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Absorption, Recovery, and Growth: Export Resilience of Top 10 World Economies

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ABSTRACT

Exports of an economy- both quantum and value- directly impact the growth of an economy. Drawing on the export-led growth hypothesis, this exploratory analysis examines the export resilience in the Top 10 leading economies (in terms of size of GDP) in the world economic system in the face of the COVID-19 pandemic. The findings rank the economies on four parameters: Shock Absorption Capacity, Recovery Capability, Sustainable growth potential, and the overall ranking of export resilience. Further, the top five overall export resilience ranking countries- Italy, Brazil, India, China and Japan- have been examined on a case-by-case basis to gain deeper insights.

***Keywords**: Export Resilience, COVID- 19 Economic Impact, Top 10 Economies, Export Performance, Export-Led Growth Hypothesis.*

***JEL Classification:** F14, F43, O57, F44*

Introduction

Foreign Trade has always assumed a central position in the development plans of all nations worldwide- developed, developing, and underdeveloped. Exports form an essential and sizable portion of the total output produced by a nation (Hultman, 1967). It serves two purposes- one, it is a necessary source of foreign exchange earnings for a nation, and two, it boosts its economic growth. Trade has always been a catalyst for economic development. Higher export growth rates lead to higher economic growth, and implementing export expansion policies can bring various economic benefits. (Quddus & Saeed, 2005)

Research around the world over the last century has, both theoretically formulated and empirically evaluated, the significant and positive impact that a nation's export has on its GDP and growth (Jin, 2024) (Popović et al., 2019). Exports play a crucial role in ensuring Global Economic stability and growth by contributing to economic growth (or GDP growth) (Hagemejer & Mućk, 2019); (Popa et al., 2016), employment, income, and consequently, the standard of living (Kahiya et al., 2014); and political stability (Mamba et al., 2024)

Resilience describes the ability of a system to withstand shocks and disturbances: absorb, bounce back, and adapt (Braun et al., 2020). Thus, export resilience is the ability of exports to absorb disturbances (Shock Absorption Capacity); bounce back from shocks (Recovery Capability) and adapt to it (Sustainable growth potential). The concept is applied to numerous contexts in the academic and public

discourse - environmental resilience, urban resilience, regional economic resilience, etc (Quddus & Saeed, 2005). Export resilience, simply put, is the ability of a sovereign's exports to maintain (absorb or withstand) and recover from shocks- from environmental to economic and regional to global (Gnangnon, 2022). A comprehensive study of the export resilience of a country is imperative to ensure economic stability (Montes Ninaquispe et al., 2024), effective and efficient policymaking (Zhu & Ye, 2024), and sustainable growth practices (Liu & Liu, 2024).

Global Trade environment in recent years has been muddled with ongoing challenges such as the pandemic; supply chain vulnerabilities (Ivanov, 2020)- both Supply side and demand side shocks (Emery, 1967); and increasing geopolitical tensions (Saini et al., 2022) - from US-China Cold war 2.0 to Russia-Ukraine war, tensions in the middle east to troubles in the global South, cyber-attacks to overall geopolitical and economic uncertainties. All these disruptions have impacted businesses and exports across geographical boundaries. The COVID-19 pandemic has impacted all stakeholders along the value chains of all commodities and sectors in different capacities (Schnitzler et al., 2021). Access to credit and profit margins tend to influence businesses' impact and responses to external shocks (Emery, 1967). Against this backdrop, assessing the resilience of an economy's exports in the face of the pandemic is essential.

Drawing on the backdrop of the export-led growth hypothesis, the paper comprehensively analyses the pre-pandemic and the post-pandemic resilience of the exports to GDP ratio in the Top 10 leading economies in the world economic system. We find that Italy ranks first, Brazil ranks second and India ranks third in terms of the overall rank of export resilience. Further, we identify the key factors that have contributed to the export resilience of the top five economies in the overall export resilience ranking.

The rest of the paper is structured as follows: Section 2-Literature review discusses the work that has already been done in the area; Section 3- Research Objective lists the specific objectives of the paper; Section 4- Methodology explains data collection and sample determination. ; Section 5- Findings lists the research findings; Section 6- Discussion is focused on a deeper analysis of the paper's findings and policy recommendations; and Section 7- provides the Conclusion.

Literature Review

The relationship between exports and the economic growth of a country has been a topic of analysis as early as 1967 when (Emery, 1967) analyzed the causal relationship between exports and economic growth for a group of 50 countries for the period 1953-1963 and found a significant correlation between exports and Gross National Product of a country. A statistically reliable relationship between exports and GNP was established then. For every 2 ½ percent increase in exports, there was a 1 percent rise in a nation's real Gross National Product (GNP). Further evidence was provided in 1984 by (Kavoussi, 1984), where export expansion was associated with better economic performance in both low- and middle-income countries in a sample of seventy-three developing countries. It further recognized that the favorable impact of exports on total factor productivity drives the positive association.

