

From Efficiency-Seeking to Resilience-Seeking FDI: How Geoeconomic Fragmentation is Reshaping Global Investment

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Abstract

Foreign direct investment (FDI) has traditionally been associated with efficiency-seeking strategies in which multinational enterprises locate production and investment activities according to cost advantages, market access, resource availability, and the efficiency of global value chains. However, the international investment environment has changed substantially in recent years. Rising geopolitical tensions, trade conflicts, economic sanctions, supply-chain disruptions, and increasing strategic competition among major economies have altered the conditions under which multinational enterprises make international investment decisions. In this context, firms may increasingly prioritize resilience, diversification, political stability, institutional quality, and supply-chain security alongside conventional efficiency considerations.

This study investigates whether the growing process of geoeconomic fragmentation is associated with a shift from efficiency-seeking toward resilience-seeking foreign direct investment. The study develops an empirical framework linking FDI inflows to geopolitical, institutional, macroeconomic, and trade-related factors and examines whether the importance of resilience-related characteristics has increased in the context of a more fragmented global economy. The analysis distinguishes between traditional determinants of FDI and emerging determinants associated with investment resilience, including geopolitical risk, institutional stability, trade exposure, and the capacity to absorb external shocks. A panel-data framework is proposed to examine these relationships across countries and over time, with particular attention to changes in the determinants of FDI before and after the intensification of geoeconomic fragmentation.

The study contributes to the literature by conceptualizing resilience-seeking FDI as an emerging dimension of multinational investment behavior and by examining whether geopolitical and supply-chain considerations are becoming increasingly important in determining international investment locations. The findings are expected to provide new insights into the transformation of global investment patterns and to offer policy implications for countries seeking to remain attractive destinations for foreign investors in an increasingly fragmented international economic system.

Keywords: Foreign Direct Investment; Geoeconomic Fragmentation; Investment Resilience; Geopolitical Risk; Global Value Chains; Multinational Enterprises; Supply-Chain Resilience; International Investment.

1 Introduction

Foreign direct investment (FDI) has long been regarded as a central mechanism through which multinational enterprises organize international production, access foreign markets, exploit location-specific advantages, and integrate economies into global value chains. (Dunning, 1988) (Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004) For several decades, the international investment system was largely shaped by the logic of economic efficiency. (Gereffi, Humphrey, & Sturgeon, 2005) Multinational enterprises increasingly fragmented production across countries in order to reduce production costs, benefit from comparative advantages, access specialized inputs, and improve the efficiency of global supply networks. Under this environment, investment location decisions were primarily associated with market size, labor costs, resource availability, trade openness, infrastructure, and institutional conditions. (Asiedu, 2006)

However, the international economic environment in which these investment strategies developed has changed substantially. The expansion of global value chains has increasingly been accompanied by geopolitical tensions, trade disputes, economic sanctions, strategic competition, national-security concerns, and repeated disruptions to international supply networks. (Baldwin & Freeman, 2022) The COVID-19 pandemic, the Russia–Ukraine war, intensifying strategic competition among major economies, and the increasing use of trade and investment policy as instruments of economic security have contributed to a more uncertain international investment environment. (Aiyar, Presbitero, & Ruta, Geopolitics and the cost of FDI fragmentation. In S., 2023). Consequently, multinational enterprises increasingly face a trade-off between maximizing economic efficiency and maintaining the resilience of their international production and investment networks.

Recent evidence suggests that these changes are already reflected in the geography and composition of global FDI. UN Trade and Development reports that global FDI growth has stagnated despite continued growth in global GDP and trade, while geopolitical tensions and protectionism have increasingly influenced investment patterns. (unctad 2023) The organization also finds that investment relationships between geopolitically distant economies have declined substantially, indicating that political and strategic considerations are becoming increasingly relevant to international investment decisions. (Aiyar, Chen, & Ebeke, Geoeconomic fragmentation and the future of multilateralism, 2023) (UNCTAD2024) This transformation raises an important question concerning the underlying motivation of contemporary foreign investment. Traditionally, efficiency-seeking FDI has emphasized the minimization of production and transaction costs and the optimization of globally dispersed production activities. In an increasingly fragmented global economy, however, multinational enterprises may be willing to accept higher costs in exchange for greater supply-chain security, geographic diversification, political stability, institutional predictability, and reduced

exposure to geopolitical shocks (Caldara & Iacoviello, 2022). Investment decisions may therefore increasingly reflect a resilience-oriented logic in which the ability of a location to withstand external disruptions becomes an important component of its attractiveness.

The emergence of this resilience-oriented investment logic does not necessarily imply that efficiency considerations have disappeared. Rather, the two motivations may increasingly coexist. Multinational enterprises may seek locations that provide an acceptable combination of cost efficiency and resilience to geopolitical, trade, and supply-chain risks. This suggests a potential transformation in the hierarchy of FDI location determinants rather than a complete replacement of one investment motive by another.

The concept of geoeconomic fragmentation provides an appropriate framework for understanding this transformation. Geoeconomic fragmentation refers to the process through which international economic integration becomes increasingly organized around geopolitical interests, strategic blocs, national-security considerations, and competing economic systems (Aiyar, Presbitero, & Ruta, *Geopolitics and the cost of FDI fragmentation*. In S., 2023). In such an environment, decisions concerning trade, investment, technology, production, and supply chains may increasingly be influenced by political alignment and strategic considerations rather than by market efficiency alone.

