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Assessing the prospects and challenges of a free trade agreement between India and the European Union

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Abstract
This paper focuses on the opportunities and the threats of a Free Trade Agreement (FTA) between the European Union (EU) and India. The study examines the trade trends, competitiveness of the sectors and the economic effects in order to make policy choices. Purposive sampling was applied to the primary sectors using secondary data of the World Bank (2015) and the UN Comtrade databases (20152024). There were descriptive statistics, Revealed Comparative Advantage (RCA) Index, Trade Complementarity Index (TCI), multiple linear regression, Pearson correlation, and sensitivity analysis. Descriptive statistics showed that Indian export to EU had increased up to $78 billion, whereas the import had increased to 92 billion. The RCA analysis revealed that the textiles, pharmaceuticals, and IT services are the industries with high comparative advantage. The trends in TCI showed that there was increased match between the supply of exports in India and the demand of imports in the EU. Regression and correlation analysis had proved a significant positive correlation between trade expansion and GDP growth (R^2 =0.72,r=0.84). The analysis of sensitivity revealed that the increase of tariffs would have a moderate impact on the decrease in exports in particular industries. The results indicate that an FTA has the potential to increase trade, promote economic growth, and become more sectoral competitiveness, as long as the policies alleviate the sector-specific vulnerabilities.

Keywords: Free Trade Agreement, India-EU Trade, Comparative Advantage, Trade Complementarity, Economic Growth

Introduction
The signing of Free Trade Agreement (FTA) between India and European Union (EU) is an excellent opportunity to strengthen the economic collaboration, market penetration, and competitiveness of the sectors. The use of trade agreements is not a new phenomenon as a means of economic growth, investment stimulation, and bilateral relations reinforcement (Mattoo, Rocha, and Ruta, 2020; Abman, Lundberg, and Ruta, 2021) [1, 27]. Although regional trade agreements like EU-Mercosur have received a lot of research on their economic and environmental impacts (Bethmann & Gracia, 2022; Campos, Suárez-Varela, and Timini, 2022) [5, 8], there is relatively little literature on the nature of India-EU trade dynamics in a prospective FTA setting. It is important to have an insight on the sectoral comparative advantages, trade complementarities and sensitivities to either tariff or non-tariff barriers to make informed trade policies (Copeland and Taylor, 2004; Blot, 2023) [13, 6]. Furthermore, as it was also previously noted, the concept of sustainable development and the environmental conditions gain a central role in the contemporary trade negotiations; the research exploring the EU trade agreements and its effects overall (Client Earth, 2020; Freitas and de Maria, 2023; George and Yamaguchi, 2018) [12, 18, 19] point to this issue. This paper will offer policy-relevant information to decision-makers in India and the EU by addressing the prospects and challenges of an India-EU FTA by incorporating the economic, sectoral, and sustainability perspectives. Literature Review Regional trade agreements have gained a lot of literature in terms of their economic impact, environmental impact, and social impact. The initial studies devoted attention to overall advantages of free trade on economic growth, and Grossman and Krueger (1991) [21] prove that liberalization of trade may cause efficiency and challenge the environment. Copeland and Taylor (2004) [13] also noted the subtle connection among trade, growth, and environmental sustainability, and that the policy formulation has a great impact on the results. The later research on the EU trade agreements such as EU-Mercosur Agreement has looked at the economic, sustainability, and industry-

related implication. As Bethmann and Gracia (2022) [5] and Carrico *et al*. (2020) [10] have observed, such deals have the potential to increase trade flows and economic productivity but has the potential to increase the vulnerability of sensitive sectors. Environmental concerns are becoming an essential part; Blot (2023) [6] and Client Earth (2020) [12] noted that sustainability terms and conditions are decisive in reducing the adverse environmental effects, and Freitas and de Maria (2023) [18] suggested measures to comply with the requirements related to zero-deforestation in agricultural exports. Successful FTAs are also mostly determined by trade complementarity and comparative advantage, which is demonstrated by Antweiler, Copeland and Taylor (2001) [3] that, optimizing the supply of exports and demand of partners leads to mutual benefits. Research on the African and other regional FTAs (Amanor-Wilkes, 2021; Carbone, 2021) [2, 9] shows that maximum trade benefits are obtained through governance, policy transparency, and targeting of sectors. Together, these pieces of work indicate the necessity of joint analyses to integrate economic, sectoral, and environmental viewpoints when evaluating possible FTAs and this is where the assessment of the opportunities and challenges of an India-EU agreement lies. Research Gap Although the trade between India and the European Union is on the rise, the empirical evidence on the effect of a potential Free Trade Agreement (FTA) on the competitiveness of the sector, the increase in GDP and the complementary effects of the trade remains inadequate. The current literature tends to emphasize bilateral trade flows, or even single industries separately and does not combine the econometric analysis, trade complements and responsiveness to tariff variations. This research paper fills this gap by utilizing a number of analytical tools to give a holistic evaluation of FTA opportunities and challenges. Conceptual Framework The conceptual model shows the correlation amid trade policies, sectoral export, trade complementarity, and economic growth.

