

# **Trends, Patterns and Prospects in Global Trade and Investment**



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## ***Trends, Patterns and Prospects in Global Trade and Investment***

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(February 2025)*

### **Executive Summary**

This research paper attempts to see if there is an emergence of geo-political fault lines in the global FDI flows, on the similar lines as trade fragmentation, which has now been well-established in literature. The paper looks at the overall FDI trends using the *fDiMarkets* dataset and also carries a disaggregated analysis of FDI flows in green technology sectors, in particular. This enquiry into the early signs of FDI realignments, allows us to not just identify the channels through fragmentation is manifesting, but also helps to anticipate the areas where the of this policy-driven reversal of global integration may have long-term impacts.

Some of the early evidence of FDI fragmentation has been captured by IMF which indicate that FDI flows in the recent years have moved along geopolitical fault lines, thus intensifying the ongoing geoeconomic fragmentation process. The paper has reviewed the existing literature on policy-driven reversal of FDI flows globally and it further add to the literature by specifically looking at FDI flows in green technology sectors. In the era of rising climate action, climate finance and associated technology transfer, the role of FDI in green technology sector assumes greater importance. We see that some early trends of FDI fragmentation in green-technology sectors as well as we see that the share of China has dropped from 9.7% of US outbound FDI in 2013 to 5.5% in 2019 and 2.6% in 2023. China has also become a less significant global destination since 2015 whilst India has risen. In this regard, the paper also discusses the impact of this early FDI fragmentation in green technology sectors on capital formation, technology transfer and energy transition goals for developed and developing countries.

At the macro level, the paper also sees how the geoeconomic fragmentation in general and FDI fragmentation in particular, is likely to shape the new-age negotiations of Free Trade Agreements (FTAs) and Bilateral investment Treaties (BITs). We understand that going forward, new-age FTAs shall be overwhelmingly governed by the capacity of the

countries to mutually complement their needs for critical resources and their ability to enhance supply chain resilience. Further, w.r.t investment protection agreements/treaties, we understand that while the recent emergence of trade fragmentation does not dilute the enforceability of existing investment treaties, the new negotiations of such treaties may emerge on the lines of geo-political alignments and also attracting investments from host countries that are likely to bring in advanced technology transfers with their inbound investments.

The paper concludes with possibilities of India – UK collaboration in an increasingly fragmented world, with specific areas of collaboration in green technology and climate finance.

*The paper has been co-written by economists from the UK Government Economic Service and the Indian Economic Service as part of the India-UK Government Economic Exchange program. The program involved visits to both London and New Delhi where participants met with relevant government officials, academics and international institutions in order to better understand the scope of the questions and bring in further expertise. This paper, written for Indian and UK government officials, forms the main output of the program, alongside a presentation to Chief Economists from both countries and a box article in the annual Indian Economic Survey. While the paper is a joint piece of analysis, its recommendations do not always reflect joint India-UK government positions and are not to be treated as government policy.*

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## **(I) Background: Emergence of Geoeconomic Fragmentation**

The last five years have presented a sequence of policy shocks and natural shocks to the global trade, testing the resilience of trade supplies and agility of trading partners. Starting from the escalation of US-China trade war in 2019, the tariff war between the two biggest trading partners in global trade created an uncertain trade environment. This was followed by the multiple waves of COVID-19 pandemic in 2020 and 2021 which led to serious disruption in the supply chains for goods around the world. Before the trading volumes could fully recover from the pandemic shock, the Russia - Ukraine conflict emerged in February 2022. The protracted nature of this conflict and the subsequent sanctions imposed on Russia by the EU disrupted the well-established global supply chain for oil and gas in the world trade order. Finally, the disruption of Suez Canal, first incidentally with the 2021 obstruction by the ship Ever Given, and secondly emanating from the security crisis in Red Sea in 2023 spelt a logistical nightmare for trade across Europe and the Asia-Pacific.

Together, the above shocks to global trade coupled with rising shipping costs, prompted countries to search for alternate trading partners, leading to a changing landscape in global trade. For instance, in 2023, Mexico became the largest goods trade partner of the US, surpassing China and Canada. US imports from Vietnam also more than doubled from USD 46 billion in 2017 to USD 114 billion in 2023, as per reports of Vietnam Custom Office. Similarly, the European Commission reports that EU's pipeline gas imports from Russia declined from 150.2 billion cubic meters in 2021 to 42.9 billion cubic meters in 2023, while its imports from the US rose from 18.9 billion cubic meters to 56.2 billion cubic meters. The empirical evidence of trade patterns changing is thus, clear and convincing.

Interestingly, the emerging patterns in global trade have been driven so far not solely by the logic of export competitiveness but by concerns of stability of import / export demand and geopolitical concerns like amicable bilateral relations. The literature and reporting have referred to this realignment of global trade as protectionism / friend-shoring / near-shoring / de-risking of supply chains.

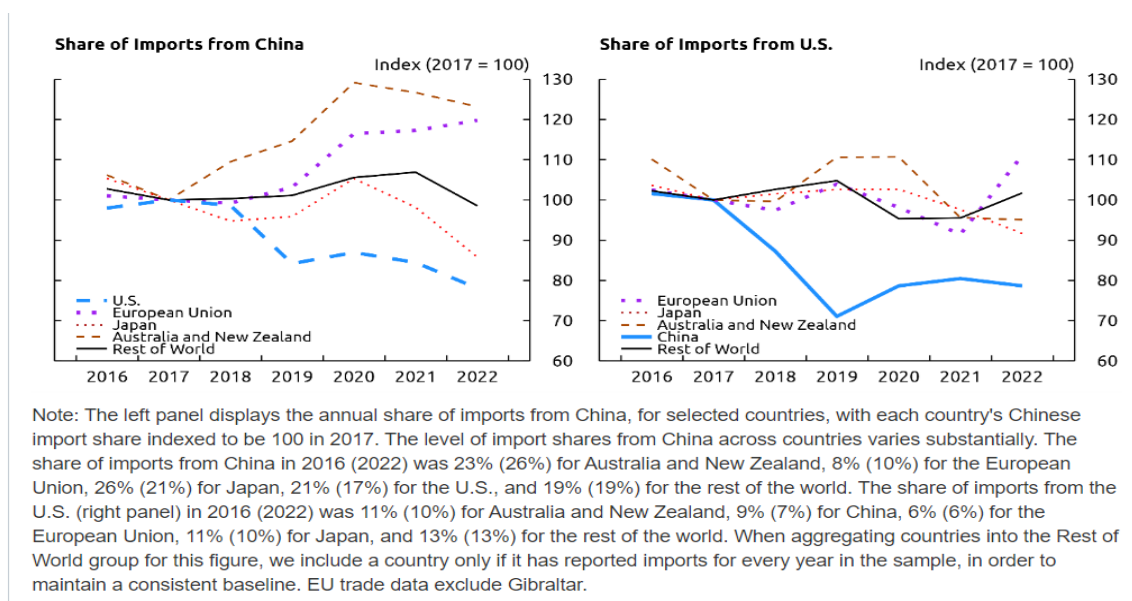
Our present research project on "Trends, Patterns and Prospects in Global Trade and Investment" goes a step further and aims to examine if global trade patterns are changing / friend-shoring in trade front is also reflecting in cross-border flows of long-term investments or FDI flows. Most previous work has focused on trade fragmentation, though FDI is potentially more state directed than trade, latter being where business to business

interaction is more common. This could lead to FDI flows being more susceptible to fragmentation along political lines than global trade, hence the importance of this study. Therefore, we attempt to examine if there is an emergence of geo-political fault lines in the global FDI flows, on the similar lines as trade fragmentation.

## (II) Literature Review

It is imperative to revisit the literature on trade fragmentation briefly before we discuss the topic of investment fragmentation. The *Federal Reserve Note<sup>1</sup> on Assessing the Extent of Trade Fragmentation* shows that U.S. and China show clear signs of decreasing their reliance on one another, based on study of annual bilateral country-level imports from 2016 through 2022, taken from UN Comtrade. The Fed research tracks the shifts in trade reliance between country groups over time, by calculating indexed annual share of imports sourced from China and the U.S. These trade shares highlight shifts in proportions of imports sourced from different countries, even as the nominal value of overall trade varies from year to year. As shown in Figure 1 below, it is seen that share of Chinese imports in US total imports has sharply declined from 2019 onwards and same is the trend for US imports in China. At the same time, it is seen that while reliance of US allies like Australia, New Zealand and Japan on Chinese imports have declined distinctly since 2020, the same cannot be said of European Union, another US ally.

