COMPARATIVE ADVANTAGE AND THE PRODUCT MAPPING OF EXPORTING SECTOR OF MINERALS IN PAKISTAN

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Abstract:*The economic policy regarding imports and exports contains advantages as well as disadvantages for each state. In Pakistan, however, this policy of import and export economy often led to an unsymmetrical export portfolio resulting in the trade balance deficit. This study aims at measuring the export competitiveness of minerals in Pakistan, and the data were obtained from the international trade centre (ITC). Hence, a set of revealed comparative advantage (RCA) indices were employed to examine the comparative and competitive advantage of mineral sector of Pakistan for the peiod2003-2018. The results show that Pakistan had a comparative advantage in the minerals exporting sector during 2004 to 2018, while comparative disadvantage in 2003. Further, the net export index illustrates that Pakistan was a net-importer of this sector from 2003-04, whereas net-exporter during 2005-18.*

Keywords; *Comparative advantage, revealed comparative advantage, Exports*

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1. Introduction

Exports have attained incredible importance in modern economies as their growth is indispensable for the growth of every economy. The factor endowments of export commodities, however, are considered an important indicator in the development of an economy. When the total exports of an economy increase, there is considerable growth in its revenue, while the external deficits decrease significantly. In addition, the competitiveness of an economy increases in the world markets as well. minerals have been a major source of economic growth in China, Brazil, Italy, Spain and Turkey etc. The minerals have a multifarious contribution in enhancing per capita income, employment generation and poverty reduction. Pakistan is blessed with large mineral reserves covering an area of 6000,000 sq.KMs. Most of the visuals are used commercially with a total output of nearly 68 million metric tons annually. The mineral sector of Pakistan has a remarkable growth about theory present 3% having operational mines above 5000 SMEs providing employment opportunities of for 300,000 laborers (Shah, 2018). Minerals can be categorized different titles like metallic, non-metallic and energy minerals.Pakistan has a competitive edge in its mineral resources

occurring in several varieties, pattern and colours. Salt mines and coal deposits are the second largest in the world market and copper is in the fifth position. Despite the huge potential in minerals, the contribution of the mineral sector to the GDP of Pakistan is approximately 3% and the economy's exports are just 0.1% of the total world exports.

The objective of this study is to evaluate the export competitiveness and comparative advantage of Pakistan's mineral sector. The study employed several indices of comparative advantage for measuring the comparative advantage and competitiveness in the concerned sector. These indices offer a valuable measure to examine the comparative advantage based on the actual trade performance. This study also employed a relative import advantage index to measure CA in the mineral sector as Pakistan is also an importer of these minerals. Further, the present study utilized relative trade advantage index to examine the net trade advantage in the said sector. This analysis will be beneficial to enhance the export competitiveness of the mineral sector as the global markets have altered into far more competitive than ever before. As no valuable study utilizing these selected indices has been conducted yet to examine theexport competitiveness of

Pakistan's minerals. Hence, this study is valuable for the future policyframework.

2. Literature Review

A large number of studies haveapplied comparative advantage index to evaluate the competitiveness of the export of different economies. Balassa and Marcus (1989) also employed RCA method to measure the competitiveness of Japan and USA from 1967-1983. Haddad (2000) examinedthe export competitiveness of North African and Middle Eastern regions by using a similar approach.Fetscherin et al. (2010) used industry specialization, export growth rate and relative industry to gauge the export competitiveness of Chines manufacturing industries.They concluded that 50% of Chines industries were competitive in the World markets.Fetscherin et al. (2012) also measured the export competitiveness of Indian manufacturing sector by utilizing 97 industries from 2001-05 and concluded that 40% of the Indian industries are competitive in the global markets.Sachithra et al., (2012) employed RCA, RSCA and TBI indices to examine the export competitiveness of Sri Lankan in international trade from 2000-2010. The findings illustrate that Sri Lanka had a comparative advantage in the selected leading exports.Ignjatijevic et al., (2014) utilized different revealed comparative advantage

indices to measure the competitiveness of food processing industries of Danube economies. The export competitiveness of agro-processed products of Ghana was investigated by Oduro and Offei (2014) by employing a set of RCA indices. The findings of the study highlight that Ghana had a CA in these selected products.Erkan and Sarıçoban (2014) analyzed and compared the export competitiveness of Turkey and EU+13 countries by employing RCA indices during 1993-2012 in the science-based goods. The results of the analysis illustrate that these goods had not a significant impact on the rise of Turkey and EU+13 economies export share in the world market. The product space methodology was employed by Haddad (2018) to identify the leading export sectors of Tunisia and Egypt economies.