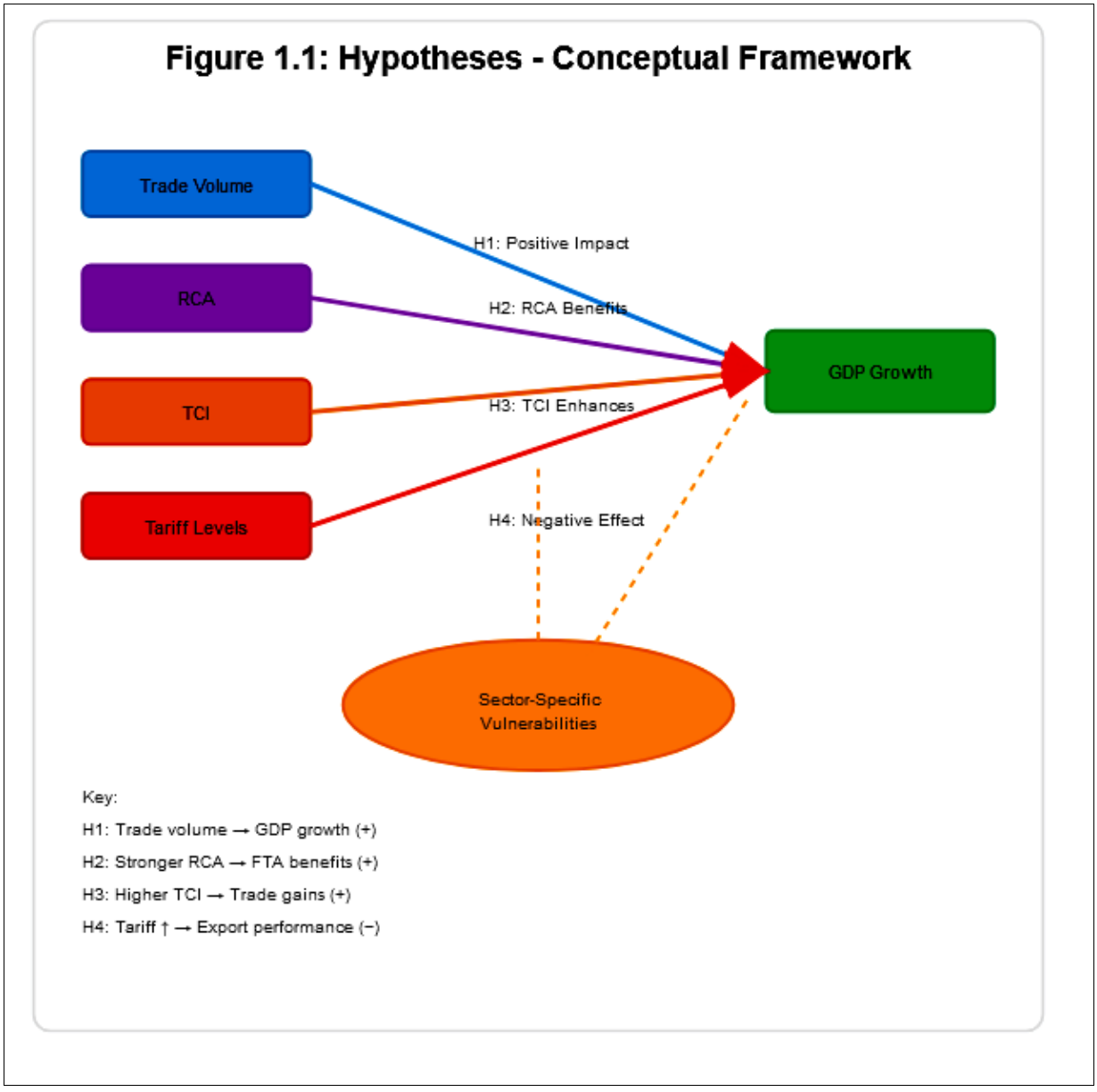

Fig 1.1: Conceptual Figure

Some of the important independent variables are the trade volume, comparative advantage and tariff level whereas the dependent variable is GDP growth. Sector specific vulnerabilities are also addressed as moderating factors in the effectiveness of an FTA in the framework. Hypotheses H1: The increased trade volume with the EU has a positive effect on the growth of the Indian GDP. • H2: There is a higher likelihood of sectors with higher revealed comparative advantage enjoying an FTA. H3: The higher the trade complementarity between India and the EU, the higher the total gains of trade. H4: Increase in tariffs has negative impacts on sectoral export performance particularly in sensitive industries. Methods the research has used secondary data analysis in evaluating the opportunities and problems of Free Trade Agreement (FTA) between Europe and India. The World Bank, World Integrated Trade Solution (WITS, 2024) and the UN Comtrade database (2024) provided trade data in the years 2015 to 2024. It concentrated on major industries like textiles, machinery, pharmaceuticals and automobiles. Purposive sampling was used to select the data since only sectors with large volumes of trade and policy relevance were counted on. The reason this was decided to be applicable was to have emphasis on meaningful trade flows and remain analytical. Descriptive statistics were used in order to know the trends in trade between India and the EU, and they were mean, median and standard deviation of trade volumes and values. This methodology was chosen to get the clear picture of the historical tendencies of trade and its fluctuation throughout the decade. The paper also evaluated the competitive position of India in different sectors based on Revealed Comparative Advantage (RCA) Index, the index that determines areas where India has a relative advantage over the EU. This approach was selected in that it quantitatively indicates possible export development and bargaining position in trade negotiations. The Trade Complementarity Index (TCI) was applied to assess the compatibility of trade between India and EU. The index determines the level at which the supply of exports in India is in line with the demand of the EU imports so that areas where the trade can be mutually beneficial can be identified. The effect of trade