



EXPORT DIVERSIFICATION AND TRADE RESILIENCE OF INDIA: A STUDY OF GLOBAL SHOCKS AND TRADE DISRUPTIONS

Dr. Abdur Rashid Ahmed

Assistant Professor, Department of Economics, Assam Don Bosco University

ABSTRACT

DOI No: 10.36713/epra31753

Article DOI: <https://doi.org/10.36713/epra31753>

India's diversified trade strategies have shifted to product diversification indicating growth in the non-traditional product base, and geographical diversification started adding more and more trading partners in the export list over the last few decades. India was able to exhibit a powerful position over the last couple of years in relation to global shocks such as global recession, political instabilities, disruption of global supply chains, and global pandemics like Covid-19. Hence, taking the principal objective of assessing the level of product and location diversification of Indian export, the study explores the realization of trade resilience in presence of various global shocks and trade disruptions. Using the concentration index of HHI, Theil and ANOVA model, the study finds that the product diversification indices based on HHI and Theil index of total export of India on various product categories to the globe is concentrating but the results of geographical diversification is increasing even during the period of Covid-19 pandemic. However, the one-way ANOVA result also reveals that the high degree of trade resilience which helps India to maintain high growth rate in terms of export volume which again positively impact on GDP growth rate of the country.

KEYWORDS: Export Diversification, Trade Resilience, Herfindahl-Hirschman Index (HHI), Theil Index, ANOVA, India

JEL Classification: F14, F41, O24, Q54

INTRODUCTION

India is an open economy mainly driven by her exports and imports and therefore India's external performance is heavily prone to fluctuation in foreign economy including various global crisis and economic downturns such as wars, supply chain disruptions, punitive sanctions imposed by the US government and epidemiological disease outbreaks like Covid-19, etc. These risks are regarded as being counterbalanced, and the economic stability and resilience of trade fortified through export diversification strategies. India diversified its export products and added new partners, which helped India stay unaffected by external as well as internal downturns in several sectors. Because maintaining the strong external policy, India remained a relatively open for international trade in the world. India's trade strategies have shifted to diversification including product diversification indicating rising geographical diversification due to adding more and more trading partners in the export list of the country over the last few decades and also due to the growth of Indian product market to some extent in the non-traditional product base. India has been faced with exigencies of trade including international disturbances of different kinds like the global financial crisis, the US-China trade war and the latest Covid-19 pandemic. Such disturbances even highlighted the problem of significant concentration on a

particular group of export goods or on particular markets. Even today questions can be raised over how far India has wholly transformed the export basket in order to enhance the buffers of the country. During the last two decades, India's export has increased significantly from mere 44 billion USD in 2001-02 to 375 billion USD in 2022-23 which will touch 2 trillion USD by 2030 as predicted by the government making India truly as one of the leaders in international trade. In terms of exports to GDP ratio, this growth is a quantum jump from meager 9% in 2001 to 24% in 2022-23 (PHD Chamber of Commerce and Industry, 2023). Although India has tried to diversify its export basket, there are still some uncertainties with laying emphasis on the improvement in export diversification as a way of fortifying its trade resilience. For instances, the segregational composition of export is seen with major contributions in sectors namely textiles, pharmaceuticals and IT services sectors respectively. This has left India vulnerable, to some extent to external demand shocks mainly in these sectors because India's export destination remains skewed in sectors like textiles, pharmaceuticals and information technology during last two decades. This specialization makes India vulnerable to external shocks in these sectors of trade.

However, India has shown time to time a powerful position in relation to global shocks including global recession, political

instabilities, disruption of global supply chains, and global pandemics such as Covid-19. In India, this risk is clearly addressed by export diversification unlike other countries of the world since she has developed trade resilience and general economic stability even during the years of all these global shocks. It is therefore important to understand how export diversification leads to trade resilience so that policymakers can formulate strategies of how best to lessen vulnerability and open the door for sustained development even when the world economy is not favorable. Hence, the principal objectives of the study to measure the degree of product and geographical diversification of Indian export during the period 2004-2023 and also to assess the impact of diversification on trade resilience especially in presence of various global shocks and other trade disruptions.

