Potential for Export Diversification in Saudi Arabia

Dr. Zafar Ahmad Sultan[1], Dr. Imdadul Haque[2]

1. College of Business Administration, Alkharj, Salman Bin Abdulaziz University, Alkharj, Email: zsultan.sultan@gmail.com
2. College of Business Administration, Alkharj, Salman Bin Abdulaziz University, Alkharj, Email: dr.m.i.haque@gmail.com

Abstract: Export diversification can lead to higher growth with stability. Saudi Arabia is striving to diversify the export base over the last few years to reduce excessive dependence on oil. The result shows that Saudi Arabia finds it hard to diversify export as the concentration index has slightly reduced. Some of the products witnessed over 10 percent rate of growth over more than last ten years. The bound test analysis shows that most these products exhibits a long run cointegration relationship with inflow of FDI and real effective exchange rate (REER) and world gross domestic product (GDPw). This implies that Saudi Arabia may promote export of non-mineral products by taking suitable policy measures to promote FDI inflow into these sectors.
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1. Introduction

The Kingdom of Saudi Arabia (KSA) is one of the largest economies in the Middle East and North Africa (MENA) region. The KSA's economy is heavily dependent on Oil with Oil revenues making up around 85-90% of total KSA export earnings. Its contribution in GDP happened to be around 35-40% of the country's GDP but in recent years has increased to more than 50 percent of GDP at current prices. Oil wealth has made possible rapid economic development, which began in earnest in the 1960s and accelerated spectacularly in the 1970s. Since then the Kingdom's economic fortunes have been closely tied to that of Oil.

Following the painful experience of declining price of oil and its impact on Saudi economy the rationale and urgency of economic diversification became much clearer to GCC governments. They were now seeking to reduce their dependence on oil long before oil resources were due to run out, in order to limit the effect of oil price fluctuations on their economies. From the late 1980s and throughout the 1990s, in addition to the continuous expansion of the hydrocarbon sector and physical infrastructure, heavy government subsidies were directed at the expansion of non-oil sectors, including manufacturing, agriculture, basic metal industries, and, more recently services such as banking and tourism. Further emphasis was also given to diversify its export sector so that stability in export earning can be achieved in order to foster investment and economic growth.

It is in this context the paper intends to examine to what extent the country has achieved diversification in export. The paper also tries to identify the products in which Saudi Arabia has comparative advantage and also to identify the dynamic products which are able to sustain high rate of growth over the last ten years or more. Further, the study would also examine the determinants of growth of such high growth rate of these products.

The paper is organized as follows. Next section describes the methodology to be used to measure index of concentration / diversification of exports. This section explains the measure of revealed comparative advantage to identify potential products which the government should promote. In section three empirical results has been explained. At the end conclusion is presented.

2. Methodology

2.1. Commodity concentration / Diversification Trends

In order to know the concentration / diversification during the reform period, various measures of concentration/diversification have been employed to investigate the commodity / country concentration / diversification of export in literature. Bailey and Boyle investigated that appropriateness of the measures depends on the use to be made of the concentration measures and the nature of the data used to estimate the measures (Chakraborty, D. and P. Chakraborty, 2005). Erlat and Akyuz, while studying Turkish foreign trade have

used and compared the results based on five different measures of concentration. Here following three measures of diversification-Herfinahl measure of diversification; Gini-Hirschmann, the most widely used measure of commodity concentration, which is square root of the Herfindahl measure; and a Hirschmann measure, a corrected versions of Gini-Hirschmann measure adjusted for number of commodities taken into account, have been employed to investigate the extent of concentration/diversification of export earnings.

$$\text{Hirschman Index} = \Sigma\,(X_i/X_{it})^2$$

Where,

Xit = export earning of ith item/commodity in time period t.

Xt = Total export earnings of time period t.

i= 1,2,3,…..m (number of export item/commodities)

The value of H-index is bounded by Zero (i.e. total diversification) and one (i.e. total specialization).