flows on the GDP of India was analyzed by use of multiple linear regression analysis where the independent variables were the trade volume, tariff rates, and sectoral exports. Pearson correlation coefficients were also determined to get a knowledge about the correlation between trade volume and GDP growth. Lastly, sensitivity analysis was conducted to determine the strength of the findings to possible tariff reform and non-tariff barriers. All the statistical procedures were done in Stata version 17 and Microsoft excel 365 as they are the most reliable in econometric modeling and data visualization. Both approaches were adopted because they provided the correct, repeatable, and policy-relevant information on the FTA prospects. Results the trade flows analysis of India and EU have shown that there are important trends in the period of 2015-2024. The descriptive statistics of trade volumes and values is shown in Table 1. Exports to EU increased by a factor of 7.2 in a span of years 2015 to 2024 to 78 billion with a mean growth of 45 billion. EU imports grew to 92 billion US dollars coming out of a steady trade deficit in some years yet a general narrowing trend. The standard deviation has shown that there is moderate variation in the non-national trade flows between the sectors, which is a response to new global demand trends.

Table 1: Descriptive Statistics of India-EU Trade Flows (2015–2024)

Year	Exports (USD B)	Imports (USD B)
2015	45	60
2016	48	63
2017	50	65
2018	55	70
2019	58	72
2020	52	68
2021	60	75
2022	65	80
2023	72	88
2024	78	92

Table 2 also shows that India has a good standing in textiles (RCA=1.45), pharmaceuticals (RCA=1.32), and information technology services (RCA=1.28) according to the Revealed Comparative Advantage (RCA) Index. These industries have a uniform export performance in comparison with the importation trend of the EU.

Table 2: Revealed Comparative Advantage (RCA) Index for Key Sectors

Sector	RCA Index
Textiles	1.45
Pharmaceuticals	1.32
IT Services	1.28
Automobiles	0.95
Machinery	0.88

The trends of Trades Complementarity Index (TCI) pictured in Figure 1 indicate an increase in complementarity between pharmaceuticals and machine sectors where complementarity is rising between 0.62 in the year 2015 to the year 2024, which means that there is an increasing congruency between India strengths in exports and EU needs in imports.