Drawing on the augmented production-function framework, (Fosu, 1990) shows that the Manufacturing export sector has a more significant positive impact on GDP growth in less developed countries than the primary export sector. Further, (Khan & Saqib, 1993) suggest that more than 90% of the contribution of exports to economic growth is indirect. A higher export content of skill-intensive goods generates higher per-capita GDP growth rates (An & Iyigun, 2004). Numerous studies support the export-led growth hypothesis, which suggests that export expansion is a crucial driver of economic growth (Alavinasab, 2013)

Export Resilience is the ability of an entity, firm, or nation to maintain, sustain, and perhaps grow its trade performance in times of external shocks (Fosu, 1990). Thus, it focuses on shock absorption capability, recovery capacity and Sustainable Growth potential. In the global context, factors positively influencing Export resilience can be categorized into Inherent and acquired factors. Inherent factors include Economic flexibility and mutual trade dependence (Plyusnin & Vasilchenko, 2023), Gender diversity on boards (Wei, 2024), Speed of internationalization of the economy (Ning et al., 2024), firm capabilities (Gorynia et al., 2024) and supply chain strategies (Hassan et al., 2024). Acquired factors include trade diversification and network redundancy, digital transformation (Hongliang et al., 2024), and level of regional economic integration (Mu et al., 2024). When it comes to developing and least developed countries, export resilience is seen to be enhanced by development aid for trade (Gnangnon,

2022), Foreign Direct Investment (FDI) flows (Plyusnin & Vasilchenko, 2023), digital inclusive finance (An & Iyigun, 2004) and AI-based solutions (Khan & Saqib, 1993).

The export diversification versus specialization debate is integral to export resilience. (Plyusnin & Vasilchenko, 2023) analyzed export resilience in Northern European countries and found that countries such as Finland, Sweden, and Denmark showed strong export and import positions due to broad specialization and a high degree of diversification in trade networks. Norway and Iceland, in comparison, were less stable because they only had trade specialization. However, diversification also has the potential of creating and intensifying uncertainties, while specialization can create over-reliance on specific sectors or partners. Thus, (Kuznar, 2024) advocates for a balance between diversification and specialization strategies for East Asia's journey toward export resilience.

Pandemics can adversely affect trade in exporting and importing countries by raising bilateral costs associated with Trade (Emery, 1967) and disruptions in the global value chains (Kavoussi, 1984). (Kato, 2022) examines the export resilience of manufacturing exports (skill and technology-intensive) to two specific shocks- demand and exchange rate for ASEAN, China, and India. Chinese exports show high responsiveness to demand shocks, which is advantageous in the global value chains. India and ASEAN, too, show export sophistication and resilience. However, (Bas et al., 2024) find that products heavily relying on limited global suppliers, such as China, witnessed increased export declines compared to economies with diversified input sources. Regional integration mechanisms such as the Belt and Road Initiative (BRI) significantly enhance export resilience in low-income countries (Mu et al., 2024). However, (Boffardi et al., 2022) find that highly integrated regions such as the European Union (EU) are more adversely affected during adverse global economic conditions such as recession and pandemics. In Sub-Saharan Africa, only three economies- South Africa, Cameroon, and Botswana showed stable export resilience between 2006 and 2015 (Ngouhouo & Nchofoung, 2022).

(Fosu, 1990) argues that it is crucial to understand and improve export resilience for businesses and policymakers alike. Export Resilience is vital for sustainable development and global competitiveness. Operational capability theory (Teece et al., 1997) highlights the role of firm-specific capabilities- resource management, strategic flexibility, efficiency, etc.- in enhancing export resilience (Gorynia et al., 2024). Dynamic Capabilities Theory (Teece et al., 1997) focuses on a firm's ability to adapt, reconfigure, and leverage capabilities and resources to enhance export resilience by adequately maintaining supply chains (Blessley & Mudambi, 2022). Internationalization Process Theory (Johanson & Vahlne, 1977) emphasizes the importance of prior export commitments and speed of internationalization- breadth and depth- for export resilience. Further, digital capabilities play a moderating role. (Ning et al., 2024) Drawing on extensive literature, this paper attempts to illustrate, examine, and understand the export resilience demonstrated by the top ten leading economies of the world.

Research Objectives

Export Resilience is the summation of the three distinct abilities in the face of external shock: Shock Absorption Capacity (the ability to absorb the shock), Recovery Capability (the ability to bounce back from the shock), and Sustainable Growth Potential (the ability to sustain and grow its performance). The COVID-19 Pandemic took the world by shock. Thus, the paper's primary objective is to quantitatively study the top ten economies of the world based on export resilience (export-to-GDP ratio) in the face of the pandemic and rank them on their performance.

While it is essential to rank the top ten economies in terms of their ranks of resilience to assess the situation in the world at large, it is also imperative to qualitatively understand the nuances behind such obtained rank. Does the overall rank follow the direction of ranks obtained for the individual parameters? Are the top performers consistent across all three dimensions? Or is there a significant deviation from one parameter to the other? And if so, why? Which government policies have led to success/shortfall? Moreover, what can be the policy recommendations? Thus, the secondary objective of the paper is to present the case study of the top five economies based on the overall resilience rank and analyze the role of government policies in supporting export resilience and economic recovery. Thus, the objectives of this research paper are as follows:

- To study the top twenty economies of the world based on export resilience (export to GDP ratio) and rank them along the following lines:
  - Shock Absorption capacity (Pre-pandemic vs. Pandemic period comparison)
  - Recovery Capability (Pandemic vs post-pandemic period comparison)

- Sustainable Growth Potential (Pre-pandemic vs. post-pandemic period comparison)
- Overall Rank of Resilience

- To present the case study of top five economies based on the overall resilience rank and analyze the role of government policies in supporting export resilience and economic recovery.