**Figure 1: Indexed share of imports from China and US across regions and countries**



Source: UN COMTRADE

<sup>1</sup>Pierce, Justin R., and David Yu (2023). "Assessing the Extent of Trade Fragmentation," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, November 03, 2023.

Accordingly, based on the above results, the Federal Reserve finds considerable realignments in US-China trade but does not find strong support for fragmentation of trade into geopolitical blocs. The paper also subsequently looks at specific trade fragmentation in Advanced Technology Products, called as ATPs, in strategic sectors. The authors find that U.S. imports of ATPs from China decrease by much more than U.S. imports of other goods from China. In other words, while the U.S. experienced an overall decline in the share of imports from China, the change is much more apparent in ATPs. In this regard, the paper discusses that ATPs might be more prone to trade fragmentation for at least two reasons. First, they may be more specialized, on average, than non-ATPs, implying that they would be less substitutable with other goods in a crisis making firms more likely to take pre-emptive steps to secure supply chains of ATPs in instances when geopolitical risk is increasing. Second, given that ATPs include goods critical to national, military, and economic security, they face higher risks of governments imposing restrictions on their trade. Thus, examining strategic sectors yields more details about U.S. trade-fragmentation from China.

Another interesting research has been carried out by *Centre for Economic Policy and Research of IMF* in their e-book publication on "*Geoeconomic Fragmentation- The Economic Risks from a Fractured World Economy*<sup>2</sup>." This is a compilation of research findings discussed in the IMF conference on this subject held in May 2023. The publication delves on not just trade fragmentation but geo-economic fragmentation in general, including aspects like fragmentation in investment, technology and financial markets. The report discusses that for several decades, international trade acted as a catalyst for catch-up in incomes across countries a large reduction in global poverty and cheaper prices, especially for low-income consumers. Cross-border migration provided tangible benefits to both people and firms, conferring efficiency gains in the allocation of labour across countries at different levels of income and productivity, while generating remittances that often acted as a macroeconomic stabiliser for source countries. Capital flows, especially the more stable variety of foreign direct investment, provided less-developed economies with a valuable source of external financing, contributing to rising firm productivity and deeper domestic financial markets. All these channels, moreover, contributed to technological diffusion from the world scientific frontier to diverse countries, via the ideas embodied in trade,

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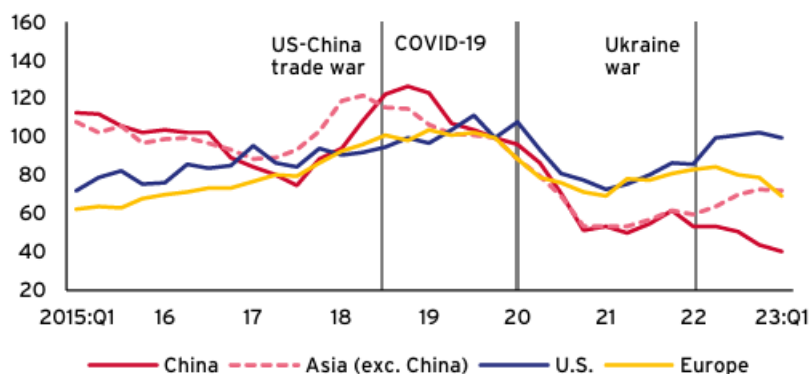
<sup>2</sup> Aiyar, S, J Ahn, A Habib, D Malacrino, D Muir and A Presbitero (2023), 'Geopolitics and the cost of FDI fragmentation', in Aiyar, S, A Presbitero and M Ruta (eds), *Geoeconomic Fragmentation: The Economic Risks from a Fractured World Economy*, CEPR Press

investment and people. Goeconomic fragmentation is likely to exercise the opposite impact through much the same channels.

The CEPR report acknowledges that the bulk of the incipient literature on the potential economic effects of goeconomic fragmentation has focused on the risk of disrupted trade flows and much less attention has been paid to foreign direct investment (FDI). Accordingly, the report looks at the early evidence of FDI Fragmentation. The report examines the investment-level greenfield FDI data from FDi Markets data source during the period 2015 to 2023 (Q1) and observes that the flow of strategic FDI to Asian countries started to decline in 2019 and has recovered only mildly in recent quarters (Figure 2). For China, the decline continues, revealing early signs of FDI fragmentation.

**Figure 2: FDI Fragmentation in Strategic Sectors (Based on no. of investments, four quarter moving average, 2019:Q4=100)**

Foreign direct investment flows to different regions are diverging, with China losing market share.



Sources: FDi Markets and IMF staff calculations.

Note: Vertical lines indicate the start of the US-China trade war, the start of the Covid-19 pandemic and the start of the Ukraine war.

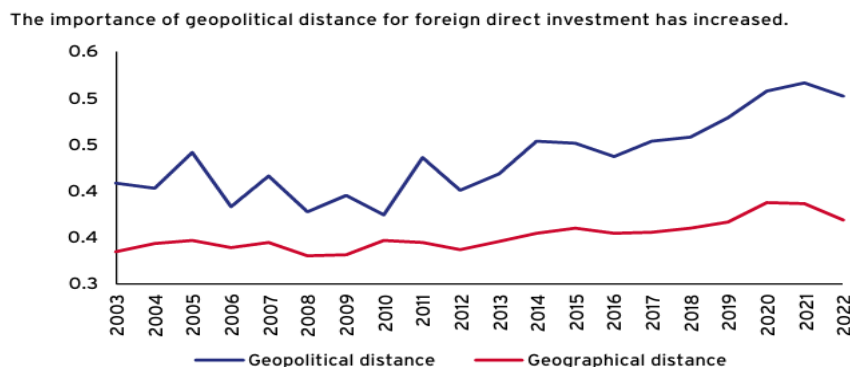
The CEPR research also shows that FDI flows have been characterised by divergent patterns across host countries, particularly in strategic sectors (like semiconductors) on which policymakers may place greater weight due to national and economic security interests. Furthermore, based on scrutiny of specific cases, it is seen for instance, that among major Asian and European recipients of FDI flows from United States, some of the relative winners (e.g. Canada and Korea) are politically closer to the United States than the relative losers (e.g. China and Vietnam). This reinforces the impression that

geopolitical forces have been playing a role in respect of FDI fragmentation amidst geoeconomic fragmentation process.

### a) Connection between Geoeconomic Fragmentation and FDI

The CEPR report goes a step further to examine the prima facie evidence of the increasing role played by geopolitical distance in determining FDI. For this purpose, the countries are divided into five blocks based on their geopolitical distance from the United States. The results indicate that the share of FDI taking place between countries that belong to the same group has been increasing over time from about 40% between 2003 and 2010 to more than 50% in 2021. Moreover, the significance of *geopolitical proximity* vis-à-vis *geographical proximity*, has increased further since 2016 and has moderated only a bit towards end of 2022 (Figure 3).

**Figure 3: FDI between geographically and geopolitically close countries (in percent)**



Sources: Bailey et al. (2017); Centre d'études prospectives et d'informations internationales, Gravity database, FDI Markets; IMF staff calculations.

Note: Figure shows the annual share of total FDI between country pairs that are similarly distant (i.e. in the same quintile of distance distribution), geopolitically and geographically, from the United States.

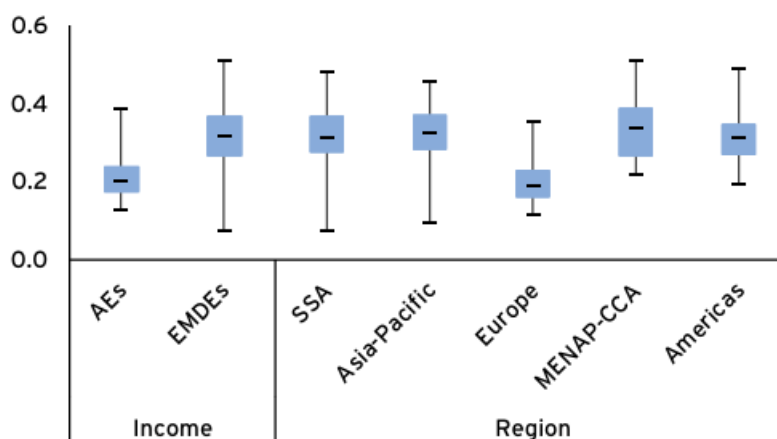
The above suggestive evidence is robustly established by application of empirical gravity model equations, which flexibly control for confounding country-time characteristics that embody other push and pull factors (such as the business cycle and political risk in both source and destination countries). The estimates from the gravity models show that the role of geopolitical alignment for bilateral FDI flows is significant and economically relevant, particularly for emerging market and developing economies. Further, the analysis suggests that these factors are more important for FDI in strategic sectors, such as pharma and semiconductors.