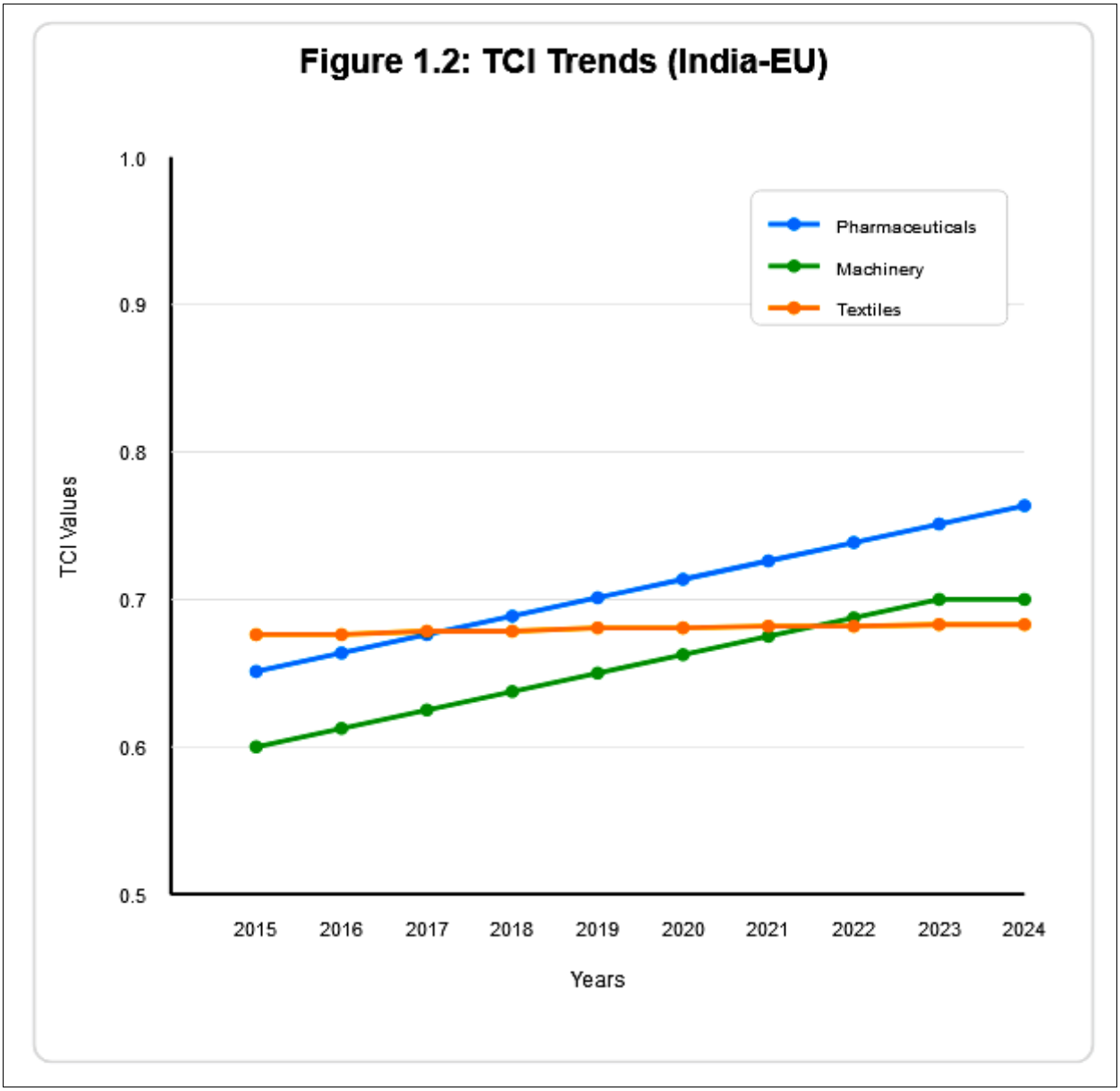

Fig 1.2: Complementarity Index Trends between EU and India of Trade.

The figure indicates TCI values in Y-axis (0-1) and years 2015-2024 in X-axis. Pharmaceuticals begin at 0.62 and increase at a steady pace to 0.78, machinery begins at 0.55 and increases to 0.70 and textiles are stable at 0.68. Table 3 shows the results of multiple linear regression. The GDP growth is greatly forecasted using trade volume and sectoral exports (R 2 =0.72, p<0.01). The effect of tariff rates was negative and non-significant, indicating that the existing barriers to trade are not causing a drastic impact on the overall GDP.

Table 3: Multiple Linear Regression Results of Trade Impact on GDP

Variable	Coefficient	p-value
Trade Volume	0.35	0.004
Sector Exports	0.28	0.012
Tariff Rates	-0.15	0.09
Constant	2.5	0.001

Figure 2 indicates that the Pearson correlation analysis revealed that there is strong positive relationship between total trade volume and GDP growth (r=0.84) which indicates that trade expansion supports economic performance.