Research Methodology

To check the export resilience, the top 10 economies of the world have been identified according to the size of GDP in US bn dollars (2022-23) from the IMF database. Thus, these countries form the sample for the current study. The export figures have been taken from TradeMap since they provide the data for the calendar year. The exports of goods and services have been added to arrive at the total export figure. The dataset has been divided into three categories – Pre-pandemic years (calendar years 2018 and 2019), Pandemic year (calendar year 2020), and Post-Pandemic Year (calendar years 2021 and 2022). The total export figure was then divided by the nation's GDP (as derived from the IMF database) to determine the export-to-GDP ratio for each category, which was used to rank the countries along all parameters. For pre-pandemic and post-pandemic categories, a simple average of the two years has been taken to arrive at the pre-pandemic export-to-GDP ratio and the post-pandemic export-to-GDP ratio to allow for comparison.

Findings

Export Resilience Ranking

The prime objective of the paper is to analyze the performance of the top ten economies of the world based on export resilience (export-to-GDP ratio) and rank them. To examine the shock absorption capacity, i.e., the ability of the economy to absorb the external shock, a comparison of the pre-pandemic export-to-GDP ratio (2018 and 2019) with the pandemic export-to-GDP ratio (2020) was undertaken. The pre-pandemic ratio was subtracted from the pandemic ratio to calculate the pandemic vs. pre-pandemic ratio and thus measure the shock Absorption Capacity. The higher the ratio, the higher the capacity to withstand the shock. The findings are presented in Figure 1 and listed in Table 1. All figures are negative (except Brazil which showed an improvement of 2.03 in the export-to-GDP ratios) because, as expected, the exports-to-GDP ratio fell during the pandemic worldwide. The Shock Absorption Capacity was comparatively more robust in the countries with a favorable ratio, followed by the least negative figures. The first three rank holders are Brazil (2.03), China (- 0.39), and India (-1.35).

To examine the Recovery Capability, i.e., the ability of the economy to recover from the shock, a comparison of the pandemic export-to-GDP ratio (2020) and the post-pandemic export-to-GDP ratio (2021 and 2022) was undertaken. The pandemic export-to-GDP ratio was subtracted from the post-pandemic export-to-GDP ratio to calculate the post vs. pandemic ratio and thus measure the recovery capability: the higher the ratio, the higher the capability to recover. The findings are presented in Figure 2 and listed in Table 2. All figures are optimistic because the exports-to-GDP ratio was expected to improve during the post-pandemic world, which it did. The Recovery Capability was comparatively higher for countries with a greater alacrity of adaptation. The first three rank holders are the Italy (6.68), Germany (5.19), and France (4.42).

Table 1: Shock Absorption Capacity (Pandemic vs Pre-pandemic Export-To-GDP ratio)

S. No.	Country	Pre-Pandemic export to GDP Ratio	Pandemic Export to GDP ratio	Pandemic vs pre pandemic ratio	Rank- Shock absorption capacity
1	United States	12.09	10.21	-1.88	5
2	China	19.69	19.3	-0.39	2
3	Germany	47.76	43.72	-4.04	10
4	Japan	18.19	15.94	-2.25	7
5	India	19.27	17.92	-1.35	3
6	United Kingdom	31.7	29.54	-2.16	6
7	France	31.24	27.3	-3.94	9
8	Italy	32.5	30.8	-1.7	4
9	Brazil	14.01	16.04	2.03	1
10	Canada	32.23	29.71	-2.52	8

Source: Author's compilation

To examine the Sustainable Growth potential, i.e., the ability of the economy to sustain and perhaps grow its performance in the face of external shock, a comparison of the pre-pandemic export-to-GDP ratio (2018 and 2019) and the post-pandemic export-to-GDP ratio (2021 and 2022) was undertaken. The pre-pandemic export-to-GDP ratio was subtracted from the post-pandemic export-to-GDP ratio to calculate the post vs. pre-pandemic ratio and thus measure the Sustainable Growth potential. The higher the ratio, the higher the growth. The findings are presented in Figure 3 and listed in Table 3. All figures are positive (except the United Kingdom and United States, which showed a fall of 0.29 and 0.74 in the export-to-GDP ratios, respectively). Positive figures show that economies not only managed to recover from the shock of the pandemic but also improved their export performance in the post-pandemic world. The first three rank holders are Brazil (5.19), Italy (4.98) and China (2.11).

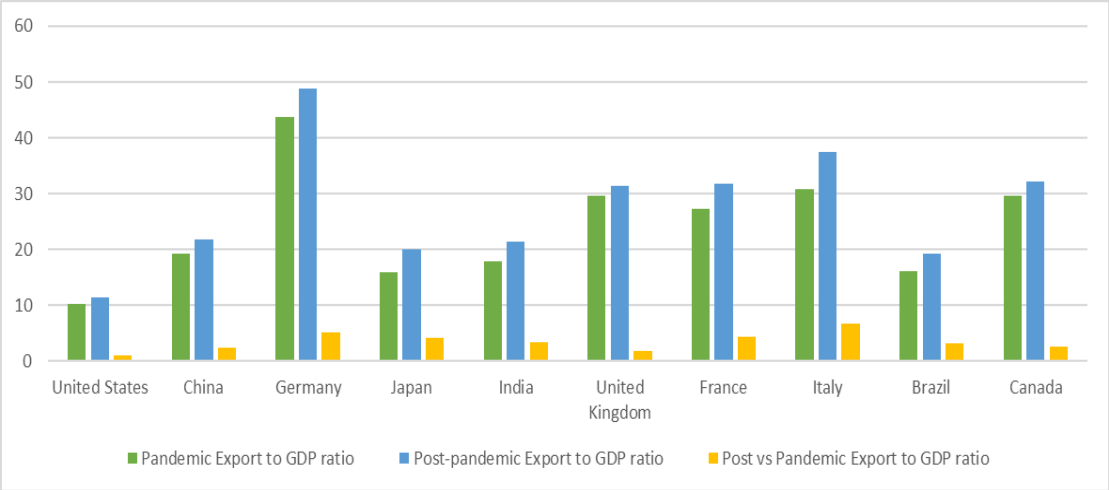

Figure 2: Recovery Capability (Pandemic vs Post-pandemic Export-to-GDP ratio)