## b) Vulnerability to FDI Fragmentation: A New Index

Having established some evidence of FDI fragmentation, the authors in the CEPR report subsequently assess the how vulnerable are destinations countries to FDI fragmentation. Accordingly, the authors construct an index of countries' exposure to GEF risks by considering countries' inward FDI geopolitical exposure, their global market power, and the strategic content of their investment stock. The results show that emerging market and developing economies (EMDEs) are more vulnerable to FDI fragmentation on geopolitical lines than advanced economies (Figure 4). This is rationalized on the grounds that EMDEs rely to a greater extent on FDI inflows from more geopolitically distant countries.

**Figure 4: Vulnerability Index**

Emerging market and developing economies tend to be more vulnerable to relocation of foreign direct investment than advanced economies.



Sources: Atlantic Council; Bailey et al. (2017); fDi Markets; NL Analytics; Trade Data Monitor; and IMF staff calculations.

Note: Figure shows distribution of vulnerability index by income and regional groups, based on post-2009 foreign direct investment flows. AEs = advanced economies; EMDEs = emerging market and developing economies; MENAP-CCA = Middle East, North Africa, Afghanistan, Pakistan, Caucasus, and Central Asia; SSA = sub-Saharan Africa.

## c) How FDI spillovers enhance growth in AEs and EMDEs

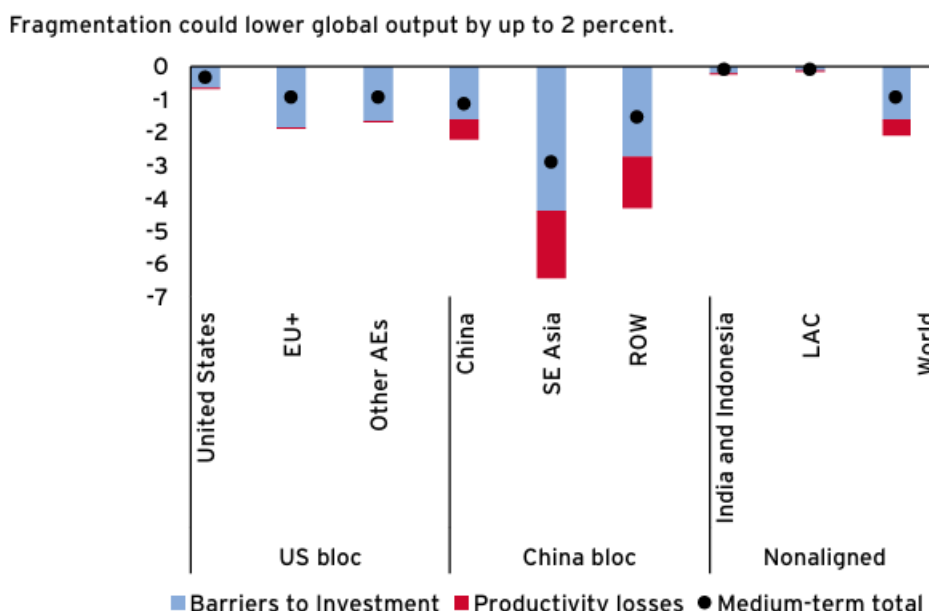
The CEPR publication describes that technological progress and subsequent productivity growth induced by FDI has indeed been one of the major growth drivers in all economies. It is also empirically seen that the entry of multinational corporations in foreign countries brings positive spillovers to productivity of domestic firms. The authors further elaborate that such productivity spillovers manifest differently in Advanced Economies (AEs) and Emerging Market and Developing Economies (EMDEs). In AEs, the main channel is through positive *within-industry* spillovers. As domestic firms react to tougher competition

from multinational corporations, they attempt to become more productive. By contrast, in EMDEs, the positive spillovers come to domestic suppliers, which benefit from greater local demand for components. Furthermore, the technological diffusion is another benefit seen across the value chain firms. Accordingly, the potential FDI fragmentation (expected in light of some early evidence already) would likely involve the loss of such benefits, thus hampering capital formation and technological diffusion.

#### d) Modelling the Costs of FDI Fragmentation

The IMF-CEPR report also attempts to quantify the potential costs of FDI fragmentation and their distribution across countries. It models fragmentation as a permanent rise in investment barriers between opposing geopolitical blocs centred on the two largest economies (US and China). The modelling scenarios indicate that FDI fragmentation could substantially reduce global output level, by about 2% in the long term (Figure 5). Moreover, output losses are likely to be unevenly distributed. This is particularly concerning as EMDEs stand to lose the most due to their heavy reliance on FDI for capital formation and productivity gains from the transfer of better technologies.

**Figure 5: Impact of Investment Flow barrier on GDP (percent deviation from No-Fragmentation scenario)**



Source: IMF staff calculations.

Note: Baseline fragmentation scenario represents a 50% decline in investment input flows between China and US blocs and two nonaligned regions (India and Indonesia and Latin America and the Caribbean). Darker bars denote scenario with lower elasticity of substitution (1.5) between foreign sources of investment inputs. Lighter bars denote scenario with higher elasticity of substitution (3.0) between foreign sources of investment inputs and thus a greater role for diversion. AEs = advanced economies; EU+ = European Union and Switzerland; LAC = Latin America and the Caribbean; ROW = rest of the world; SE = Southeast.

Some parallel evidence of FDI fragmentation is also documented in the IMF World Economic Outlook (April 2023<sup>3</sup>). For instance, it highlights that the US outward FDI to China sharply declined by over 40 per cent during 2020:Q2-2022:Q4 period as compared to FDI flows during 2015:Q1-20:Q1. During the same time, FDI flows from US reallocated from Asia and China to emerging Europe. The report also asserts that this investment fragmentation, captured for greenfield projects, is more pronounced for vertical FDI (when foreign firms enter a country to supply inputs to other domestic firms) than for horizontal FDI (when foreign firms directly compete with domestic firms to sell directly to customers). This in turn has negative ramifications for the capital formation and technology transfer in the destination countries, with EMEs being more vulnerable.

### **e) FDI and Green- Tech sectors**

An attempt to study the FDI trends has also been made in the BCG Report on “Foreign Direct Investment and the Greening of Emerging Markets.” The report documents that while developed countries have witnessed strong flows of inward FDI in green – technology sectors (which have supplemented their already existing large pools of domestic capital, the trends have been pointing to a concentration of similar FDI to a few developing countries outside the developed world.

The report then identifies the channels of accelerating the FDI inflows in the developing world to support climate finance, including leveraging of blended finance instruments and support of development finance institutions. It acknowledges that EMDEs face the interconnected challenges of updating their development strategies and upgrading their FDI attractiveness and supplements its suggestions for this through select country-cases. However, the report as such is silent about fragmentation of green-tech FDI.

## **(III) Analysis**

### **a) Theory**

The rationale behind the interest in trade and foreign direct investment patterns is the centrality of these variables to a country’s economic performance. The impact of nations being open to trade and investment and how this drives economic growth is well researched, and there are numerous academic papers covering trade as a driver of GDP

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<sup>3</sup> International Monetary Fund. 2023. World Economic Outlook: A Rocky Recovery. Washington, DC. April, Chapter 4 (Gеоeconomic Fragmentation and Foreign Direct Investment)

per capita growth across low-, middle- and high-income countries. Classical macroeconomic theory suggests opening up to free-trade and global markets allows countries to gain from exporting goods they have comparative advantage in, as well as benefits arising from imported goods that previously were not available on the domestic market or are now cheaper for both industry and consumers. Recent research on this includes the paper from Idris, Yusop and Habibullah (2017) which outlines a causal relationship between trade openness, defined as total exports and imports divided by GDP, and economic growth. Notably, their findings are consistent for both developing countries and OECD nations. In recent years, however, the long trend of pushing for further trade integration and globalisation has slowed. A less integrated global trading system has the potential to negatively effect the global economy and the economy of individual countries if gains from trade are unable to be realised.