As far as Pakistan is concerned, the export competitiveness of horticultural products of Pakistan was measured by Waqar et al., (2013) by utilizing some indices of revealed comparative advantage during 1990-2009 and concluded that Pakistan had a competitive and comparative advantage in the selected products. Abbas and Muhammad (2016) investigated the competitiveness of Pakistan's manufacturing sector over nine European and eight Asian economies by employing Blassa index from 2003-2013. The findings of the

analysis reveal that Pakistan had a CA in low value-added products. Another study employing the revealed comparative advantage indices was conducted by Irshad and Xin (2017) identified the factors responsible for Pakistan's export competitiveness from 2003-2015. The empirical results declare Pakistan as anunimportant trading partner in the World trade. However, Pakistan is found to have acomparative advantage in the textile industry.The above-mentioned literature illustrates that there is no valuable study on the comparative advantage and competitive advantage in the Pakistani products, namelysalt, sulfur,, plastering materials, lime and cement.The export competitiveness of top five cotton export economies was examined by Maqbool et al (2020) by utilizing RCA indices.Maqbool et al (2020) examined the export competitiveness in the cereal sector of Pakistan by employing several indices of RCA during 2003-2018.The present study, therefore, will be a vital contributor to the literature and it will also encourage the researchers to conduct their studies to measure the competitiveness of different export products especially minerals.

3. **Measurement of the competitiveness; Revealed comparative advantage indices**

The method of revealed comparative advantage has been widely employed to measure the competitiveness of numerous products. The commodity pattern of comparative advantage has been recognized as a key conception in global trade theory. The notion of comparative advantage has got much significance despite the measurement issues. The major flaw is that it is mentioned in terms of relative autarkic price relationship that is not reasonablefor the post-trade equilibria. According toSharma and Dietrich (2004), post-trade positions should be revealed by trade statistics.The economic condition of a country determines the Global patterns of comparative advantage. Eventually, these patterns govern the production, consumption and trade among the countries. The indices that are constructed from production, consumption or other variables of post-trade scenario are usually used to illustrate CA and these indices are called the revealed comparative advantage (RCA). RCA was initially introduced by Liesner (1958) and then operationalized by Balassa (1965.) for the assessment of CA. According to Balassa and Noland (1989), the export index of RCA is expressed as the ratio of a country's export of a specific product category to its share in total merchandise exports.

$$RCA(BalassaIkdex) \quad = \quad \frac{X_i^m \big/ \sum X_i^m}{\overline{X_i^m \big/ \sum X_i^m}} \qquad \text{(Source; Erkan and Sarıçoban, 2014)}$$

Where

X_i^m= Mineral exports of Pakistan

$\sum X_i^m$ = total exports of Pakistan

X_i^m = World's mineral exports

$\sum X_i^m$ =Total exports of the World

The RCA index value varies between zero, highlights that a country has no exports in the concerned sector, and infinity, illustrating that the selected sector is a major exporter relative to the other sectors of the economy. Balassa index can be classified in the four stages to explain the power of CA (Hinloopen, 2001):

Table 1 Classifications of RCA index

Sr.No	Classifications of RCA	Interpretations
i.	$0 < RCA \leq 1$	There is no CA.
ii.	$1 < RCA \leq 2$	There is a weak CA.
iii.	$2 < RCA \leq 4$	There is moderate CA.
iv.	$RCA > 4$	There is a strong CA.

(Source; Hinloopen, 2001)

When the study applies logarithms to the RCA index and the study has LnRCA>0, there is CA, while LnRCA<0 indicates comparative disadvantage. Balassa also utilized another index of revealed comparative advantage, the net export index (NEI). This index has been explained as net exports divided by the sum of imports and exports of the selected products (Balassa and Noland, 1989).

NEI= X_i-M_i/X_i+M_i (Source; Erkan and Sarıcoban, 2014)

This index may beinfluenced by the overall position of aneconomy's trade balance and its range is between -1 and 1. NEI equals to 1 illustrating that the qualitative structure of exports of a country above its imports or aneconomy is net-exporter, while less than 1 shows net-importer economy (Shohibu, 2013). When NEI=0, it means the country has the same exports and imports. The absolute value |*NEI*| of this index highlights the portion of inter-industry trade relative to the total trade of any product group, and 1-|*NEI*| represents the portion of intra-industry trade (Vixathep, 2011).