Source: Author's Compilation

Table 2: Recovery Capacity (Pandemic vs Post-pandemic Export-to-GDP ratio)

S. No.	Country	Pandemic Export to GDP Ratio	Post-Pandemic Export to GDP Ratio	Post vs Pandemic Ratio	Rank- Recovery Capability
1	United States	10.21	11.35	1.14	10
2	China	19.3	21.8	2.5	8
3	Germany	43.72	48.91	5.19	2
4	Japan	15.94	20.09	4.15	4
5	India	17.92	21.32	3.4	5
6	United Kingdom	29.54	31.41	1.87	9
7	France	27.3	31.72	4.42	3
8	Italy	30.8	37.48	6.68	1
9	Brazil	16.04	19.2	3.16	6
10	Canada	29.71	32.25	2.54	7

Source: Author's Compilation

Export resilience is the sum of shock absorption capacity, recovery capability and sustainable growth potential of a nation. Thus, an average of individual rankings- Shock Absorption Capacity, Recovery Capability, and Sustainable Growth Potential- has been taken to examine the overall Export resiliency, as listed in Table 4. The rank of resilience has been calculated by arranging the simple average in ascending order. The calculated ranking has been listed in the last column of the table. The first five rank holders are Rank 1-Italy; Rank 2-Brazil; Rank 3- India; Rank 4- China; and Rank 5- Japan. It has also been depicted in Figure 4.

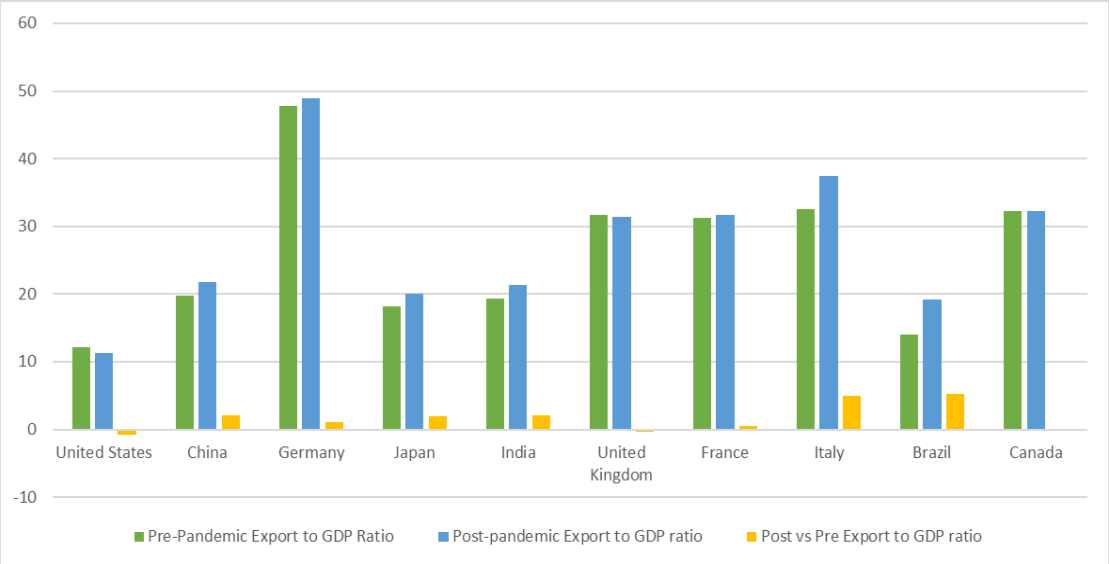

Figure 3: Sustainable Growth Potential (Pre-Pandemic vs Post-pandemic Export-to-GDP ratio)

Source: Author's Compilation

Table 3: Sustainable Growth Potential (Pre-Pandemic vs Post-pandemic Export-to-GDP ratio)

S. No.	Country	Pre-Pandemic Export to GDP Ratio	Post-pandemic Export to GDP Ratio	Post vs Pre Ratio	Rank- Sustainable Growth Potential
1	United States	12.09	11.35	-0.74	10
2	China	19.69	21.8	2.11	3
3	Germany	47.76	48.91	1.15	6
4	Japan	18.19	20.09	1.9	5
5	India	19.27	21.32	2.05	4
6	United Kingdom	31.7	31.41	-0.29	9
7	France	31.24	31.72	0.48	7
8	Italy	32.5	37.48	4.98	2
9	Brazil	14.01	19.2	5.19	1
10	Canada	32.23	32.25	0.02	8