Alongside this focus on trade, there is a significant breadth of literature which posits that Foreign Direct Investment (FDI) inflows promote economic growth (e.g. Adams 2009, Borensztein et al 1998, and Basu and Guariglia 2007), whether that be through new technology, investment in skills or enhanced competition. As such, any geopolitical trends which might lower or redirect FDI flows could lead to potential economic gains not being realised. In the case of Green-Tech sectors, this has the potential not only to affect the economic benefits of the transaction but also any positive impacts on helping a country meet its climate targets. Of course, it is important to note that the argument around “economic security” has also been used to explain that de-risking from certain trade value chains and screening a minimal number of harmful investments may increase economic resilience and therefore economic growth (and climate action if Green-Tech sectors) in the long run. Whether a potential fall in trade and FDI has certain outcomes is crucial, but the first stage of this analysis is to understand the current trends of such flows globally.

## **b) Data and Methodology**

In order to capture the global trends in FDI and specifically in environmental projects, labelled as “Green-Tech” sectors here, the bilateral FDI flows data from fDi Markets is used. This database is maintained by Financial Times Ltd. and tracks cross-border investment in a new physical project or expansion of an existing investment which creates new jobs and capital investment. Therefore, it should be noted that this data excludes other form of foreign investment like mergers and acquisitions, private equity and venture

capital funding. The dataset is based mainly off announcements which can affect data quality and is why the number of projects is likely to be more reliable than the total Capex of FDI flows, which can include estimated values. Despite the caveats, for the lack of an alternate comprehensive data source, fDi Markets data is globally referenced by research organizations and international organizations like IMF, UNCTAD etc. fDi Markets is a commercially procured dataset which is available for institutions to purchase worldwide.

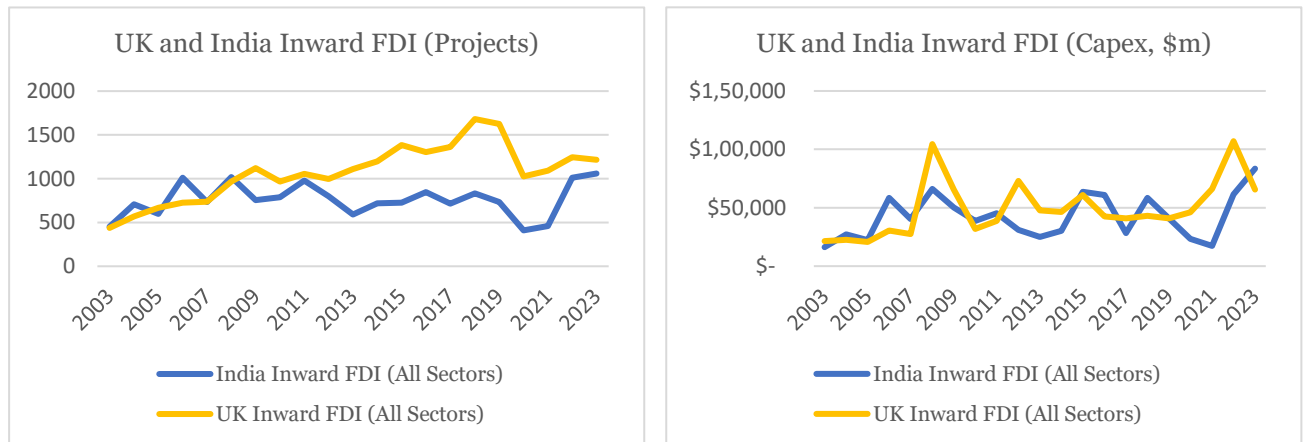
Much of the previous literature has used older data, with the IMF WEO work mentioned above covering up to 2022. This paper seeks to bring in new data from more recent years. This is particularly important when looking at topics pertaining to economic security like FDI fragmentation because of the relevance of recent global events and fast evolving nature of the subjects. Since the previous literature, the Russia-Ukraine war has continued, US-China strategic competition has heightened and many countries have brought in or updated investment screening regimes, inbound and outbound. These developments make this topic ripe for more up-to-date analysis, and this paper seeks to analyse how the trends observed in prior literature have continued or diverted.

In addition to the inclusion of more recent data, the paper also assesses FDI trends in two groupings. The first is all FDI across all sectors; the second is FDI which occurs in Green-Tech sectors, given the motivation of this paper is to observe how trends differ between these sectors and FDI as a whole. For the purposes of capturing environment-conscious projects, “Green-tech” sectors are adopted in this report as per standard classification of this sub-sector in fDi Markets data to include mainly projects in renewable energy sectors such as solar, wind and thermal energy, as defined by their Environmental Technology Cluster.

### **c) Trends in UK and India FDI**

Before analysis of global FDI patterns and whether fragmentation might be observed, we will first look at some FDI trends for both the UK and India. Foreign Direct Investment is incredibly economically important to both countries, creating jobs and bringing foreign technology and know-how. Both countries also have some form of inbound FDI screening mechanism, ensuring certain investments perceived as harmful are not permitted or are remedied in some way. Globally, both countries are significant FDI destinations and by number of projects, the UK was 3<sup>rd</sup> in 2023 as a destination with India 5<sup>th</sup>. For Green-Tech

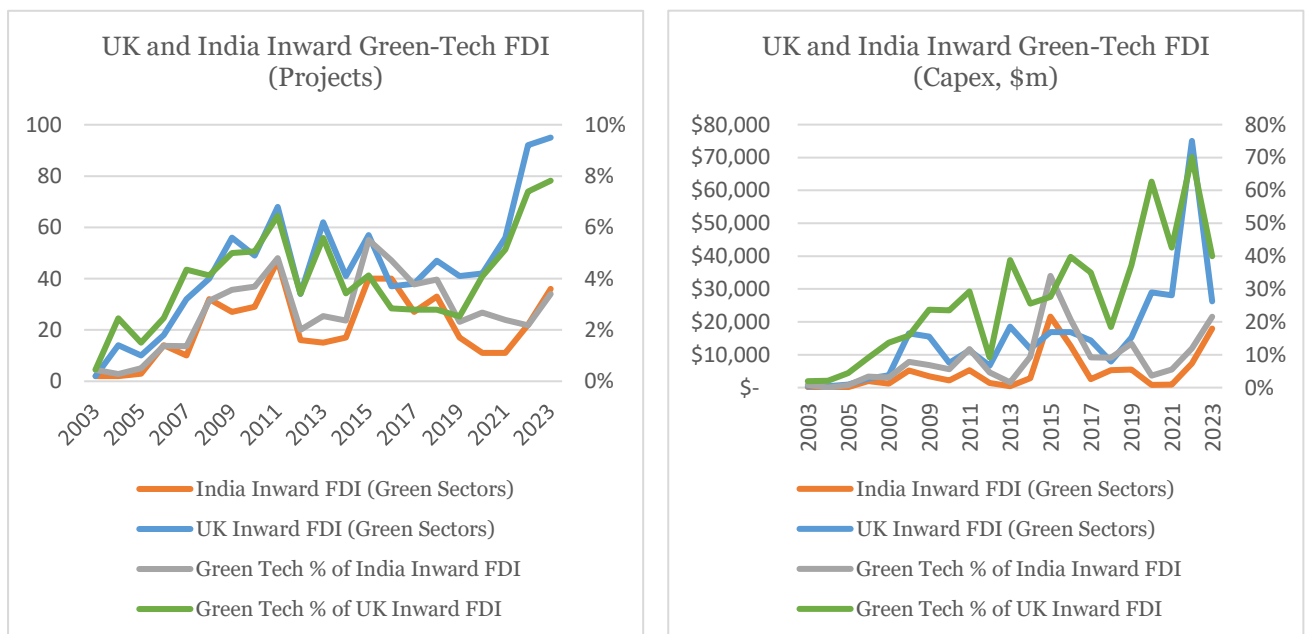
sectors, the UK was the 4<sup>th</sup> most significant destination and India 10<sup>th</sup>. The US was the top destination for FDI worldwide in 2023 across all sectors and in Green-Tech investments.