Theoretical Framework

The idea of export diversification has attracted great interest from economists and policymakers in view of its possible effects on growth, stability, and structure of industries in export destinations especially in developing countries. The literature under consideration in the study offers diversified views on the export diversification and its impact on economic growth with special reference to the empirical analysis across countries. In their cross-country analysis, Aditya and Roy (2007) examine the effects of export diversification on various parameters of the economy. They notice that countries with higher levels of export diversification enjoy better rates of economic growth since export diversification helps to reduce the vulnerability associated with exporting a large number of goods to other countries. This concurs with the literature on minimizing exposure to exogenous conditions, especially in the developing countries. In a similar vein, Agosin (2007) on export diversification and growth in emerging economies argues that diversification could help create immunity against world economic crisis. The study suggests that because diversified exports help nations to adapt to new circumstances in global markets, they are likely to achieve higher rates of sustainable growth. In another study, Al-Marhubi (2000) provides the real world analysis of the association between export diversification and economic growth. The research measures the effect of diversification on growth rates using econometric models to compare the results of the experiments between the economies. The study underlines the validity of going for greater diversification as supporting the fact that diversification is associated with economic growth, thereby implying that countries can assume higher growth rates through the broadening of their export bases. In their study, Arip et al. (2010) contemplate on Malaysia to explore export diversification and its effect on economic growth. They also appreciate that diversification of export base is desirable in terms of economic vulnerability and the ability to cope with outside adversity. The study also underscores how government policies enable export diversification with reference to infrastructure improvement and investment promotions.

Using terms of trade and real exchange rate volatility, Bleaney and Greenaway (2001) investigate the impact of investment and growth in sub Sahara Africa. Their study suggests that export diversification can protect the economies from terms of trade shocks, which supports stability and investment- the wheel of development. Besides, Cadot et al. (2011) look into the nature of the humped shaped relationship between export

diversification and economic growth. The authors submit that although there may be some benefits in the initial stages of diversification, there may be a point at which the returns on diversification are actually declining. As this simple yet complex framework would imply, there is merit in the fact that the composition of exports actually needs to be managed to achieve the best results for growth. Dawe (1996) gives a systematic assessment of export instability, and the effect it has on investment and growth. The study argues that export instability at a higher level is negative for economic growth, and export diversification is crucial in stabilizing export earnings and enhancing investment. These findings accord with the existing literature in observing that stability is usually a key precondition for the growth of sustainable economic development.

Feenstra and Kee (2004) discuss the link between Export variety and productivity which they argue that Export variety increases national productivity standards. Their work highlights the importance of diversification – an aspect that has earlier informed the notion that diversification in exports can catalyze economic growth. On this same note, industry and countries, Ferreira and Harrison (2012) provide a detailed analysis of Costa Rica, in arguing that shift from a traditional agricultural export to products in technology and services would boost overall economic growth. This case clearly illustrates how change through diversification in product diversification can change the economy and even make it more competitive. Funke and Ruhwedel (2001) reveal empirically for the case of East Asia that export variety significantly determines performance. The study also underscores the importance of diversification in the economic growth, especially in the littler industrialized nations. Greenaway et al. (1999) decompose links between exports, export destination, and growth and stress the importance of the structure of exports for growth paths. As for the authors, national governments should direct their efforts toward building up a diverse and competitive export base. The work carried out by Grossman and Helpman (1991) provides development on quality ladder in growth theory arguing that the process of diversification brings about technological improvements and quality improvements in exports thus driving growth.