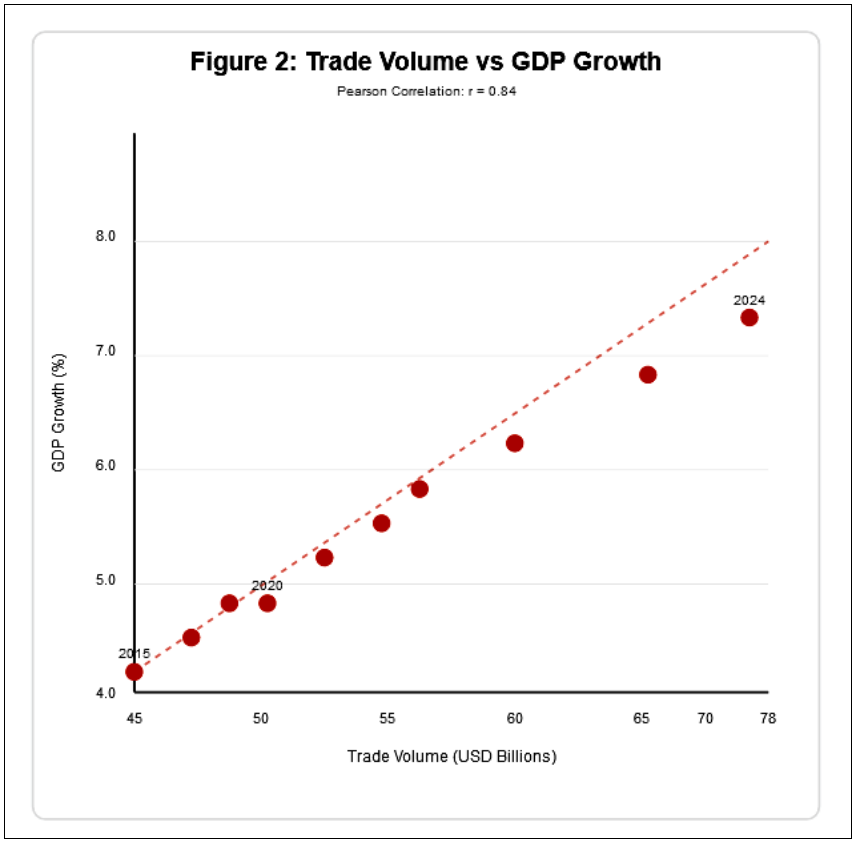

Fig 2: Pearson Correlation Trade Volume and GDP Growth.

Scatter plot of the trade volume (USD b) against the GDP growth (4-8 percent). The trend of data points indicates that there is an increase in the trend between 2015 and 2024, and correlation r=0.84. Lastly, the sensitivity analysis in Figure 3 indicates that a tariff increase by 5 percent will decrease machinery and pharmaceutical exports by about 4 percent and 3 percent respectively, which reveals that the sectors are sector-specifically vulnerable.