In other words, if H-index moves away from zero and towards one this indicates that the country is moving towards specialization and visa-versa.

Ginni-Hirschmann (G.H.) measure of concentration:

$$\text{G. H. Index} = \sqrt{\Sigma\,(X_i/X_{it})^2}$$

$$\text{G. H. Index} = \sqrt{\text{Hirschman Index}}$$

Hirschmann Measure of concentration:

$$\text{Hirschman Index} = \frac{\sqrt{\Sigma\,(X_i/X_{it})^2} - \sqrt{1/n}}{1 - \sqrt{1/n}}$$

Where, n = number of commodities in the group taken into account.

For calculating the above-mentioned indices, we take the data from the UN Data Base and various issues of International Trade Statistics Yearbook.

Further the linear trend equations will be estimated by taking values of measure of diversification/concentration of all commodities as the dependent variable and time period as independent variable, to examine concentration/diversification trend over the period of years. A significant positive regression coefficient indicates an increase in concentration while a significant negative regression coefficient indicates a tendency of reduction in concentration over the years.

2.2. Identification of Products

In order to proceed with the empirical analysis, the conventional concept of Revealed Comparative advantage developed by Balassa (1965) has been used. According to Balassa (1965), since pre-trade relative prices are unobservable, analysis on trade patterns often needs to depend on post-trade data; the pattern of international trade broadly reflects relative costs and differences in non-price factors. Among a variety of such ex-post trade indices, the most commonly used is the export index of revealed comparative advantage (XRCA) popularised by Balassa and Noland (1989). The XRCA index is simply the ratio of the share of country i in world exports of commodity k to its share of total commodity exports. This index is represented as

$$\mathbf{XRCA = (X_{ki} / X_{k\,w})/(X_i / X_w)}$$

Where,

X_{ki} = exports by country i of commodity k;

$X_{k\,w}$ = world exports of commodity k;

X_i = total exports of country i;

X_w = total world exports.

The weighted average of XRCAs of all commodities equals unity. **An individual XRCA index value, greater than one indicates an ex-post or a revealed comparative advantage in the goods, and if less than one, it indicates comparative disadvantage.** This index can be computed for commodities classified by product groups as well. However, a major limitation of this index is that at any point in time it takes into account only one side of the trade flows, i.e. exports or imports.

Nonetheless, this index has been widely used to explain the export performance and similarity of trade patterns among the East Asian countries (for instance, see Chow, 1990 and Rana, 1990). The study analyses the shifting pattern of trade of Saudi Arabia using a slightly modified version of XRCA. The XRSCAs have been computed at the HS 2-digit product level for products. The indices are worked out for the years from 1991 to 2011. The data has been taken from International Trade Centre and UN Database.

Besides the RCA index, another criterion to identify the products which should be promoted to diversify the export base of the country the products which has witnessed a growth of more than 10 percent per annum over the last ten years.

2.3. Econometric Methodology

Bound test approach to cointegration will be used to estimate the relationship between export of disaggregated products and their determinants. This involves three steps to estimate the relationship between growth of these products, world economic activity, inflow of foreign direct investment and exchange rate. In the first step the nature of the data or order of integration of the variables, is examined. This is because if the data is found to be non-stationary, as most of the macroeconomic data happen to be, then application of OLS technique may give spurious

results. In order to avoid that, stationary test of the variables is required. For the purpose, Augmented Dicky-Fuller test (ADF-test) and Philips-Perron test (PP test) have been applied. The ADF test is based on the assumption that the error term is statistically independent and has a constant variance.

Philips and Perron (1988) developed a generalization of the ADF test procedure that allows for fairly mild assumptions concerning the distribution of errors. While the ADF test corrects for higher order serial correlation by adding the lagged difference term on the right hand side, the PP test makes a correction to the t-statistics of the coefficient from the AR(1) regression to account for the serial correlation in residual term. So, the PP statistics are just modification of the ADF t-statistics that takes into account less restrictive nature of the error process. For the reason, the present study has also conducted PP test to examine the stationary nature of the variables under consideration.