**Figure 6: UK and India Inward FDI (2003 – 2023)**

Source: fDi Markets

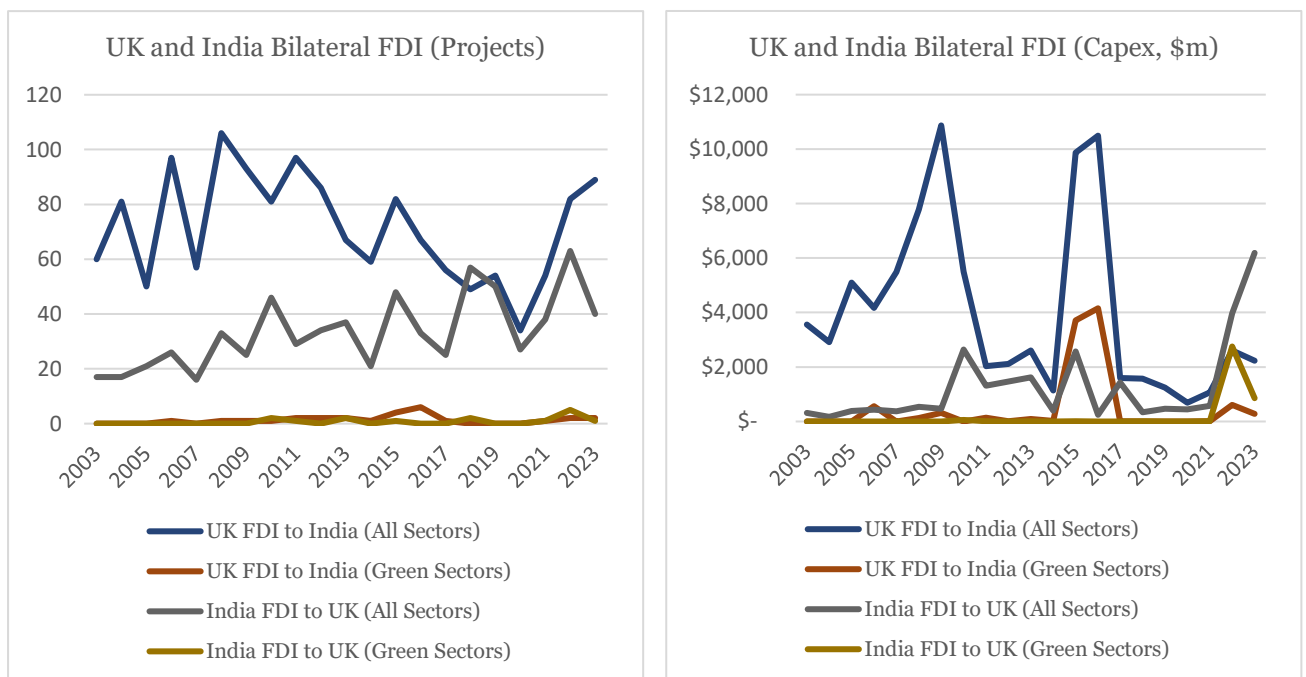
FDI projects into the UK steadily increased from 2003, peaking in 2018. There was an expected fall in 2020 due to the COVID-19 pandemic and a small recovery in the years since. For India, after an early but steady rise in the number of FDI projects, numbers stagnated from 2006 to 2019, though there has been a significant post-COVID rise. In terms of Capex, the UK has seen a varied but broadly upward trajectory, whilst India’s recent rise in inward FDI is starker than when looking at project numbers.



**Figure 7: UK and India Inward Green-Tech FDI (2003 – 2023)**

Source: *fDi Markets*

Both India and the UK have made important climate commitments and see tackling climate change as one of the central issues facing all countries. As such, FDI in Green-Tech sectors is something which both countries see as an important part of the journey to a greener economy. Over the 20-year period, the UK has seen an overall rise in the volume of Green-Tech FDI in terms of both number of projects and capex. Notably, the percentage of all inward FDI capex which was in Green-Tech sectors peaked at over 70% in 2022. Furthermore, the percentage of FDI capex which is related to Green-Tech is significantly higher than the percentage of FDI projects, and thus investments in these sectors are of notably higher value on average. For India, there has been a slower but steady increase in Green-Tech FDI over the 20-year period. The rise however is less pronounced, both in terms of capex and number of projects than the UK has seen, especially from 2019 onwards.



**Figure 8: UK and India Bilateral FDI (2003 – 2023)**

Source: *fDi Markets*

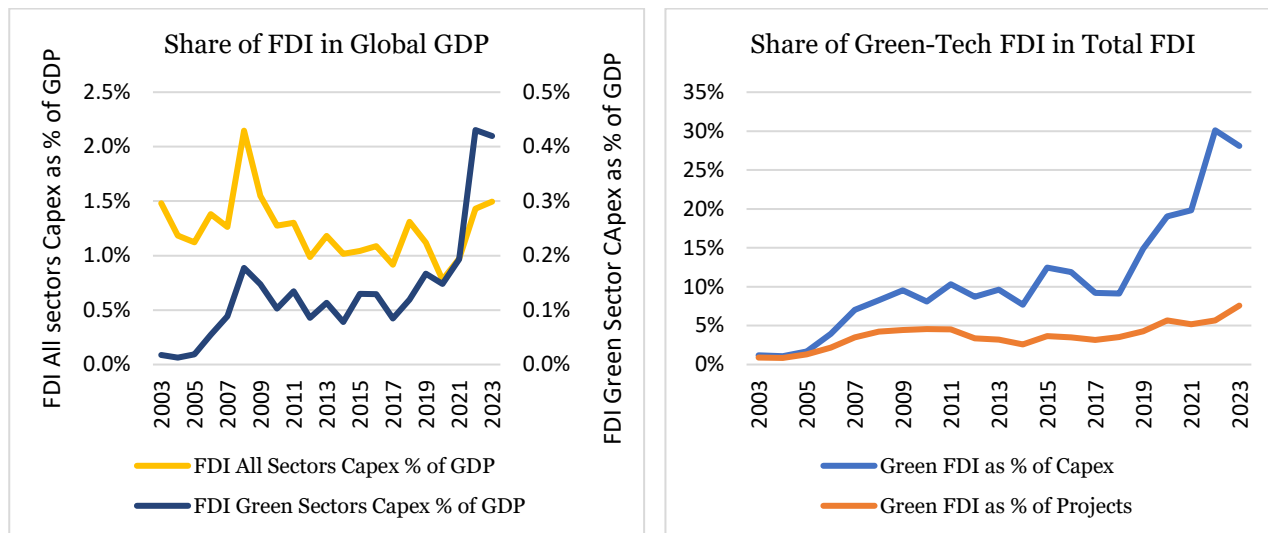
Looking at the bilateral FDI relationship between India and the UK, each is significant to the other. By number of projects over the time period, India is the 4<sup>th</sup> most significant destination for UK outbound FDI, whilst the UK is the 3<sup>rd</sup> ranked country for Indian outbound FDI. For Green-Tech FDI, India is 8<sup>th</sup> in the list of UK FDI destinations and the

UK is 2<sup>nd</sup> for Indian outbound FDI. The overall trend of UK FDI projects into India has not changed significantly over the time period, though has seen a recent increase and the capex values have been much more volatile. In terms of project numbers, Indian FDI into the UK has risen steadily over the 20 years to 2023, with a dramatic rise in capex values in the last 2 years. For Green-Tech FDI, both flow directions are fairly minimal in terms of project number, though the capex figures have spiked in years with large investments. Overall, there is a significant amount of bilateral FDI between the two countries and they are both currently negotiating a Bilateral Investment Treaty as well. Having said that, FDI in Green-Tech has not yet followed the same bilateral pattern as FDI in general, and here the relationship seems presently less notable.

#### **d) Trends in FDI Fragmentation**

In figure 9, it is seen that FDI flows as a share of GDP, have been on a general decline over the last two decades. While FDI accounted for an average 1.35 percent of global GDP in the period 2003-2013, the same share declined to an average of 1.12 per cent during 2014-23. However, the FDI in green technology sectors has been more resilient in and has increased its share in global GDP from 0.09 per cent during 2003-2013 to 0.19 per cent in 2014-2023. This reflects the emergence and mass production of various environmental technologies in the most recent decade, as well as the fact that sustainable green transitions have been placed at the heart of government policy around the world. For example, in 2021 at the COP climate conference in Glasgow, India committed to being net zero by 2070, whilst the UK legislated in 2019 to be net zero by 2050. Further, in 2022 and 2023, this share of green-tech FDI capex in global GDP has more than doubled compared to previous years.