Source: Author's Compilation

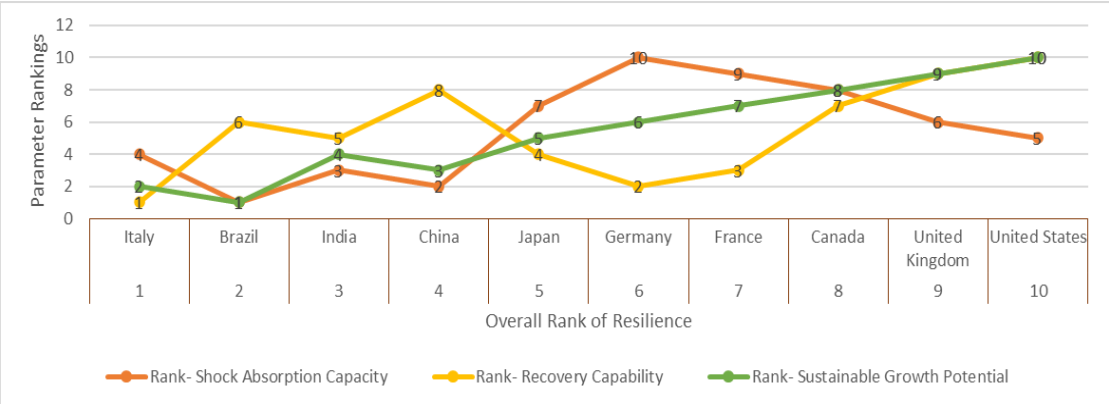

Figure 4: Top 5 ranks of overall Export Resilience and component rankings

Source: Author's Compilation

Table 4: Overall Rank of Export Resilience (Export-to-GDP ratio)

S. No.	Country	Rank- Shock Absorption Capacity	Rank- Recovery Capability	Rank- Sustainable Growth Potential	The average of all three rankings	Rank of Resilience
1	United States	5	10	10	8.33	10
2	China	2	8	3	4.33	4
3	Germany	10	2	6	6	6
4	Japan	7	4	5	5.33	5
5	India	3	5	4	4	3
6	United Kingdom	6	9	9	8	9
7	France	9	3	7	6.33	7
8	Italy	4	1	2	2.33	1
9	Brazil	1	6	1	2.66	2
10	Canada	8	7	8	7.66	8

Source: Author's Compilation

Case Study of Highest-Ranking Export Resilient Economies

- **Italy**

Italy ranks highest in the overall rank for Export Resiliency in the top 10 economies of the world. It ranks 4th in Shock Absorption Capacity, 1st in recovery capability, and 2nd in the Sustainable Growth Potential ranking. Its pre-pandemic export-to-GDP ratio is 32.5, and the pandemic export-to-GDP ratio is 30.8, showing a decline of 1.7 points. This decline is smaller than many other major economies, showcasing remarkable absorption capacity, despite Italy being one of the hardest-hit countries in the early stages of the pandemic. Thus, Rank 4 in shock absorption capacity demonstrates its resilience. Four key factors- Industrial Base and Product Mix (Italy's high-value exports, from automotive components to luxury goods, remained in demand even during the pandemic), Flexible Small and Medium Enterprises (which quickly adjusted their production to meet growing demands or essential goods in the world), Trade Relationships (especially with the European Union) and Supply chain Management (strong logistics networks), and Government Support measures (fiscal and monetary measures including export credit guarantees and financial support to businesses)- contributed to the robust ranking. Italy successfully leveraged its geographic and logistics advantages. Its strategic location in Europe and continued functionality of major ports like Genoa and Venice, even during the pandemic, prevented major supply chain collapses and boosted performance.

Italy's pandemic export-to-GDP ratio is 30.8, and the post-pandemic export-to-GDP ratio is 37.48, showing an increase of 6.68 points. The increase is highest among these major economies, more than the United States (an increase of 1.14 points), China (an increase of 2.50 points), and Germany (an increase of 5.19 points), showcasing excellent capability to recover from external shocks. Italy's industrial and manufacturing strength in the automotive, fashion, and machinery sectors likely drove its recovery. Further, timely policy intervention and support to key export sectors played a key role. Strong intra-European trade partnerships provided further impetus to the rebound. EU recovery funds, directly and indirectly, supported industries and trade. Italy's rank of 1 in Recovery Capability indicates a robust ability to bounce back from external shocks. Italy's' strong industrial base makes it a leading exporter of machinery, automobiles, pharmaceuticals, and luxury goods. Resurgence in global demand during recovery boosted exports of these goods. Further, Italy benefited from the EU's integrated trade policies and a reconfiguration of Global supply chains. It benefited from China +1 Strategy of nations (nearshoring and reshoring) and new export opportunities created therein. Government support measures included export credit schemes and policy assistance to exporters in securing finance and market access. Timely intervention created opportunities for recovery, which were aptly capitalized on.

Italy's pre-pandemic export-to-GDP ratio is 32.50, and the post-pandemic export-to-GDP ratio is 37.48, showing an increase of 4.98 points. Italy's performance indicates its economic agility and showcases positive, sustainable growth potential. Italy compares favorably to countries such as the United States (-0.74 points) and Germany (+1.15 points). Ranked second in Sustainable Growth Potential rankings, Italy's performance highlights its competitive edge in adapting to external shocks and converting them into opportunities for growth. Italy's sectoral strength and diversity – Pharmaceutical

exports, machinery and industrial goods, luxury goods, and food exports- collectively played a critical role in the pandemic and recovery phase. High specialization in Italian SMEs (Small and Medium Enterprises) and flexibility in the production capabilities of Italian manufacturers allowed Italy to sustain its trade advantages. Proximity to key markets of Europe, strong partnerships, diversified markets, and access to Mediterranean and Asian Markets through ports like Genoa and Venice allowed Italy to maintain and later increase its trade flows. Targeted tax breaks for exporters, export credit guarantees, and financial support from initiatives under the EU Recovery Fund kept businesses competitive in the global markets. Further, Italian investments in digital tools and technologies significantly improved the efficiency of the export processes. The shift to Digital Trade made them less susceptible to disruptions.