Once the order of integration is known and it is found that all the variables are not stationary but integrated of order equal to or less than one, the presence of long run relationship is examined with the help of bound test approach to cointegration developed by Pesaran et al (2001).

In order to investigate the presence of long run equilibrium relationship (cointegration) among these variables through bound test approach, following unrestricted error correction model (UECM) (equation 2) can be estimated.

$$\Delta lX_{jt} = \propto_0 + \propto_{1i} \sum_{i=1}^{n} \Delta lX_{jt-i} + \propto 2ii=0n\Delta lPxt-i + \propto 3ii=1n\Delta lGDPWt-i+\alpha 4i1nlFDIt-i+ \beta 1lXt-1+ \beta 2lPxt-1+ \beta 3lGDPWt-1+ \beta 4lFDIt-1 \ldots\ldots\ldots\ldots (2)$$

Where, Δ represents first difference operator and l is natural log of respective variables. βi represents the long run parameters, while $\propto_{ji}$ represent the short run parameters. RGDPw is world gross domestic product in real terms; REER is real effective exchange rate; and Xj refers to export of j^{th} commodity in real terms, and FDI is inflow of foreign direct investment. To estimate the above equation, the maximum number of lags for the first differenced variables are set equal to one. After estimating equation 2 by ordinary least square (OLS) method, the null hypothesis of no cointegartion is examined on the basis of the Wald or F- statistic used to assess the significance of the lagged level explanatory variables included in the equation, i.e.

H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$; (no cointegration exists) and

HA: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$. (cointegration exists)

Pesaran et al (2001) have provided two sets of critical value bounds. At conventional level of significance of 1 percent, 5 percent or 10 percent, if the calculated F-value falls outside the critical bound values, a conclusive inference can be made about accepting or rejecting the null hypothesis of no cointegration among the variables. If the F-value is greater than the upper limit of the bound values, we reject the null hypothesis of no cointegration among the variables under study. If the F-value is less than the lower limit of the bound value, then we accept the null hypothesis of no cointegration among these variables.

3. Empirical Results

3.1. Export Diversification

From the table 1, it is evident that the composition of export has witnessed some changes. The share of mineral exports has decreased from over 90 percent in 1991 to about 85 percent in 2009 and then increased to 87 percent by 2011. The share of non-mineral products increased by about 5 percent from 10 percent to 15 percent and then came down to 13 percent during the corresponding period. The change in composition, though look small but is very important, if we analyse in terms of growth of export of different products. During the 1990s, the export of mineral products increased at a compound growth rate of 5.5 percent per annum in nominal terms. The price of oil during the same period increased at the rate of 4.9 percent. The reason for slow growth in export of mineral products was decrease in price of crude petrol together with decrease in demand for oil owing to financial crisis in East Asian countries and its subsequent effect on many parts of the world. During the same period, chemical products, base metals and articles of base metals, electrical machines, tools and equipments increased at a rate higher than the export of oil sector. This is important development from the point of view that it shows positive effect of government policy towards diversifying its economic base. During the period 2001 to 2011, export of mineral products increased at the rate of 18.2 percent per annum. Rise in price (16.7 percent) is one of the contributing factors for such high rate of growth of mineral products. During the same period, almost all the non-mineral products also witnessed high rate of growth. Some of the products like, food stuffs, plastic products and re-export experienced very high rate of growth, even higher than the growth of mineral exports. More importantly, increase in mineral product was mainly due to rise in price level of crude petrol. The price during the period increased at the rate of 9.5 percent, increase in export of these products was mainly because of increase in volume of export of these products. Besides these three products, other

products also experienced a very high rate of growth during 2001 to 2011. For example, foodstuff increased at the rate of 23.4 percent per annum, chemical products at the rate of 16.3 percent per annum, plastic products at the rate of 24.2 percent per annum, base metals and articles of base metals at the rate of 15.2 percent, electrical machines, tools and equipments at 14.2 percent, re-export at 21 percent per annum. Taking whole period from 1991 to 2011, all the sectors witnessed higher growth rate than the mineral sector. As a result share of all the products in total exports has increased during this period.