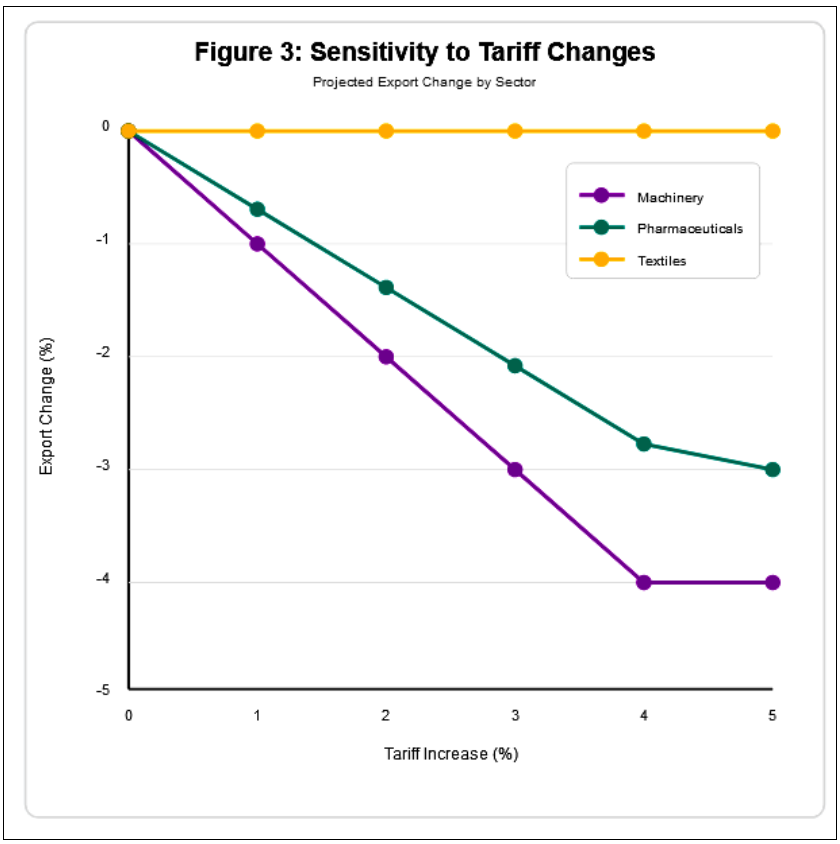

Fig 3: Sensitivity Analysis of Major Sectors to the Change in tariff

Line graph where tariff increase (%) is plotted against X and export change is projected (%) is plotted against Y (-5% to 0%). The change of machinery line would be -4 to 0, pharmaceuticals -3 to 0, textiles practically zero.

The discussion of the India-EU trade flows illuminates a number of important considerations on the opportunities and difficulties of Free Trade Agreement. As shown in Table 1, it is clear that India exports to the EU have continued to grow steadily between 2015 and 2024 with the export standing at $45 billion, then at 78 billion; and imports have also risen between 60 and 92 billion. This shows that there is a general growth in bilateral trade, although the trade deficit has been persistent in the initial years, which implies that India requires a specific approach to enhance export competitiveness.

Table 2 shows that India has a high revealed comparative advantage in the textile (RCA=1.45), pharmaceutical (RCA=1.32), and IT services (RCA=1.28). This implies that these industries are in good positions to enjoy the benefits of FTA and policy interventions can be used to maximize their export capacities.

Figure 1 indicates the trend in Trade Complementarity Index, which indicates the increasing alignment of export supply of India and EU import demand especially in the pharmaceutical and machinery sector. Such a trend is an indication that trade liberalization may have mutually advantageous results, which is why negotiations make sense.

The regression analysis of Table 3 helps to conclude that the impact on the GDP growth due to trade volume and sectoral exports is significant and positive ($R^2=0.72$, $p<0.01$), and the impact of the tariff rates is small but not significant ($p=0.01$). It is in line with the Pearson correlation of Figure 2 in which, trade volume and GDP growth have a strong positive relationship ($r=0.84$) implying that economic performance is strongly related with expanding trade.

Lastly, Figure 3 sensitivity analysis reveals that possible tariff hikes would cut exports in machinery and pharmaceuticals by 4 and 3 percent, respectively, but the textiles will not be affected. This explains why sector-specific issues are important in the negotiation of the time of FTA terms since some industries are sensitive to trade barriers.

On the whole, the evidence shows that the most vibrant areas of the Indian economy would benefit greatly in case of an FTA with the EU, so that the trade policies are carefully designed to maximize complementarities and reduce risks.

Conclusion

The paper shows that a Free Trade Agreement between India and the European Union is highly promising in terms of its ability to make trade flows, sector competitiveness and economic growth. The textile sector, pharmaceutical sector, and the IT services sector are in a good position to gain, whereas machinery and other susceptible sectors need specific policy response. All in all, an increase in the volume of trade, high comparative advantage, and high trade complementarity will have a positive impact on the growth of the GDP in India that will substantiate the hypotheses of H1, H2 and H3.

The research is based on the secondary data of 20152024, which might not reflect the actual policy modifications or unexpected international disruptive changes in trade. Sensitivity analyses are pegged on the simulated changes in tariffs, which might not be equivalent to the actual FTA negotiations. Also, non-tariff and political influences were not measured and this can have an impact on the generalization of the results.

Findings provide actionable insights for policymakers and trade negotiators, emphasizing sector-specific strategies to maximize the benefits of an FTA. The study highlights the importance of supporting sectors with strong comparative advantage and monitoring vulnerable industries to mitigate potential trade risks.

Future research could incorporate real-time trade policy changes, non-tariff barriers, and dynamic economic modeling to assess long-term FTA impacts. Comparative studies with other regional FTAs could also provide a broader perspective on trade liberalization strategies.

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