The concept of this theoretical framework is to highlight the multifaceted opportunities of export diversification. Haddad et al. (2013) also argue that trade openness tends to lower growth volatility in diverse economy. This means that their conclusion supports the rationale for diversification in the course of exporting, because a portfolio of exports is the best way that countries can cope with market risks. Similarly, Hamed et al. (2014) analyze export diversification and economic growth in some developing countries with the similar approach. About their conclusion, which states that diversification has significant influence on growth that support the earlier studies which has shown that a diversified export base is paramount for achieving economic stability. In addition, Herzer and Nowak-Lehmann (2006) look at the example of Chile and show that export diversification has growth enhancing externalities. From their evidential results for their theories, they argue that diverse exports can augur well with better economic performance in terms of investment and innovations. Hesse (2009) expounds on the general aspects of export diversification for economic growth holding it that for countries to attain sustainable growth

they need to seek ways of deepening their export diversification. This is supported by other researchers in the literature arguing that diversification of the economy is critical in diversity risk in the context of economic vulnerability. Imbs and Wacziarg (2003) have given an idea about the nature of different stages of diversification. They argue that economies are known to go through various stages of development and diversification, and that the nature of the growth at each stage can be distinguished, to guide policy measures. Moreover, Kónya, 2006 combines Granger causality test to determine the connection between exports and growth in OECD countries. Based on this, the present study posits a reciprocal relationship that export growth fosters economic growth at the same time as the latter drives growth in exports. Krugman (1979) defines new increased returns and monopolistic competition with a view that diversification results to scale economies and improved market power leading to the growth of the economy. Finally, Michaely (1977) gives an initial empirical support on export, growth relationship as well as sets the ground work on the scope of exports on the growth process.

To sum, the body of export diversification and economic growth supports the fact on how diversification greatly affects

the economy growth and resilience. The cross-sectional and longitudinal analyses of the export diversification, in general, indicate the diverse advantages of exports diversification; the hedge against external shocks and improved export efficiency and competitiveness, for instance. Export diversification should be a key policy agenda among policymakers as a way of realizing sustainable economic development.

MATERIALS AND METHODS

Data and Sources

The study is entirely based on secondary data on trade related parameters of Indian exports to across the globe during the period 2004-2023 and hence, the dataset employed in the study is time series in nature. This dataset has been collected mainly from two internationally renowned and reliable data source i.e. Trade Map facilitated by International Trade Centre particularly the export data of India based on two digit Harmonized System (HS) codes and some general values from the World Development Indicator facilitated by World Bank. The product level data has been grouped as per the following table (Table-1) for ease of calculation of HHI and Theil Indices.

Table-1: Product Grouping for Product Diversifications

Product Groups	HS Code Range	Group Description
Group-1	01–15	Animal and vegetable products, including live animals, plants, and food items.
Group-2	16–24	Prepared foodstuffs, beverages, spirits, and tobacco.
Group-3	25–27	Mineral products, including ores, slag, ash, fuels, and oils.
Group-4	28–38	Chemical products, including inorganic and organic chemicals, pharmaceuticals, and fertilizers.
Group-5	44–49	Wood, cork, and articles made from wood, along with paper and printed products.
Group-6	50–63	Textiles and textile articles, including silk, wool, cotton, and apparel.
Group-7	64	Durable goods, specifically footwear and parts thereof.
Group-8	72–83	Base metals and articles, including iron, steel, aluminum, and tools.
Group-9	84–89	Machinery, mechanical appliances, electrical equipment, vehicles, and transport equipment.
Group-10	71, 90–97	Precious metals, jewelry (71), and miscellaneous manufactured items such as optical instruments and toys (90–97).
Group-11	30, 90	Medical equipment and pharmaceuticals (often in HS 30 and parts of HS 90).
Group-12	Various	Miscellaneous products that don't fit into the other categories.
All	All	Total export value for all HS categories.