- **Brazil**

Brazil ranks second in the overall rank for Export Resiliency among the top 10 economies in the world. It ranks 1st in Shock Absorption Capacity, 6th in Recovery Capability, and 1st in Sustainable Growth Potential. Its pre-pandemic export-to-GDP ratio is 14.01, and the pandemic export-to-GDP ratio is 16.04, showing an improvement of 2.03 points. At a time when all other top economies negative performance, Brazil's increase in its ratio highlights exceptional performance. It showcases excellent shock absorption capacity and the ability to capitalize on specific global economic trends (quick adaptability during challenging times). Multiple factors- Strong Commodity demand (Brazil, being an agricultural economy, benefitted from an increased global demand for essentials), Geographical and Structural factors (Proximity to key markets and robust supply chain mechanisms), Low dependence on Service exports (unlike counterparts like Spain and Italy which rely heavily on tourism and other services), Proactive government policies (such as support for exporters and essential workers employed in agricultural and mining activities) and a Currency depreciation (which made its export more competitive globally during the pandemic)- ensured that Brazil's export sector not only weathered the pandemic but thrived during it, highlighting the country's strategic advantage.

Brazil's pandemic export-to-GDP ratio is 16.04, and the post-pandemic export-to-GDP ratio is 19.20, showing an increase of 3.16 points. It demonstrated a moderate recovery capability with a resilience rank of 6. Brazil's ability to recover is higher than that of countries like the United States (with an increase of 1.14), but it is outpaced by nations like Germany (an increase of 5.19). Brazil's commodity exports (agriculture and mineral exports) showed increased demand during recovery and sustained demand from key trading partners such as China. However, the lack of diversified industrial exports pushed Brazil's ranking lower. Further, it faced logistical bottlenecks, such as shipping costs, container shortages, etc. Agriculture exports were affected by weather shocks. Vulnerability to price volatility created significant troubles. But Brazilian currency depreciation increased its export competitiveness. Further, government intervention to stabilize trade proved fundamental in the recovery. Brazil should strengthen trade agreements and improve its market access. The focus should be on accelerating the Mercosur-EU and China trade agreements. Lower tariffs for manufactured goods must be negotiated. Brazil would also benefit from increased integration into global supply chains and investment in high-tech and industrial exports. Moderate recovery capacity can be improved by making strategic decisions as soon as possible.

Brazil's pre-pandemic export-to-GDP ratio is 14.01, and the post-pandemic export-to-GDP ratio is 19.20, showing an increase of 5.19 points. It demonstrated highest sustainable growth potential and earned Rank 1st in the top ten world economies. As a major exporter of agricultural exports such as soybeans and poultry and natural resources such as iron ore and crude oil, Brazil saw sustained demand during the pandemic and likely increased demand during recovery. The agriculture and mining sectors, the two pillars of Brazil's economy, have remained largely unaffected by supply chain disruptions. Further, currency-driven competitiveness, i.e., the significant depreciation of Brazilian currency during the pandemic, made Brazilian goods cheaper and increased export volumes. Diverse markets, such as China, the EU, and the US, allowed Brazil to overcome the uncertainties of overreliance on one trading partner. Agility in trade policy, logistical support, and strategic partnerships helped maintain trade flow during the pandemic. Reshaped global consumption patterns that favor essentials like food and natural resources significantly boosted demand for Brazilian exports. Brazil's resource abundance and strategic location have been vital in achieving and maintaining sustainable growth. Further, increased global infrastructure projects boosted demand for Brazilian iron ore and other raw materials in the post-pandemic era.

- **India**

India ranks third highest in the overall rank for Export Resiliency in the top 10 economies of the world. It ranks 3rd in Shock Absorption Capacity, 5th in Recovery Capability, and 4th in Sustainable Growth Potential. Its pre-pandemic export-to-GDP ratio is 19.27, and the pandemic export-to-GDP ratio is 17.92, showing a decline of 1.35 points. This decline is modest compared to major export-driven economies like Germany (decline of 4.04) and Japan (decline of 2.25). Rank 3 signifies a strong shock absorption capacity, boosted by the effectiveness of government policy initiatives and the nation's evolving role in the global trading environment. Diversified Markets (expansion of trade partnerships in the last decade beyond traditional markets mitigated losses), Product mix (dominated by demand for IT and software services, which remained strong during the pandemic), and Timely policy interventions (such as the production-linked incentive schemes) contributed significantly to India's shock absorption capacity.

India's pandemic export-to-GDP ratio is 17.92, and the post-pandemic export-to-GDP ratio is 21.32, showing an increase of 3.40 points. It reflects India's recovery efforts and ranks it 5th in recovery capability. The improvement of 3.40 points is significant but lags behind countries like Japan (+4.15 points) and Germany (+5.19 points). Diversified export portfolio, with sectors such as IT, textiles, and pharmaceuticals, and increased demand for Indian exports in key markets after the pandemic contributed to the recovery. Further impetus was provided by policies such as 'Make-in-India' and production-linked incentives. India's recovery showcases its resilience in the face of external shocks. However, traditional manufacturing exports, such as textiles and automobiles, showed a slower recovery. Also, India is still in the developing stage of high-end manufacturing, unlike economies with established strong industrial bases such as Japan, Germany, etc. Shipping and supply chain disruptions affected exports of key industries, such as automobiles, post-pandemic. This hampered the performance of Indian exports. The positive impact of Production-linked incentives (PLI) schemes helped boost specific sectors, and rupee depreciation benefited exports. Further boost to infrastructure, MSME (Micro, small & medium enterprises) sector, free trade agreements, export branding, digital services and logistics efficiency is needed.