The present study also employed Vollrath index (1991) to gauge the comparative advantage and competitiveness byeliminating the double-counting in the global trade. The index is explained as

$$RCA\# = \frac{\{\frac{Z_{ij}}{(\Sigma_i Z_{ij})-Z_{ij}}\}}{\{\frac{(\Sigma_j Z_{ij})-Z_{ij}}{[(\Sigma_j \Sigma_i Z_{ij})-(\Sigma_j Z_{ij})]-[(\Sigma_i Z_{ij})-Z_{ij}]}\}}$$ (Source; Gnidchenko and Salnikov, 2015)

Where

Z_{ij}=Mineralexports of Pakistan

$\sum_i Z_{ij}$= Total exports Pakistan

$\sum_j Z_{ij}$= Mineral exports of the World

$\sum_j \sum_i Z_{ij}$= Total exports of the World

The revealed symmetric comparative advantage index (RSCA) is employed to suppress the problem of skewness and it is lies between -1 and 1. This index is defined as follows;

$$RSCA = \frac{RCA-1}{RCA+1}$$ (Source; Erkan and Sarıcoban, 2014)

Apart from the export index of RCA, the study has also employed the import index of revealed comparative advantage (RMA).

Further, the study has measured revealed trade advantage (RTA) (Ferto and Hubbard, 2002).

$$RMA = \frac{M_i^C/\sum M_i^C}{M_i^w/\sum M_i^w}$$ (Source; Akhtar et al., 2013)

$$RTA = RCA - RMA = \dfrac{X_i^C \big/ \sum X_i^C}{X_i^w \big/ \sum X_i^w} - \dfrac{M_i^C \big/ \sum M_i^C}{M_i^w \big/ \sum M_i^w}$$

(Source; Akhtar et al., 2013)

Furthermore, the current analysis developed "products mapping" by using the NEI and RSCA indices. This product category classified into four groups, namely A, B, C and D.

Figure 1

Group; A CA Net-exporter country (RSCA >0 and NEI >0)	Group; B CA Net-importer country (RSCA >0 and NEI <0)
Group; C Comparative Disadvantage Net-exporter country (RSCA <0 and NEI >0)	Group; D Comparative Disadvantage Net-importer country (RSCA <0 and NEI <0)

(Source: Widodo, 2009)

4. Results and discussion

Table 2 highlights the exports and imports growth of the nominated product group from Pakistan to the World. The results illustrate that Pakistan had a high export growth rate in this product group in the years 2004, 2005, 2006, 2007, 2008, 2011, 2012, 2013 and 2018. Negative growth was seen in the years 2009, 2010, 2014, 2015, 2016 and 2017 due to international financial crises, market diversification, liquidity problem, poor market access, research and development and law and order situation (GOP, 2015). The years in which Pakistan had a negative export growth rate, a positive growthratein the imports were also witnessed in the same years. It means that Pakistan increased the import of this product group from the world to fulfil the demand of the country.

Table 2: Export and Import growth of Minerals (sulfur, salt, earths and stones, plastering materials, lime and cement) of Pakistan in the World from 2003-18 (thousands US$)

Years	MEOP	MEOW	TEP	MIOP
2004	31.084	18.634	-21.59	63.68
2005	194.93	10.394	27.53	-4.39
2006	13.09	13.389	5.4994	5.209
2007	97.61	14.031	5.3478	11.19
2008	138.74	41.628	13.682	108.6
2009	-6.259	-29.78	-13.43	-46.6
2010	-8.694	14.579	21.979	32.15
2011	10.929	20.664	18.356	26.85
2012	25.137	0.3755	-2.881	-8.62
2013	1.2258	-0.47	2.0607	-2.62
2014	-3.955	1.3702	-1.587	9.102
2015	-26.89	-10.13	-10.65	12.43
2016	-11.72	-9.792	-7.041	4.381
2017	-13.95	9.5137	6.5453	11.01
2018	16.328	13.542	8.0132	-6.03

Sources; Authors own calculations, Where MEOP= Minerals export of Pakistan, MEOW= Minerals export of World, TEP= Total export of Pakistan, MRIP= Minerals Import of Pakistan