Source: Author's own categorization

Analytical Tools

This study employs the HHI for India's export composition for both at the product and partner level. Measures of concentration including Herfindahl-Hirschman Index (HHI) and Theil Index have been employed to understand the level of export diversification and concentration of Indian export to other nations. Moreover, to capture the trade resilience in presence to global shocks and trade disruptions, ANOVA model has been used between the years of shocks like Covid pandemic and normal years. Details of the measurement tools and models have been discussed below.

(i) Herfindahl-Hirschman Index (HHI)

The Herfindahl-Hirschman Index (HHI) is the most popular and widely used tool for market concentration and dominance. It is the arithmetic sum of the squared ratios of the shares of different products or trading partners in a particular export basket. The HHI can be calculated with the following formula.

$$HHI = \sum_{i=1}^n s_i^2$$

Where,

s_i = share of the export value of product or partner i in the total export portfolio.

n = total number of products or partners.

Hence, HHI value varies between 0 and 1. A high HHI means high concentration which means exports are being made in just a few products and trading partners while a low HHI implies export diversification which can be calculated simply deducting the concentration value from 1 (i.e. Diversification = 1 - HHI).

(ii) Theil Index

The Theil Index is actually an entropy based index of inequality and can be used to measure the concentration in trading as well.

It enables the breakdown of the results making it easier to make comparisons of between groups and within group differences. The Theil Index is expressed as:

$$\text{Theil} = \frac{1}{n} \sum_{i=1}^n \frac{s_i}{\bar{s}} \log \frac{s_i}{\bar{s}}$$

Where,

s_i = export value share of product or partner i ,

$\bar{s}$ = average share of all products or partners,

n = total number of products or partners.

The Theil Index can assume values which are equal to 0 or higher. A Theil index value of 0 indicates that all products or partners have equal proportions in the exports portfolio with other partners. The higher values of the Theil index show higher levels of the concentration and inequality. For this purpose, the Theil index is employed in this research in order to assess the unequal distribution of exports in India's product and trading partners. It also enables us to evaluate not only the general level of concentration, and at the same time, to determine if the inequality is rendered by specific product segments or trading areas.

(iii) The ANOVA Model

To interpret the impact of Covid or other trade disruptions like US-China trade war, Red sea disruptions, etc. the following ANOVA model was employed.

$$\text{Export} = \alpha + D_i + \varepsilon$$

Where, Export = the total volume of exports of India to other countries of the world; α = intercept term (i.e. the mean export of India)

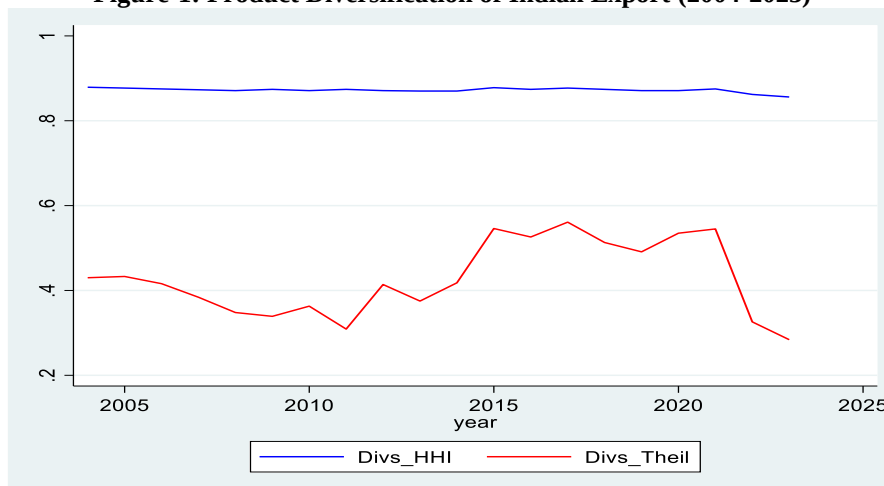
D = binary dummy variable where $D=1$ indicates year of trade disruptions due to Covid or other global issues and $D=0$ indicates otherwise.

ε = error terms.