#### **Figure 9: Trends in Global FDI (2003 – 2023)**



Source: fDi Markets

Looking at the second graph of Figure 9, it is clear that green FDI is not simply an increasing part of global GDP but is also rising quickly as a proportion of total FDI. Green FDI has gone from making up 3.2% of FDI projects from 2014-2018 to 5.7% from 2019-2023. The equivalent capex figures have risen substantially more, rising from 10.1% to 23.6% across the two 5-year periods, reaching a high of 30.1% in 2022. This growth in capex outstripping that of project numbers reflects the significantly rising average value of green FDI in comparison to other sectors. Having observed such a stark contrast in the trends between green FDI and total FDI over the last 5 years, this paper will now explore more granularly how the underlying geographic patterns of these trends differ, or indeed are similar.

It is pertinent to note that United States of America (US) is the top country in terms of outward FDI investments projects, cumulatively for the period 2003-2023, as per fDi markets data, followed by Germany and United Kingdom (UK). The magnitude of this is notable, with the US totally more than double the next highest country in terms of project numbers. Over those 21 years, China ranks 9<sup>th</sup> globally for outbound FDI and India ranks 12<sup>th</sup>. For green sectors however, the top source country is Germany, followed by the US. The UK is ranked 5<sup>th</sup>, China is 6<sup>th</sup> and India is 19<sup>th</sup> as a source of green FDI in terms of total projects.

An examination into the destinations of outward FDI originating from the US (Table 1) shows that in 2013, UK, China, Germany, India and Canada were the top five destinations in terms of new FDI projects from the US. While China accounted for 10 per cent of the new FDI projects/ investments of the US in 2013, by 2019, China’s share fell to 5.5 percent after

the onset of US-China tariff-war and by 2023, China ceased to be in the top 5 and even top 10 destinations of FDI flows from the US and its share in new FDI projects of the US fell to a mere 2.6 per cent.

**Table 1: Top 5 Destinations of FDI from the US – 2013, 2019 and 2023**

2013			2019			2023		
Destination	No. of new projects	Share in total new projects	Destination	No. of new projects	Share in total new projects	Destination	No. of new projects	Share in total new projects
<i>United Kingdom</i>	408	12.3%	<i>United Kingdom</i>	537	13.4%	<i>India</i>	385	12.1%
<i>China</i>	320	9.7%	<i>India</i>	261	6.5%	<i>United Kingdom</i>	336	10.5%
<i>Germany</i>	198	6.0%	<i>Germany</i>	245	6.1%	<i>Canada</i>	126	4.0%
<i>India</i>	182	5.5%	<i>Mexico</i>	225	5.6%	<i>UAE</i>	206	6.5%
<i>Canada</i>	166	5.0%	<i>China</i>	222	5.5%	<i>Mexico</i>	139	4.4%
<b>Total Projects</b>	<b>3312</b>		<b>Total Projects</b>	<b>4022</b>		<b>Total Projects</b>	<b>3189</b>	

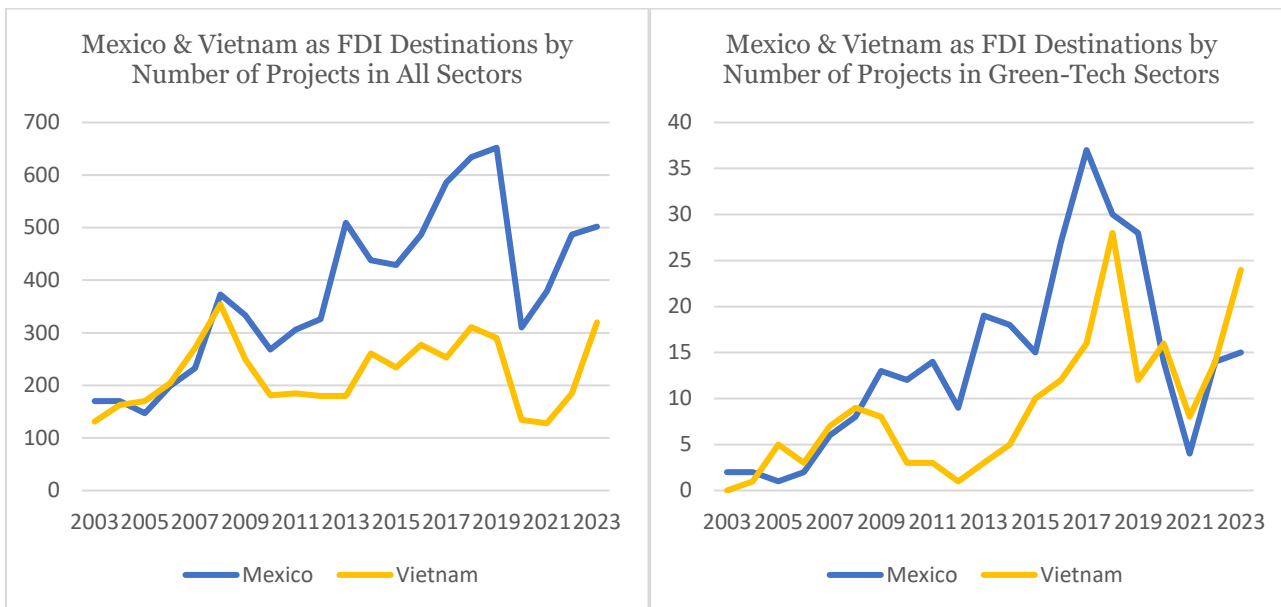
*Source: fDi Markets*

The above tabulated divergence of FDI flows on geopolitical lines from one of largest FDI source countries can be seen as early evidence of FDI fragmentation. Further, we compare the relative trends in new FDI projects initiated in the US, UK, India and China during the period 2015 – 2023 (Figure 11, no. of FDI projects in 2015 indexed to 100). It is observed that while the US and India have been able to attract more FDI projects in 2023 vis-à-vis 2015, UK has seen a dip and China has seen a sharp decline as the destination for new FDI projects.

The emergence of Mexico as a top US FDI destination may reflect its rising role as a “China+1” country. This refers to a country which acts as a trade intermediate country, most often between the US and China, which lengthens the supply chain and removes some direct trade exposure. Higher FDI in these countries would be expected in order to facilitate the goods production required. Mexico and Vietnam are both often touted as potential “China+1” destinations<sup>4</sup>, and Figure 10 below shows the relative increase in the attractiveness of both of these countries as FDI destinations over the last two decades, in both green-tech and other sectors.

**Figure 10: Mexico and Vietnam (2003 – 2023)**

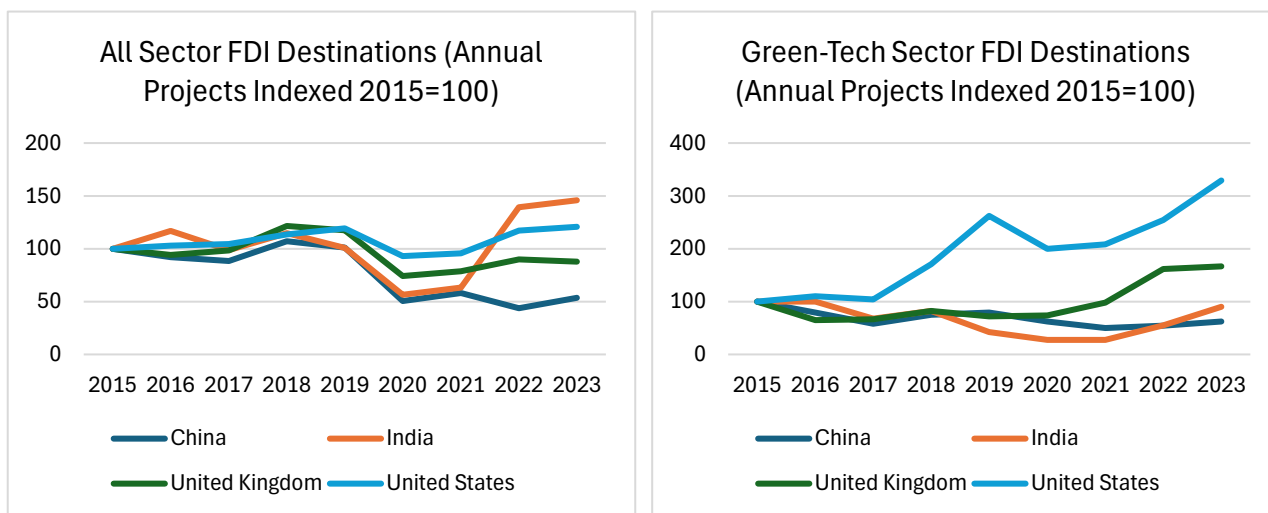
<sup>4</sup> Lee, Sunhyung, Is Vietnam the Next China? Preparing for the Post-Pandemic Decoupling (September 15, 2020). KIEP Research Paper, KIEP Opinions no. 195