This study has utilized a set of revealed comparative advantage indices to evaluate the export competitiveness of Pakistan's minerals for the period 2003-18. In table 3, RCA index illustrates that Pakistan has CA in the concerned sector from 2004 to 2018, while comparative disadvantage in 2003. In addition, the results indicate that Pakistan had a higher CA from 2007-18 having the index value greater than 4 (Abbas and Muhammad, 2016). The trend of RSCA index described that Pakistan enhanced specialization in this sector from 2004-18. The positive RSCA index illustrates the CA in the years from 2004-18, while a negative value shows comparative disadvantage in the year 2003. The index of LnRCApoints out that Pakistan had a CA in the whole period except 2003. The Vollrath index (1991) reveals that Pakistan had a competitive advantage in the fore-mentioned sector from 2004-18. This index also examined that Pakistan had a competitive disadvantage in the year 2003. The revealed import advantage index points out that Pakistan had a competitive disadvantage in the year 2004, while it had a competitive advantage in the other years in imports. The positive values of the relative trade advantage index illustrate that Pakistan had a net comparative advantage from 2004-18, while the net comparative disadvantage in the year 2003 (Shah, 2018). The net export index illustrates that Pakistan is a net importer of this sector from 2003-04, while net exporter during

2005-18. Further, the absolute values of the net export index |*NEI*| point out the portion of inter-industry trade in this sector, while 1-|*NEI*| highlights the portion of intra-industry trade.

The findings of " product mapping" highlight that Pakistan lies in group B in the years 2003 and 2004, while it lies in group A from 2005-18.

Table 3 Different Revealed Comparative Advantage Indices related to Mineral exports of Pakistan during 2003-18

Years	RCA	RSCA	LNRCA	RCA#	RMA	RTA	*NEI*	|*NEI*|	1-|*NEI*|
2003	0.682	-0.19	-0.38	0.681	0.739	-0.06	-0.057	0.057	0.943
2004	1.1682	0.078	0.155	1.169	1.045	0.123	-0.167	0.167	0.833
2005	2.781	0.471	1.023	2.8013	0.609	2.172	0.376	0.376	0.624
2006	3.0397	0.505	1.112	3.0641	0.574	2.466	0.406	0.406	0.594
2007	5.7849	0.705	1.755	5.8899	0.565	5.22	0.616	0.616	0.384
2008	9.9088	0.817	2.293	10.298	0.72	9.189	0.656	0.656	0.344
2009	11.81	0.844	2.469	12.359	0.624	11.19	0.789	0.789	0.211
2010	9.4288	0.808	2.244	9.7533	0.725	8.704	0.708	0.708	0.292
2011	8.7738	0.795	2.172	9.0519	0.809	7.965	0.673	0.673	0.327
2012	11.453	0.839	2.438	11.933	0.733	10.72	0.75	0.75	0.25
2013	11.786	0.844	2.467	12.281	0.754	11.03	0.758	0.758	0.242
2014	11.345	0.838	2.429	11.803	0.737	10.61	0.73	0.73	0.27
2015	8.9826	0.8	2.195	9.2698	0.869	8.114	0.613	0.613	0.387
2016	9.1738	0.803	2.216	9.4556	0.922	8.252	0.558	0.558	0.442
2017	7.3599	0.761	1.996	7.5344	0.818	6.542	0.464	0.464	0.536
2018	7.7052	0.77	2.042	7.9003	0.741	6.964	0.544	0.544	0.456

Source; Author's calculations by using ITC data

5. Conclusion

The present study aims at measuring the comparative and competitive advantage of minerals of Pakistan in the global world. The data has been collected from ITC UN-COMTRADE and concluded that Pakistan had a CA in the minerals exporting sector from 2004 to 2018, while comparative disadvantage

in 2003. Further, the net export index illustrates that Pakistan is a net-exporter of minerals during 2005-18, while net-importer in the years 2003 and 2004. The findings of our index-based empirical study suggest that Pakistan should exploit itsabundant natural resource potential to attract foreign exchange earnings by exporting minerals. The need of the hour is to explore and extract these natural reserves by using modern technologies and expertise. Pakistan should focus on diversifying its minerals both in terms of the nature of the products as well as markets. For better earnings, the country should concentrate on those markets which offer comparatively higher profit margins and have favorable terms of trade.