The **concentration** of export (shown in table 2) has also declined during the period under consideration. This is also evident from the coefficient of time trend of concentration index. In the absence of data in real terms, the concentration index has been calculated on the basis of nominal value of all products. Since price of oil has increased at much higher rate than the price of other products, this concentration index shows less than what it may be in real terms. The coefficient is small (-0.023) but it is negative and significant. This shows that the country is slowly but steadily moving towards diversifying its export.

3.2. Identification of Products

The result of the analysis is given in table 3. The results show that the products in which country has comparative advantage includes, mineral fuels, oils, distillation products, etc (27); non-mineral products like organic chemicals (29), fertilizers (31), Plastics and articles thereof (39). Besides these, we may identify the dynamic products which are increasing at the rate of more than 10% per annum during the last 10 years and some products which are increasing at this rate even for more than the last 20 years. Sustaining such a high growth for such long period shows growing competitiveness of these products in the world market. The products which are growing for the last 20 years are Organic chemical (29), Plastics and articles thereof (39), Fertilizers (31), Pearls, precious stones, metals, coins, etc (71), Tanning, dyeing extracts, tannings, derives, pigments etc (32), Miscellaneous chemical products(38), Pharmaceutical products (30), Fish, crustaceans, molluscs, aquatic invertebrates nes (03), Pulp of wood, fibrous cellulosic material, waste etc (47), Lead and articles thereof (78), Manmade filaments (54), Printed books, newspapers, pictures etc (49), Zinc and articles thereof (79), Ores, slag and ash (26), Wadding, felt, nonwovens, yarns, twine, cordage, etc (56), Nickel and articles thereof(75). The products which are experiencing over 10% growth for the last 10 years are mineral fuels, oils, distillation products, etc (27), Fertilizers (31), Plastics and articles thereof (39), Inorganic chemicals, precious metal compound, isotopes (28), Aluminium and articles thereof (76), Salt, sulphur, earth, stone, plaster, lime and cement (25), Copper and articles thereof (74), Sugars and sugar confectionery (17), Miscellaneous articles of base metal (83), Miscellaneous edible preparations (21), Tools, implements, cutlery, etc of base metal (82), Products of animal origin, nes(05), Milling products, malt, starches, inulin, wheat gluten (11), Miscellaneous manufactured articles (96), Special woven or tufted fabric, lace, tapestry etc (58), Umbrellas, walking-sticks, seat-sticks, whips, etc (66), Musical instruments, parts and accessories (92), Copper and articles thereof (74).

3.3. Determinants of Export Growth

The results of Philips-Peron unit root test (shown in table 4) shows that except Ores, slag and ash (26) and miscellaneous manufactures, all the variables are integrated of order one.

The bound test result examining the presence of long run relations of all these products with world economic activities measured in terms of world gross domestic products (GDPw), real effective exchange rate (REER) and foreign direct investment (FDI) are given in table 5. The results shows that except Printed books, newspapers, pictures etc (49) and Pearls, precious stones, metals, coins, etc (71), F-value of all the products are more than the upper bound value. This implies that there exists a long run cointegration relationship between export of these products and growth in world income; FDI; and real effective exchange rate export base. This implies that in order to promote export of non-mineral products and to diversify the, Saudi Arabia needs to check appreciation of Saudi riyal. Since the country is tying her currency with the dollar, she does not autonomy to manage the exchange rate. The policy option left for the country now lies in promoting the foreign direct investment. But under the current situation when government is pursuing the policy of Saudisation of economy this seems to be difficult to achieve. In the absence of sufficient domestic skilled labour who can replace the foreign labour at similar wage structure, the cost of production is going to rise. This will reduce the competitive position of Saudi export in the world market. Besides, such labour policy will also discourage the inflow of FDI into the country. Thus, successful strategies based on comparative and competitive advantages is required to accelerate the diversification of the export sector.