India's pre-pandemic export-to-GDP ratio is 19.27, and the post-pandemic export-to-GDP ratio is 21.32%, showing an increase of 2.05 points. India is ahead of countries like the United States (-0.74), the UK (-0.29), and Germany (+1.15) but is behind nations like Brazil (+5.19) and Italy (+4.98), indicating moderate performance and earning it rank 4th in the Sustainable growth potential ranking. It reflects increased export activities during the recovery period, surpassing the pre-pandemic levels. The growth of pharmaceuticals, textiles, and IT services has fueled India's performance. India's role as the pharmacy of the world expanded during the pandemic, and global demand for IT services surged. Government initiatives like 'Atmanirbhar Bharat' (self-reliant India) and PLI (Production linked incentives) schemes bolstered manufacturing and exports. Introducing schemes like the Remission of Duties and Taxes on Exported Products (RoDTEP) improved export competitiveness. Strategic partnerships, regional trade equations and global presence helped India maintain and expand trade networks at crucial junctures in the recovery and post-recovery phase. India's performance demonstrates the growing importance of emerging economies in global trade. To further improve the ranking, the government can focus on improving port and logistics efficiency, digital trade infrastructure, and trade policy reforms. India can become a global trade powerhouse by adopting a comprehensive, forward-looking policy framework.

- **China**

China ranks fourth highest in the overall rank for Export Resiliency in the top 10 economies of the world. It ranks 2nd in Shock Absorption Capacity, 8th in Recovery Capability, and 3rd in Sustainable Growth Potential. Its pre-pandemic export-to-GDP ratio is 19.69, and the pandemic export-to-GDP ratio is 19.30, showing a decline of 0.39 points. The minimal decline in China's export-to-GDP ratio and its high resilience (ranked second) highlights its strategic role in world trade. Multiple factors contributed to the robust shock absorption capacity. China's manufacturing prowess enabled rapid response to shift in the global demand, especially towards medical supplies and electronics. China boosts a diversified export market, which minimizes industry-specific disruption risk. Further, Government measures to support exporters- export tax rebates and streamlined customs processes- allowed China to absorb the shock and be among the first countries to emerge from the pandemic. Thus, it was able to capitalize on demand shifts across the globe.

China's pandemic export-to-GDP ratio is 19.3, and the post-pandemic export-to-GDP ratio is 21.8, showing an increase of 2.5 points. A positive increase (Rank 8th) is notable but quite behind other leading economies such as Germany (ranked 6th), Japan (ranked 5th), and Italy (ranked 2nd) in Recovery Capability. Its performance is relatively better than only two other countries- the United States (ranked 10th with +1.14 points) and the United Kingdom (ranked 9th with + 1.87 points). As one of the first countries to emerge from the pandemic, China captured market share early. Proactive government measures- both subsidies and incentives- enabled rapid recovery. Further, China's extensive global partnerships, strong manufacturing base, and recovery strategies minimized disruptions. However, its mid-tier recovery suggests room for further optimization in resilience and recovery. There is a need for continued efforts – trade diversification, policy reforms, and lowering dependency on low-value exports. The global shift towards decarbonization, supply chain diversification, and environmental sustainability may have negatively impacted select Chinese exports. Further, trade tensions with major markets like the United States and Europe diluted China's share of global trade during the recovery. Exaggerated by domestic challenges such as supply chain bottlenecks and stringent pandemic controls, China's post-pandemic exports could not be scaled up to sustained higher levels.

China's pre-pandemic export-to-GDP ratio is 19.69, and the post-pandemic export-to-GDP ratio is 21.8, showing an increase of 2.11 points. The positive increase highlights China's ability to leverage global trade opportunities post-pandemic, ranking it 3rd in the Sustainable Growth Potential Ranking. Decisive factors boosted China's performance. China controlled the pandemic quickly and witnessed rapid economic recovery aided by manufacturing supply chain strength. Increased global demand for medical supplies, intermediate goods, and consumer goods contributed to its growth. Timely pro-export policy interventions, tax incentives, and new trade agreements such as RCEP helped expand market access. However, risks and challenges slowed its momentum. High export dependence on specific markets such as the US and European markets was plagued by trade tensions. Rising geopolitical tensions and global efforts to reduce reliance on China carry long-term risks, from nearshoring to shifting supply chains. Labor costs in China are rising, and manufacturing hubs are shifting to countries like Vietnam, India, and Mexico. This carries repercussions for both present and future export stability. China needs to focus on high-value exports, diversify trade destinations, ensure continued policy support, and strengthen supply chain resilience to improve its performance.

- **Japan**

Japan ranks fifth highest in the overall rank for Export Resiliency in the top 10 economies of the world. It ranks 7th in Shock Absorption Capacity, 4th in Recovery Capability, and 5th in Sustainable Growth Potential. Its pre-pandemic export-to-GDP ratio is 18.19, and the pandemic export-to-GDP ratio is 15.94, showing a decrease of 2.25 points. Japan is ranked 7th in terms of its ability to absorb the shock of the pandemic, suggesting a moderate resilience. The economy depends on manufacturing-heavy exports, such as automobile, high-tech manufacturing, etc. These were hard hit by factory shutdowns, semiconductor shortages and decreased global demand. Combined with an exposure to global supply chains, an aging demographic and lack of digital export agility, Japan's performance was hard hit. These disruptions were tempered by a internal robustness (advanced manufacturing infrastructure, highly developed logistics and transport infrastructure), Government Stimulus (three massive fiscal stimulus packages- total size more than 40% of its GDP), and Monetary easing measures by the Bank of Japan. These allowed Japan to weather the pandemic better than economies such as Germany (decrease of 4.04 points) and France (decrease of 3.94 points).