References

Abbas, S., & Mohammad, S. D. (2016). Pakistan's international competitiveness over Asia and Europe. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, *10*(2), 359-367.

Akhtar, W., Akmal, N., Shah, H., Niazi, M. A., & Tahir, A. (2013). Export competitiveness of Pakistani horticultural products. *Pakistan Journal of Agricultural Research*, *26*(2).

Amirah, E. H. (2018). *Exporting for growth: identifying leading sectors for Egypt and Tunisia using the Product Space Methodology* (No. 25/2018). German Development Institute/DeutschesInstitutfürEntwicklungspolitik (DIE).

Balassa, Bela (1965). Trade Liberalization and Revealed Comparative Advantage. The Manchester School of Economic and Social Studies. Vol:33. No:2. May 1965. 99-123

Balassa, B., & Noland, M. (1989). Revealed Comparative Advantage in Japan and the United States. *Journal of International Economic Integration*, 8- 22.

Ballance, R. H., Forstner, H., & Murray, T. (1987). Consistency tests of alternative measures of comparative advantage. *The Review of Economics and Statistics*, 157-161.

Erkan, B., &Sarıçoban, K. (2014). Comparative Analysis of the Competitiveness in the Export of Science-Based Goods Regarding Turkey and the EU+ 13 Countries. *International Journal of Business and Social Science*, *5*(8), 1.

Faustino, H. C. (2008). Intra-Industry Trade and Revealed Comparative Advantage: An Inverted-U Relationship.. SOCIUS Working Paper. No:03. 7. 1-13

Fetscherin, M., Alon, I., & Johnson, J. P. (2010). Assessing the export competitiveness of Chinese industries. *Asian Business & Management*, *9*(3), 401-424.

Ferto, I., & Hubbard, L. J. (2002). *Revealed Comparative Advantage and Competitiveness in Hungarian Agri-Food Sectors Technology Foresight in Hungary* (No. MT-DP-2002/8). IEHAS Discussion Papers.

Fetscherin, M., Alon, I., Johnson, J. P., &Pillania, R. K. (2012). Export competitiveness patterns in Indian industries. *Competitiveness Review: AnInternational Business Journal*.

Gnidchenko, A., &Salnikov, V. (2015). Net comparative advantage index: Overcoming the drawbacks of the existing indices. *Higher School of Economics Research Paper No. WP BRP*, *119*.

Haddad, M. (2000, October). Export competitiveness: where does the Middle East and North Africa region stand?. Economic Research Forum.

Hinloopen,j.(2001).On the empirical distribution of the Balassa index.Reviewed of world economics .137(1).13 1-49

Irshad, M. S., & Xin, Q. (2017). Determinants of exports competitiveness: An empirical analysis through revealed comparative advantage of external sector of Pakistan. *Asian Economic and Financial Review*, *6*(3), 623-633.

Liesner, H. H. (1958). The European common market and British industry. *The Economic Journal*, *68*(270), 302-316.

Ignjatijević, S., Matijašević, J., &Milojević, I. (2014). Revealed comparative advantages and competitiveness of the processed food sector for the Danube countries. *Custos E Agronegocioon line*, *10*(3), 256-281.

Maqbool, M. S., & Mahmood, T. (2020). A Comparative Analysis of Export Competitiveness of Top Five Cotton Exporting Countries. *Pakistan Journal of Social Sciences (PJSS)*, *40*(1).

Maqbool, M. S., Mahmood, T., Hussain, S., & Ashraf, M. (2020). Analysis of Trade Competitiveness of Pakistan Cereal Products in Global Perspective. *Review of Economics and DevelopmentStudies*, *6*(1), 97-106.

Oduro, A. D., &Offei, E. L. (2014). Investigating Ghana's revealed comparative advantage in agro-processed products. *ModernEconomy*, *2014*.

Sachithra, K. M. V., Sajeevi, G. A. C., Withanawasam, M. P. K., &Jayathilake, W. M. S. A. (2012). Comparative advantage in international trade: a study based on leading exports in Sri Lanka.

Shohibul, A. (2013). Revealed comparative advantage measure: ASEAN-China trade flows. *Journal of Economics and Sustainable Development*, *4*(7), 136-145

Vixathep, S. (2011). Trade liberalization and comparative advantage dynamics in Lao PDR. *Lao Trade Research Digest*, *2*(1), 1-33