Data Analysis and Findings

The results reveal that the product diversification indices based on HHI and Theil index of total export of India on various product categories to the world on an average is not diversifying during the periods of shocks due to Covid-19 pandemic but the Theil index value during 2015-2021 shows significant product diversification (Figure-1).

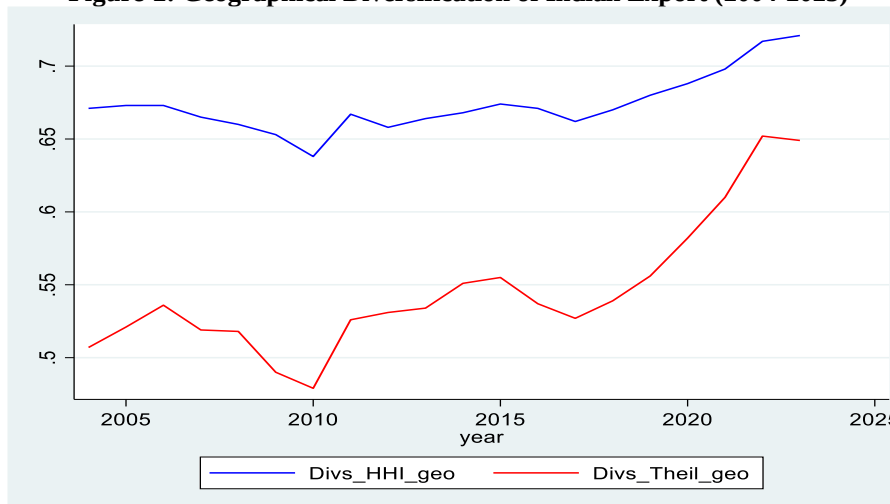
Figure-1: Product Diversification of Indian Export (2004-2023)



In addition, the results of geographical diversification based of HHI and Theil Indices indicates that the geographical diversification of India is increasing especially during the

period of Covid-19 pandemic along with rising trade volume which is a rare but positive signal in external trade showing the similar trend for product diversification.

Figure-2: Geographical Diversification of Indian Export (2004-2023)



However, the one-way ANOVA result (Table-2) reveals that the average export volume of India to the world during the

Covid period and normal years has significant difference between normal times and periods of trade disruptions which is

statistically significant at 5% level ($F=5.14^{**}$, $df_1=1$, $df_2=18$, $p\text{-value}=0.0359$).

Table-2: Analysis of Variance (ANOVA)

Table 2: Analysis of Variance (ANOVA)				
Model-1: Export = $\alpha + D_i + \varepsilon$				
Source	SS	df	MS	F (Prob > F)
Between groups	4.7104e+16	1	1 4.7104e+16	5.14** (0.0359)
Within groups	1.6486e+17	18	9.1586e+15	
Total	2.1196e+17	19	1.1156e+16	
Bartlett's equal-variances test: chi2(1) = 0.2245 (Prob>chi2 = 0.636)				
Source: Author's own calculation				

Furthermore, the calculation of mean export shows that the volume of export during trade disruptions especially Covid-19 has increased by 150% which is clearly indicated by the increment in mean export level from 240 million USD to 362 million USD (Table-3). But the comparative diversification indices between normal years and disruption years for both the HHI and Theil indices reflect the increasing trend during

disruption years indicating high level of resilience of Indian external trade indicators (Table-4). As displayed in Table-3 & 4 that the level of diversification shows upward trend by about 5%-10% in both product diversification and geographical diversification in terms of HHI and Theil indices in years of trade disruptions compared to the normal years.