**e) Delving deeper into FDI trends in Green Technologies and sectors**

At the same time, it is also interesting to note that when it comes to green technology, though the overall FDI flows in this sector has been increasing as a share of global GDP as seen in Figure 9, the fragmentation is somewhat seen in terms of more no. of projects being skewed towards the developed countries, the US and UK in our sample (with US taking leap by a wide margin) while India and China are striving to maintain the 2015 levels of new FDI projects in green-tech FDI in 2023. This highlights that while overall scenario of green-tech FDI may be on an uptrend, however, the onset of fragmentation in green-tech FDI cannot be ruled out.

**Figure 11: Some Fragmentation in destinations of FDI projects**

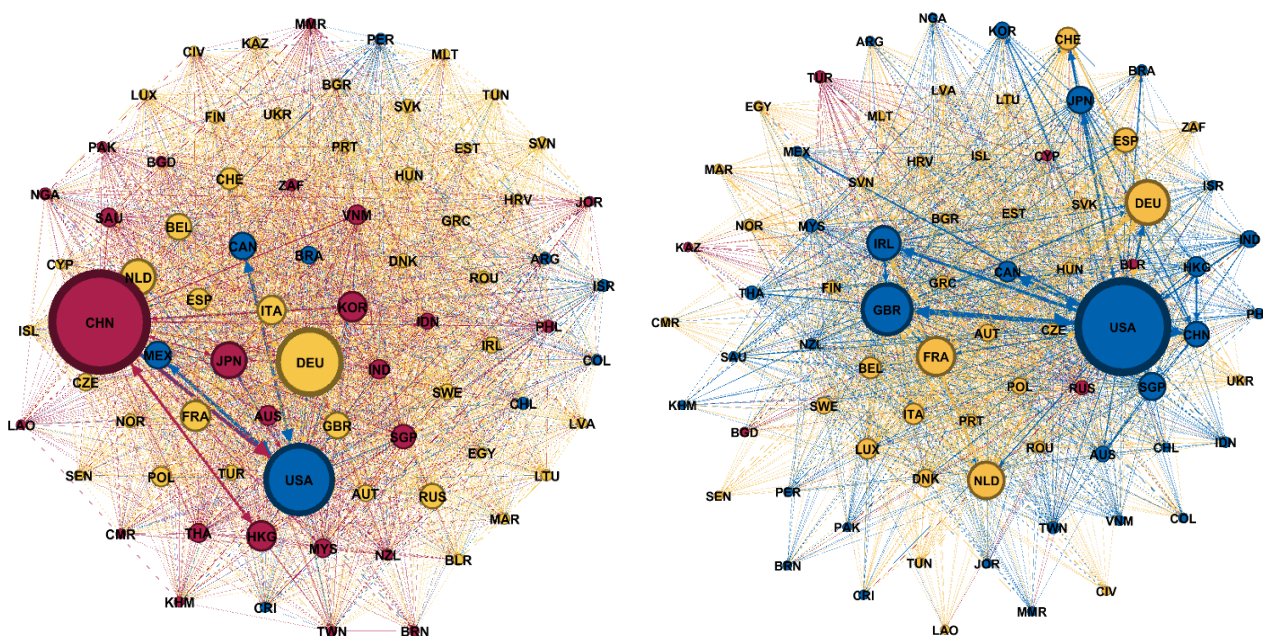


Source: fDi Markets

**f) Limitations and suggestions for further study**

This paper and wider project is an early-stage investigation into the trends seen in global FDI patterns in order to assess whether concerns of fragmentation are well founded, and if they are, to explore the implications for both India and the UK. The methodologies presented here are more explanatory than they are causal, though they have been grounded in economic theory and still add to the canon of existing literature given the nascency of the subject and using the latest data with a focus on Green-Tech sectors. More detailed analytical work on these topics is needed, and the wider literature will continue to develop as this becomes more relevant to policy makers globally.

The primary suggestion for how to enhance this work would be to do some complex network analysis on the global flows of FDI, across all sectors and also specifically at Green-Tech investments. This kind of analysis has been used to look at fragmentation extensively in the trade space, but with FDI remains relatively unexplored. Network charts like the ones below, produced by the IMF, give a sense of how countries are clustered by economic flow, and doing this for various time periods and noting how groupings evolve has the potential to show how countries have aligned in their FDI over time.



**Figure 12: Trade in Goods and Services Network Analysis**

*Source: IMF Calculations*

These IMF charts above show the global goods (Left) and services (right) trade networks in 2019. On instant inspection, it is clear that for goods trade the network is shaped more

by geography, whereas with services this is less evident. Replicating this kind of analysis but using FDI as the main flow, as well as producing charts to show evolution over time, would add value and stretch the frontier of research in this space.

There are a few other areas where further work would be worthwhile to supplement what is covered in this paper. Firstly, a more in-depth study, possibly using regression analysis, might focus on the lead-lag relationship between trade and FDI fragmentation. Trade fragmentation has emerged as a topic of conversation earlier than with FDI, but that does not imply it is a driver. Trade links and improved market access might facilitate FDI to participate in such value chains, but FDI projects also have the potential to drive future trade as new factories require inputs from abroad and also export finished products. FDI in countries like Mexico and Vietnam to provide “China+1” or “US+1” trading opportunities may be an example of this. Any time lagged relationship between FDI and trade would have implications for policy responses.

Secondly, there is a well explored archive of literature on trade rerouting and the “Rotterdam Effect” when it comes to trade in goods. This is a phenomenon where the prevalence of the Port of Rotterdam within Europe can skew trade data, making it appear that many more goods are being imported to and exported from the Netherlands than there would be in reality. This has the potential to skew analysis of global flows as the true routes and value chains might be lengthened or obscured. This paper posits that for FDI, a “Rotterdam Effect” might take a different form but that the same concerns may be valid. Investments might be re-routed from the source nation to the destination country using shell companies in a host of intermediary nations. This might be guided by various tax incentives or regulatory arbitrages, and could lead to analysis of flows not taking into account the true source and destination of investment funds. This further analysis would look into FDI in such places, including Luxembourg or the Virgin Islands for example, to assess whether this affects results and therefore policy implications.

#### **(IV) Policy Implications of FDI Fragmentation**

##### **a) Ramification for capital formation and productivity**

Fragmentation in FDI flows could impede the capital formation in the destination countries, mainly EMEs which rely on foreign financing of their domestic investment. Introduction to new barriers to capital movement like screening of investments in national security

interests in fragmented world would also result in slower diffusion of skills and technology. The resultant technology fragmentation as a result of FDI fragmentation is likely to have adverse impact on economic growth in the medium to long term. IMF World Economic Outlook<sup>5</sup> estimates that fragmentation could lower global output by up to 2 per cent.

### **b) Impact on Technology Transfer / Energy Transition Goals**

FDI slowdown, and possible fragmentation in green-technology sectors, may be more detrimental to global energy transition and realization of climate targets. In case of green technology sector, foreign capital is inevitably needed to supplement the domestic finances, especially in EMEs, to set up new non-conventional energy projects or improvise the old ones. Technology transfer is another critical input for the success of these projects. In this regard, a fragmented global order is certainly less amenable to technological development, sharing and financing. FDI fragmentation, thus, may aggravate the existing global debate on climate financing.

As a response to global investment fragmentation, it is possible that closely aligned countries may cement their investment ties by furthering their bilateral investment protection agreements. Similar reaction can also be expected on trade front in the form of new FTA negotiations on the lines of geopolitical proximity. Thus, at the macro level, trade and FDI fragmentation may together lead to undoing of the gains realized in past few decades from globalization.