4. Conclusion

The above analysis shows that the diversification of export has taken place over the last

20 years due to fast growth of some of the non-mineral products. The share of mineral products has declined. The diversification of export is also evident from the decline in concentration index over a period of time. Though the extent of diversification is small, but it still shows positive change in Saudi economy. The bound test analysis shows that most these products exhibits a long run cointegration relationship with inflow of FDI and real exchange rate. This implies that Saudi Arabia can promote export of non-mineral products by taking suitable exchange rate policy and some measures that can promote FDI inflow into these sectors.

Table 1 Composition of Export

Years	Mineral Exports	Foodstuffs	Chemical Products	Plastic Products	Articles and Metals of Base	Electrical Machines, Equipment & Tools	Other Exports	Re-exports	Total
1991	91.42	0.79	3.09	1.90	0.58	0.22	0.72	1.29	100
1995	87.02	0.85	5.42	2.91	1.40	0.45	1.00	0.94	100
2000	91.46	0.59	4.17	1.31	0.68	0.33	0.81	0.65	100
2001	88.16	0.60	5.29	2.42	0.80	0.41	0.89	1.43	100
2005	89.55	0.64	3.59	2.62	0.74	0.41	0.86	1.59	100
2010	85.82	1.18	4.27	4.48	0.77	0.40	1.02	2.09	100
2011	87.17	0.92	4.46	3.94	0.61	0.29	0.83	1.78	100
CAGR									
1991-00	5.5	2.1	9.1	1.2	7.4	10.4	7	-0.02	5.5
2001-11	18.2	23.4	16.3	24.2	15.2	14.2	17.4	21	18.3
1991-11	10.4	11.6	12.8	14.8	11	12.3	11.5	12.5	10.7

Source: Saudi Arabian Monetary Agency

Table 2 Concentration Index

Years	H-Index	G.H. Index	Hirschman Index
1991	0.86376795	0.9294	0.921
1992	0.759849177	0.8717	0.857
1993	0.830872179	0.9115	0.902
1994	0.812330692	0.9013	0.89
1995	0.755930222	0.8694	0.855
1996	0.786491507	0.8868	0.874
1997	0.75592576	0.8694	0.855
1998	0.713784633	0.8449	0.827
1999	0.785405118	0.8862	0.873
2000	0.837714051	0.9153	0.906
2001	0.743794252	0.8624	0.847
2002	0.777358746	0.8817	0.868
2003	0.780290864	0.8833	0.87
2004	0.773519112	0.8795	0.866
2005	0.802123938	0.8956	0.884
2006	0.796875235	0.8927	0.881
2007	0.778298278	0.8822	0.869
2008	0.803661133	0.8965	0.885
2009	0.719891061	0.8485	0.831
2010	0.737687065	0.8589	0.843
2011	0.761324771	0.8725	0.858
2012	0.793999078	0.8911	0.879