Table-3: Mean Estimation of Exports (2004-2023)

Dummy variable (D)	Mean	Std. err.	[95% conf. interval]	
Normal years	2.40E+08	2.47E+07	1.89e+08	2.92e+08
Years of disruptions	3.62E+08	3.90E+07	2.80e+08	4.43e+08
Source: Author's calculation				

Table-4: Comparison of Average Diversifications

Period	HHI (product)	Theil (product)	HHI (geo)	Theil (geo)
Normal years	0.872	0.416	0.668	0.532
Years of disruptions	0.869	0.474	0.695	0.600
Source: Author's calculation				

However, the robustness of the diversification uptick during years of trade disruptions can be checked through ANOVA model which will explain the difference with statistical significance. The two ANOVA models in Table-5 and Table-6 exhibit the results for product diversification and geographical diversification. Here, the Table-5 shows that the product

diversification between normal years and years of disruptions is not statistical significant ($p\text{-value}=0.2473$) which confirms the acceptance of null hypothesis of no product diversification (as the result failed to reject the null hypothesis) indicating not so strong product diversification of Indian production base in the global market.

Table-5: Analysis of variance (ANOVA)

Table 3: Analysis of variance (ANOVA)				
Model-2: Theil (product diversification) = $\alpha + D_i + \varepsilon$				
Source	SS	df	MS	F (Prob > F)
Between groups	0.010788016	1	0.010788016	1.43 (0.2473)
Within groups	0.1358212	18	0.007545622	
Total	0.146609216	19	.007716275	
Bartlett's equal-variances test: $\chi^2(1) = 0.1849$ (Prob> $\chi^2 = 0.667$)				
Source: Author's calculation				

However, the Table-6 displays that the geographical diversification between normal years and years of disruptions is highly significant at 1% level ($p\text{-value}=0.0048$) which confirms the rejection of null hypothesis of no geographical diversification which again indicates that the Indian export is

statistically diversified in the global market even during the times of trade disruptions like Covid-19, US-China trade war and Red sea disruptions. Hence, the results indicate India developed trade resilience in terms of geographical diversification but not in terms of product diversification.

Table-6: Analysis of variance (ANOVA)

Table 6: Analysis of Variance (ANOVA)

Model-3: Theil (Geo. diversification) = $\alpha + D_i + \varepsilon$				
Source	SS	df	MS	F (Prob > F)
Between groups	0.014607014	1	0.014607014	10.32*** (0.0048)
Within groups	0.025479933	18	0.001415552	
Total	0.040086947	19	0.002109839	
Bartlett's equal-variances test: $\chi^2(1) = 0.0545$ (Prob> $\chi^2 = 0.815$)				
Source: Author's calculation				

CONCLUSION AND POLICY IMPLICATION

Employing the various tools of diversification particularly the Herfindahl-Hirschman Index (HHI) and the Theil index, I have observed that the total volume of export of India on various product categories to the world is concentrating but the results of geographical diversification based of HHI and Theil Indices higher diversification of India is increasing even during the period of Covid-19 pandemic and years of trade disruptions. Thus, this records a rare but positive signal in external trade unlike product diversification along with rising trade volume.

Moreover, the one-way ANOVA result also reveals that the average export volume of India to the world during the Covid-19 period is raising significantly compared to normal years. Besides, the average volume of export during trade disruptions especially Covid-19 has increased by 150% from 240 million US Dollars to 362 million US Dollars.

But the level of diversification shows upward trend by about 5%-10% in both product as well as geographical diversification in terms of both HHI and Theil indices in years of trade disruptions compared to the normal years. However, the robustness of the diversification uptick during years of trade disruptions also checked through ANOVA model and found that the product diversification between normal years and years of disruptions is not statistical significant but that the geographical diversification found to be highly significant level of trade resilience in terms of geographical diversification. Thus, the above discussion indicates the high degree of trade resilience of India which helps the country to obtain high growth rate in terms of export volume with a compound annual growth rate (CAGR) of 9.08% which again equally increases GDP of the country with a CAGR of 9.23%. Now, the finding of the study could be utilized for making informed-decisions while making external trade policy especially to further the trade resilience of the country enhancing and extending the product-base of India and promoting the production of goods and services in the country.

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