinery, a closer examination of imports reveals that trade liberalization reduced the ratio of imports to total bilateral trade. This means that the rate of change is faster for bilateral trade when compared to imports for trading partners. Trade liberalization hinders extensive margins, indicating greater competition in sub-sample 2005-2013, where the assumption of monopolistic competition is also supported.

Table 6: Results of the Transport Industry

sample	**Imports 1996-2004**		**Imports 2005-2013**		**Exports 1996-2004**		**Exports 2005-2013**	
	Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Log income	0.053	-0.505	0.022	-0.197	0.014	-0.203	0.012	1.131**
Log population	-0.265	0.160	-0.051	-0.203	-0.123	-1.365	0.008	-3.918*
Log distance	1.294	1.86	0.086	2.497	0.576	1.029	0.246	3.709
development	0.586	-3.472	0.084	-2.037	0.262	-3.001	-0.093	4.646***
Border dummy	1.479	3.94	-0.063	-0.96	1.149		0.072	-5.165*
Integration dummy	0.118*	0.925	0.043	1.456	0.003	0.119	0.631***	-0.137
ECOWAS	0.298	-1.861	0.016	-2.26	0.126	-0.775	0.49***	-2.933
EAC	0.1	0.462	0.01	-1.195	-0.011	-0.323	-0.124*	2.492**
Nafta			0.108	-0.764				1.789
EU	-0.125	2.055	-0.024	-1.773	0.22*	1.294	0.338*	-1.58
Exchange rate	0.001	0.023	-0.0005	-0.001	-0.0007	-0.018	0.0007	-0.016
tariff	-0.037*	-0.209	0.016	-0.3	-0.017**	-0.392*	-0.023	-0.1007

Tariff liberalis dummy	0.048*	-0.062	-0.012	-0.33	0.0003	-0.435*	0.001	-0.08
Interaction dummy	-6.7e-13	1.8e-11	1.0e-12	1.9e-11	2.1e-11**	4.7e-10*	8.1e-12***	7.7e-11*
constant	-5.225	1.63	-0.184	-4.5	-1.529	52.882	-3.165	
Country 2								
Country 3								
Country 4	0.3901*							
Country 5								
Country 7								
Country 8								
Country 9							0.558***	4.186***
Country 10			0.095***				-0.827***	1.305**
Country 11								
Country 12			0.282***				-0.886***	1.075*
Country 13								1.412**
Country 14			0.161*					4.09***
Country 15							-0.911***	
Country 16	0.2306*							
Country 17							0.592***	
Country 18								
Country 19			0.082**					1.76**
Country 20								
Country 21								8.9*
Country 23								6.833*
Country 24								
Country 25			0.249***				-0.888***	
Country 26							0.194*	
Country 27								
Country 28			0.11***				-0.924***	
Country 30								
Country 31								7.45*
N	247	224	277	261	248	214	277	257
R2	0.49	0.718	0.86	0.657	0.712	0.716	0.868	0.737
F	5.267	12.783	41.03	11.93	13.591	13.3	43.77	17.081
Prob>F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*p<0.05			**p<0.01			***P<0.001		

An inspection of the transport manufacturing industry unveils that under trade liberalization, the ratio of imports to bilateral trade increases, meaning a rise in imports, when compared to a situation with no trade liberalization. The growth in imports shows a shift from the domestic market to the international market. Additionally, there are less significant trading partners in sub-sample 1996-2004 than 2005-2013. With exports, the trade liberalization variable reduced the elasticity of trade flows, thus limiting the impact of changes in policy aimed at improving trade flows.

5. Conclusion and Recommendations

The analysis reveals that the heterogeneity of industries examined results in different impact levels of trade liberalization on trade patterns. The tariff liberalization variable lowers the responsiveness of trade flows to

policy changes in other determinants of the gravity model. This means that any policy action linked to other determinants tends to have a reduced influence on trade flows. This phenomenon is accompanied by a situation whereby tariff liberalization encourages less competition among trading partners as the number of significant trading partners is lower when trade liberalization is significant, creating a stronger case for consolidation within international markets. This is substantiated by the findings who noted that huge demand elasticity increased the sensitivity of intensive margins. This may be attributed to the lack of improvement in terms of productivity, as a result of slow levels of innovation. It is also noted that trade liberalization can improve on extensive margins, but only in a few industries, and where there is also less evidence of improvement. Having analyzed the effect of trade liberalization on industry performance and on trade patterns, the study concludes that South Africa has not benefitted as much as expected. Some industries have fared better than others, but the general view based on results obtained is that trade liberalization has a limited effect on enhancing trade patterns. Various crises that have affected the Eurozone and individual European countries have contributed to the decline in exports to this area. On average, other regional blocs have seen a substantial rise in export values from South Africa to their economies since 2008.

Recommendations: Tariff liberalization lowers the responsiveness of trade flows to policy change in other determinants of the gravity model. This makes it difficult to influence trade flows. The ability of domestic industries to tap into International practices needs to be vastly improved as these stem the results of innovation. Research and development is vital for domestic industries in the international market; hence, policy aimed at improving the ability of domestic industries productivity levels, will amplify the positive effects of trade liberalization on both extensive and intensive margins. Consideration should be given to focusing on price elastic products, thus resulting in in a structural shift domestically.

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