### **c) Spillovers to other sectors**

The IMF Staff Discussion Note<sup>6</sup> (Jan 2023) further raises the concerns that the recent geopolitical events have increased the risks of fragmentation in the international payment system. If certain countries are alienated from using global financial and trade-financing infrastructure as a part of sanctions for a prolonged period of time, then this increases the likelihood of development of parallel systems that lack inter-operability and have transaction costs and inefficiencies. This increase frictions in fully-global trade and investment which in turn could further incentivize trade and investment in a closed network, thus intensifying geopolitical fault lines. Thus, the second order spillovers from

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<sup>5</sup> International Monetary Fund. 2023. World Economic Outlook: A Rocky Recovery. Washington, DC. April, Chapter 4 (Goeconomic Fragmentation and Foreign Direct Investment)

<sup>6</sup> Aiyar, Shekhar, Ilyina, Anna, and others (2023). Goeconomic Fragmentation and the Future of Multilateralism. Staff Discussion Note SDN/2023/001. International Monetary Fund, Washington, DC.

trade and investment fragmentation into global payment systems may create a cycle of global geoeconomic fragmentation.

## **(V) Ramification of Overall Geo-economic Fragmentation on Bilateral trade and Investment Pacts**

### **a) New Age FTA negotiations**

The Free Trade Agreements are mutually agreed trade concessions between a set of countries (bilateral/ plurilateral/ multilateral) to enhance their trade links by agreeing to reduced tariff and non-tariff barriers. With the emergence of geo-economic fragmentation, the supply chains for many critical and advanced technology products have become vulnerable. Accordingly, it is expected that the new age FTAs shall be overwhelmingly governed by the capacity of the respective countries to complement their needs for critical resources and their ability to enhance supply chain resilience.

As regards the FTAs already ratified and operational, the emergence of new trading partners based on friend-shoring / near-shoring concerns could imply that some countries may have the incentive to renege from FTA commitments. In light of the fact the WTO dispute resolution bodies are not fully operational at present, trade fragmentation could translate into enforceability concerns of such FTAs.

### **b) Future of Investment Treaties**

The investment promotion and protection agreements are mainly aimed at protecting the rights and investments of foreign investors in a domestic territory, assuring the treatment of foreign entities on favourable or reasonable basis and also setting the broad contours of manners of dispute settlement, in case of any alleged breach of the assurances promised in such investment treaties or protection agreements.

While the recent emergence of trade fragmentation does not dilute the enforceability of existing investment treaties, the new negotiations of such treaties may emerge on the lines of geo-political alignments and also attracting investments from host countries that are likely to bring in advanced technology transfers with their inbound investments.

## **(VI) Suggestions for Policy Preparedness**

*It is important to note that, given the joint nature of this analysis, recommendations made by this paper may not always reflect joint India-UK government positions and are not to be treated as government policy.*

Given these implications of geoeconomic fragmentation, it is tempting to think that the first best target for the global institutions is to try and reverse this trend. The benefits of trade and investment fragmentation, in terms of national security, stability of supply chains ensuing from friend shoring etc. may be short-run but costs in terms of the lost opportunity of realizing technological gains and capital formation could persist longer. Thus, countering geoeconomic fragmentation, particularly in trade and investment, would require a concerted multilateral effort and discussion. In terms of trade and FDI flows, a rule-based system assures the firms and investors of their seamless operations, notwithstanding the geopolitical alignments of source and destination countries, thereby enhancing the gains from global integration. Towards this end, both India and UK believe in strengthening the international rule-based system.

In respect of investment fragmentation in green technology sectors, it is seen that often FDI inflows are diffused with technology transfer, latter being the sine qua non of energy transition. Accordingly, in the global interests to decelerate climate change, there may be a need to consider liberal regulatory regime in intellectual property rights (IPR) for certain green technologies. This would help to ease the trade-offs involved in technology transfer in the global discourse on climate change and counter investment fragmentation in green technology sector to a certain extent. Needless to say, the IPR regime should continue to retain the protective elements required to encourage innovation in tackling climate change.

Lastly, policy preparedness is also important to contain the spillovers from trade and investment fragmentation into other sectors. This requires a focussed domestic effort to identify countries-specific vulnerabilities for instance, in terms of certain sectors or skills being more closely intertwined with global demand. This has to be followed thus with planning to minimise the extent of spillovers to these sectors from policy driven global fragmentation.

### **(VII) How does trade and investment fragmentation affect India and UK**

The prevalence of trade fragmentation (which has been well evidenced by now) and investment fragmentation (which has started showing some early signs and might further firm up) in the global landscape enhances the significance for bilateral partnerships. India,

as a developing country, stand to benefit from the capital formation as well as the technology transfer that inward foreign direct investments.

UK has been one of the top 10 FDI source destinations for inward FDI received in India. In terms of cumulative inward FDI during the period April 2000 to September 2024, share of UK FDI to India stands at 5%<sup>7</sup>. At the same time, the similar share for Overseas Direct Investment (ODI) from India to the UK in cumulative terms during April 2000 to September 2024 stands at 6%<sup>8</sup>. These inward and outward investment shares together indicates that prevailing partnerships in investment have a high potential for further deepening. The ongoing negotiations for India-UK Bilateral Investment Treaty (BIT) and Free Trade Agreement (FTA) aim to precisely scale up this trade and investment potential between the two nations.

On the efforts for Climate and Clean Energy initiatives, in 2023, subsequent to conclusion of G20 summit in New Delhi, the UK announced<sup>9</sup> stepping up of its climate commitments, both by decarbonising the UK economy further and supporting the world's most vulnerable to deal with the impact of climate change. In this regard, UK announced that it will contribute USD2 billion to the Green Climate Fund (GCF), which was established by 194 countries following the Copenhagen Accord at COP15. The GCF is the largest global fund dedicated to supporting developing countries to reduce global emissions and helping communities adapt to the effects of climate change.

In addition to climate finance, India-UK partnership also announced in 2023 upon that the role of green technology sector: Both nations are dedicated to accelerating the clean energy transition and achieving net-zero goals, collaborating on initiatives such as the Green Grids Initiative and India's International Solar Alliance while advocating for developed nations to fulfil their climate finance commitments.

On the technology front also, there exists a lot of potential in scaling up the use of green technology developed in both India and UK by leveraging R&D and manufacturing capabilities of both countries. This will help not just in the two countries climate change mitigation policies but also in jointly promoting export potential of the two countries to the rest of the world.

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<sup>7</sup> <https://dpiit.gov.in/sites/default/files/FDI%20Factsheet%20September%202024.pdf>

<sup>8</sup> <https://dea.gov.in/sites/default/files/Draft%20ODI%20Factsheet%20November%202024.pdf>

<sup>9</sup> <https://www.gov.uk/government/news/prime-minister-announces-record-climate-aid-commitment-as-g20-in-india-concludes>

## **(VIII) Conclusion**

This paper focus on fragmentation in FDI flows, building on a small amount of past research in this area, which to date has been more focused on trade. This includes the use the latest data, a focus on green sector FDI and implications for both the UK and India as well as their bilateral partnership. Previous literature showed an emerging trend, up to 2021, of FDI being increasingly along geopolitical rather than geographic lines. This was noted as having particular risks for emerging and developing economies when compared to advanced economies, as well as for Asia-Pacific countries compared to those in Europe or the Americas.

This paper used data from fDi Markets to answer these research questions, with data on greenfield FDI up to the end of 2023. This analysis showed a rising importance of green FDI within the total picture of FDI flows, as well as key changing patterns in FDI flows. To illustrate, China has dropped from 9.7% of US outbound FDI in 2013 to 5.5% in 2019 and 2.6% in 2023. It has also become a less significant global destination since 2015 whilst India has risen. This paper has also explored the options for deepening this analysis, including the use of complex network algorithms.

As a result, a number of global and specific UK-India policy implications and recommendations emerge. Firstly, if fragmentation lowers FDI flows, this could impact capital formation, productivity and potential impacts energy transition goals if green FDI is lowered and beneficial technology transfer inhibited. And secondly, the UK and India remain crucial FDI partners and further collaboration through a new BIT and international climate fora will strengthen both countries as they tackle a changing global economic situation and the green transition.

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