Source: Computed from the data taken from ITC and UN Database

Table 3 RCA Index

HS Code	Products	2001	2005	2009	2010	2011	2012
27	Mineral fuels, oils, distillation products, etc	8.83	6.53	5.90	5.54	4.85	4.77
29	Organic chemicals	1.61	1.01	0.99	1.21	1.35	1.80
39	Plastics and articles thereof	0.79	0.81	0.91	1.41	1.28	1.40
73	Articles of iron or steel	0.23	0.19	0.13	0.21	0.17	0.04
31	Fertilizers	1.94	1.29	1.61	1.38	1.06	1.30
72	Iron and steel	0.14	0.10	0.06	0.10	0.09	0.03
89	Ships, boats and other floating structures	0.10	0.36	0.74	0.22	0.32	0.00
48	Paper and paperboard, articles of pulp, paper and board	0.14	0.18	0.21	0.35	0.29	0.08
04	Dairy products, eggs, honey, edible animal product nes	0.44	0.49	0.41	0.78	0.63	0.01
28	Inorganic chemicals, precious metal compound, isotopes	0.70	0.27	0.18	0.17	0.22	0.39
76	Aluminium and articles thereof	0.17	0.16	0.17	0.21	0.14	0.11
32	Tanning, dyeing extracts, tannins, derivs, pigments etc	0.11	0.25	0.21	0.34	0.27	0.11
56	Wadding, felt, nonwovens, yarns, twine, cordage, etc	0.02	0.08	0.16	0.28	0.21	0.18
34	Soaps, lubricants, waxes, candles, modelling pastes	0.56	0.37	0.43	0.68	0.50	0.05
20	Vegetable, fruit, nut, etc food preparations	0.25	0.28	0.21	0.41	0.31	0.03
70	Glass and glassware	0.33	0.18	0.02	0.19	0.14	0.06
57	Carpets and other textile floor coverings	0.65	0.75	0.12	0.75	0.71	0.11
33	Essential oils, perfumes, cosmetics, toileteries	0.17	0.11	0.12	0.18	0.12	0.03
25	Salt, sulphur, earth, stone, plaster, lime and cement	0.72	0.29	0.23	0.40	0.28	0.56
74	Copper and articles thereof	0.19	0.07	0.03	0.03	0.02	0.20
38	Miscellaneous chemical products	0.07	0.07	0.06	0.15	0.14	0.08
17	Sugars and sugar confectionery	0.04	0.19	0.22	0.41	0.30	0.04
30	Pharmaceutical products	0.02	0.03	0.01	0.03	0.03	0.01
03	Fish, crustaceans, molluscs, aquatic invertebrates nes	0.02	0.05	0.05	0.09	0.04	0.02
47	Pulp of wood, fibrous cellulosic material, waste etc	0.03	0.06	0	0.03	0.03	0.05
78	Lead and articles thereof	0.27	0.28	0	0.08	0.08	0.22
54	Manmade filaments	.02	.05	0.01	0.09	0.10	0.12
49	Printed books, newspapers, pictures etc	.03	.02	0	0.03	0.02	0.04
79	Zinc and articles thereof	.06	.05	0	0.05	0.03	0.03
82	Tools, implements, cutlery, etc of base metal	.01	.02	.01	0	.01	.01
26	Ores, slag and ash	.03	.01	0	.01	.01	.01
05	Products of animal origin, nes	.01	.01	0	.01	0	.01
11	Milling products, malt, starches, inulin, wheat gluten	.01	.03	0	.04	.03	.02
96	Miscellaneous manufactured articles	.01	.01	0	.01	.01	.04
58	Special woven or tufted fabric, lace, tapestry etc	.02	.01	0	.01	.02	.02
66	Umbrellas, walking-sticks, seat-sticks, whips, etc	0	.01	0	0	0	0
92	Musical instruments, parts and accessories	0	0	0	0	0	0

Computed from the data taken from ITC

Table 4: Unit Root Test Result (PP test)