Japan's pandemic export-to-GDP ratio is 15.94, and the post-pandemic export-to-GDP ratio is 20.09, showing an increase of 4.15 points. Japan's recovery Capability (ranked 4th) is relatively strong and suggests that Japan's export sector rebounded significantly after the pandemic, contributing more to its economic output. Recovery in global demand for high-value exports such as automobiles, electronics, precision instruments bolstered Japan's exports. Further, post-pandemic improvements in logistics, reduced trade barriers, and stabilized supply chains enables Japan to increase its exports. Japan's maintained and strengthened its presence in key markets such as US, China, ASEAN etc. Its participation in trade agreements like the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Regional Comprehensive Economic Partnership (RCEP) allowed Japan to access stable demand across multiple geographies. Government support for exporters through financing, logistics coordination, and easing of regulations helped businesses survive and rebound. However, it still struggled with some lingering effects of semiconductor shortages, continued demographic drag and

global shipping bottlenecks. Nonetheless, Japan's recovery reflects a solid, policy-backed export performance in a stable macroeconomic environment.

Japan's pre-pandemic export-to-GDP ratio is 18.19, and the post-pandemic export-to-GDP ratio is 20.09, showing an increase of 1.9 points. It shows a positive but moderate trajectory for sustainable growth potential. Japan's manufacturing sector capitalized on pent-up global demand and a surge in capital goods investment by developed economies. Increased demand for hybrid and electric vehicles or semiconductor-related equipment in a world that is increasingly becoming "environmentally aware" likely boosted its exports. Japan's global reputation for high-precision and high-quality manufacturing sustained its market share in premium segments. Long-standing bilateral and multilateral trade relationships reinforced export based with reliable demand. However, competition from emerging Asian exporters is intensifying. Further, Japan's service exports-especially in IT and digital sectors- remain limited. Structural demographic headwinds in the form of an aging population and shrinking workforce have created medium-term sustainability challenges that need to be addressed.

Thus, Japan must focus on diversification of its trade basket by investing in digital trade and services, support SMEs and regional exporters, attract high-skilled labour and strengthen export-linked innovation to improve its sustainable growth potential.

Discussion and Policy Implications

The paper focused on a comprehensive view of the export resilience of the top ten countries (by GDP) before, during, and after the COVID-19 pandemic. The analysis focuses on Shock Absorption Capacity, Recovery Capability, and Sustainable Growth potential of the nations. It defines overall export resilience as a function of these three distinct capabilities. The rankings reflect the magnitude of individual performance of an economy's export-to-GDP ratio as well as relative performance to other economies. Initial data analysis reveals that in the top 10 countries of the world, in terms of the size of their GDP, only three developing economies have a place in the study sample (India, China and Brazil). That is expected because developed nations are bound to have a higher GDP than developing countries. However, among the top 3 ranks of the shock absorption capacity - Brazil, China, and India- none of the nations is a developed nation (HDI>0.8).

The fact that developing economies have been able to maintain their export-to-GDP ratios with minimal reductions (China with a fall of 0.39 and India with a fall of 1.35) or even increase their export-to-GDP ratio (Brazil with a rise of 2.03) is indeed astounding. When the world was grappling with the pandemic, developed economies like Germany and France faced a reduction of 4.04 and 3.94 points in their pandemic vs. pre-pandemic export-to-GDP ratios, respectively. The developing economies showed much higher resilience. In terms of recovery capability, developed nations showed mixed performance- Germany (+5.19) and the United States (+1.14). Developing nations generally exhibited more substantial recovery capabilities, focusing on essential goods and commodities. Most developed nations struggled to achieve sustainable growth in exports- the United States (-0.74 points), the United Kingdom (-0.29 points), and Germany (+1.15 points). On the other hand, developing nations showed stringer potential- Brazil (+5.19 points) and India (+2.05 points).

The exploratory analysis reveals that developed nations must reduce their dependency on few markets, invest in digital transformation, and strengthen supply chains for high-value exports. Developing countries must leverage competitive advantages, enhance trade infrastructure, invest in human capital, and promote regional trade agreements. To boost shock absorption capacity, focus should be on diversification of export portfolio, robust supply chain linkages, and proactive government action and policy framework. Recovery capability involves export diversification, trade infrastructure, and policy agility. Developing resilience in critical sectors, leveraging natural advantages and upskilling workforce are crucial for sustainable growth potential. Overall, the analysis suggests that by focusing on long-term sustainability, targeted diversification, integrated trade policies, and timely policy intervention, nations can enhance their export resilience and better withstand future global shocks.

Conclusion

The export-to-GDP ratio reveals the export performance of a nation. The current study examined the export performance of select nations before, during, and after the pandemic. To improve export resilience, countries must adopt bilateral and multilateral agreements to tap into global markets, create synergies, and diversify their trade portfolios. Continuous investment in innovation and R&D is necessary to build, maintain, and grow export resilience of all types- Shock Absorption, Recovery, and

Sustainable Growth. Economies focusing on achieving double-digital export growth must enhance their resilience to external global shocks. Becoming a global leader in renewable energy and digital services would accelerate economic transformation. Sustained export diversification and incentives for emerging industries are vital for creating export resilience.

While resilience ranks weigh absolute and relative raw export growth among nations, it may also be a factor of broader dimensions such as percentage improvement relative to pre-pandemic levels, economic diversification, policy responses, and structural reforms. Thus, economies must focus on holistic, time-bound, and strategic measures to improve their resilience ranking. Further research is suggested in such broader dimensions. Future research can also focus on a sectoral-level analysis of nations at similar rankings to further enhance understanding.

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