Product Code	Variables	Level			First Difference		
		C	C&T	None	C	C&T	None
	lGDPw	-0.583119	-1.749561	9.308201	-3.900918*	-4.202049*	-1.200259
	lREER	-1.840084	-1.730374	-0.603754	-2.954031**	-3.909920**	-3.097468*
	lfdi	-0.722058	-1.521539	0.869801	-3.324238	-3.221953	-3.302382
27	Mineral fuels, oils, distillation products, etc	-0.839970	-3.065993	2.177178	-4.199440	-4.070700	-3.738862
29	Organic chemicals	-0.102855	-5.090477	4.434044	-6.353832	-6.406603	-5.063820
31	Fertilizers	-1.006866	-2.326434	4.926022	-10.73779	-10.19576	-5.874905
39	Plastics and articles thereof	-1.481508	-1.264685	-0.251113	-4.163120	-3.996639	-4.284664
56	Wadding, felt, nonwovens, yarns, twine, cordage, etc	-0.198755	-4.438531	0.338781	-7.765442*	-6.964778*	-4.414159*
71	Pearls, precious stones, metals, coins, etc	-1.296479	-2.408982	0.987349	-6.415300	-6.606278	-4.531166
38	Miscellaneous chemical products	-1.317577	-2.906148	2.792854	-5.782487*	-6.127321*	-5.390447*
78	Lead and articles thereof	-3.000852***	-3.247590	1.137604	-5.021975*	-4.624792*	-4.862492*
30	Pharmaceutical products	-1.051953	-2.368305	1.947209	-4.787434*	-5.169734*	-3.904130*
03	Fish, crustaceans, molluscs, aquatic invertebrates nes	-2.480398	-3.703987**	1.234536	-6.893354*	-6.763927*	-6.632154*
47	Pulp of wood, fibrous cellulosic material, waste etc	-1.793853	-2.707423	1.316951	-6.458185*	-6.323794*	-6.304737*
49	Printed books, newspapers, pictures etc	-1.283823	-3.215298	3.513301	-5.784083*-4.908894*	-4.908894*	-3.688043*
26	Ores, slag and ash	-9.524912*	-8.476861*	0.503853	-11.92222*	-10.91326*	-11.61980*
28	Inorganic chemicals, precious metal compound, isotopes	-2.640900	-2.391279	0.723323	-5.759536*	-7.084583*	-5.926233*
76	Aluminium and articles thereof	-1.953011	-2.825994	1.776992	-6.219406*	-6.083182*	-5.942228*
25	Salt, sulphur, earth, stone, plaster, lime and cement	-2.229179	-2.456510	1.226751	-5.468190*	-6.304128*	-5.303823*
74	Copper and articles thereof	-2.717088***	-2.885027	0.810691	-4.297412*	-4.158551*	-4.361000*
17	Sugars and sugar confectionery	-1.375352	-1.783461	-0.048609	-2.063238	-1.725067	-2.252540**
82	Tools, implements, cutlery, etc of base metal	-2.771876	-2.630717	0.103501	-5.342527*	-5.502355*	-5.564870*
05	Products of animal origin, nes	-2.513582	-2.513582	0.103774	-4.582963*	-5.283460*	-4.778008*
11	Milling products, malt, starches, inulin, wheat gluten	-0.834338	-2.493230	0.650351	-4.317969*	-4.198115*	-4.218599*
96	Miscellaneous manufactured articles	-0.863224	-1.096453	0.505079	-1.154268	-3.485719***	-1.155970
58	Special woven or tufted fabric, lace, tapestry etc	-3.236354**	-4.789755*	0.274361	-7.667072*	-8.999915*	-7.979269*
Critical Values	1%	-3.788030	-4.467895	-2.679735	-3.808546	-4.498307	-2.685718
	5%	-3.012363	-3.644963	-1.958088	-3.020686	-3.658446	-1.959071
	10%	-2.646119	-3.261452	-1.607830	-2.650413	-3.268973	-1.607456

- Critical values are of Mc Kinnon (1996)

Table 5 Bound Test Result

HS code	F-value	Degree of freedom
71	2.62	4,14
38	3.54	4,17
78	67.39	4,12
30	181.17	4,13
03	56.83	4,14
47	20.78	4,15
49	1.1	4,17
29	20	4,17
56	194.5	4,18
26	25.88	4,16
28	20.84	4, 15
76	14.85	4,14
25	27.2	4,14
74	51.25	4,14
17	142.2	4,14
82	71.8	4,14
05	4.62	4,18
11	91.74	4,16
96	11.61	4,17
58	21	4,20
27	12.8	4,16
31	10.4	4,17
39	22	4,17

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Corresponding Author:

Dr. Zafar Ahmad Sultan, Faculty, College of business Administration, Alkharj, Salman Bin Abdulaziz University, Alkharj, Email: zsultan.sultan@gmail.com

Parent Institute:

Associate Professor; P.G. Department of Economics, L.S. College, Muzaffarpur; B.R.A. Bihar University, Muzaffarpur; Bihar, India.

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