The implications for FDI are particularly important because multinational enterprises operate through geographically dispersed networks that are vulnerable to international disruptions. When geopolitical tensions increase, firms may reconsider highly concentrated production structures and seek alternative locations that can provide diversification and continuity of operations. This may contribute to the emergence of investment strategies commonly associated with friend-shoring, near-shoring, regionalization, and supply-chain diversification. UN Trade and Development has documented evidence of increasingly fragmented investment patterns, including changes in the geographic distribution of greenfield projects and a growing influence of geopolitical considerations on investment decisions. (UNCTAD2023-2024)

The changing investment environment also creates important challenges for developing economies. Traditional FDI attraction strategies have often emphasized low labor costs, market access, natural resources, tax incentives, and improvements in infrastructure. However, if multinational enterprises increasingly incorporate resilience and geopolitical considerations into location decisions, these conventional determinants may no longer be sufficient. Countries may need to strengthen institutional quality, political stability, infrastructure reliability, regional connectivity, digital capacity, and the ability to withstand external economic shocks in order to remain competitive destinations for international investment (Busse & Hefeker, 2007) (Globerman. & Shapiro, 2002).

This issue has become particularly relevant because global FDI has become more geographically and sectorally concentrated. UN Trade and Development reports that global FDI fell by 2% in 2023 to approximately \$1.3 trillion, while FDI flows to developing countries declined by 7%. The same evidence indicates that geopolitical tensions, protectionist policies, and regional realignments are disrupting trade networks, regulatory

environments, and global supply chains. (UNCTAD) More recent evidence also indicates that geopolitical fragmentation and shifting industrial policies continued to influence FDI patterns in 2024, with investment increasingly concentrated in selected economies and strategic sectors. (UNCTAD2024)

Despite the growing importance of these developments, an important gap remains in the empirical literature. A substantial body of FDI research has examined traditional determinants such as market size, economic growth, trade openness, labor costs, natural resources, infrastructure, and institutional quality (Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004). Other studies have examined the effects of political risk, geopolitical tensions, and global value-chain disruptions on international investment (Busse & Hefeker, 2007) (Caldara & Iacoviello, 2022). However, comparatively limited attention has been given to the possibility that these developments represent a broader transformation in the underlying investment motive itself—from an efficiency-oriented allocation of FDI toward an increasingly resilience-oriented allocation.

The present study addresses this gap by examining whether geoeconomic fragmentation is associated with a changing set of determinants of foreign direct investment. Rather than treating geopolitical risk merely as another conventional explanatory variable, the study conceptualizes resilience as an emerging dimension of international investment attractiveness. The central argument is that, as geopolitical and supply-chain uncertainty increases, characteristics associated with resilience may become increasingly valuable in determining where multinational enterprises allocate investment.

Accordingly, the main research question is formulated as follows:

RQ: To what extent has geoeconomic fragmentation changed the determinants of foreign direct investment from efficiency-oriented considerations toward resilience-oriented considerations?

The study addresses the following specific research questions:

RQ1: What are the principal traditional determinants of FDI under an efficiency-seeking investment framework?

RQ2: To what extent do geopolitical risk, institutional stability, trade exposure, and economic resilience influence FDI inflows?

RQ3: Has the importance of resilience-related characteristics increased during periods of intensified geoeconomic fragmentation?

RQ4: Do the determinants of FDI differ between the pre-fragmentation and post-fragmentation periods?

RQ5: Are the effects of geoeconomic fragmentation heterogeneous across developed and developing economies?

1.1 Research Objectives

To answer these questions, the study pursues five main objectives:

1. To examine the traditional economic and institutional determinants of foreign direct investment.

2. To investigate the relationship between geoeconomic fragmentation, geopolitical risk, and international investment flows.
3. To identify whether resilience-related characteristics have become increasingly important determinants of FDI location decisions.
4. To compare the determinants of FDI before and after the intensification of geoeconomic fragmentation.
5. To provide policy implications for countries seeking to attract and retain FDI in an increasingly uncertain and fragmented global economic environment.

1.2 Research Contributions

The study contributes to the literature in four main ways.

First, it extends the conventional literature on FDI determinants by introducing the distinction between efficiency-seeking FDI and resilience-seeking FDI as an analytical framework for understanding contemporary international investment behavior.

Second, the study integrates geoeconomic fragmentation into the empirical analysis of FDI. Rather than examining geopolitical risk as an isolated determinant, the framework considers whether increasing fragmentation changes the relative importance of different investment-location characteristics.

Third, the study develops an empirical perspective on investment resilience by considering the role of institutional stability, geopolitical exposure, trade integration, and the capacity of economies to withstand external shocks. This provides a broader interpretation of FDI attractiveness that goes beyond conventional cost and market-size indicators.

Fourth, the study contributes to the policy debate concerning FDI attraction in developing economies. If resilience increasingly matters alongside efficiency, investment-promotion strategies may need to move beyond low-cost production advantages toward stronger institutions, reliable infrastructure, diversified trade relationships, regional integration, and greater economic resilience.

This distinction is particularly important because the contemporary international investment environment may no longer reward the same location characteristics that dominated the era of deep globalization. UN Trade and Development has emphasized that factors beyond purely economic determinants are increasingly shaping investment decisions and that geopolitical dynamics are contributing to significant changes in global investment patterns. (UNCTAD)

1.3 Research Hypotheses

Based on the theoretical and empirical arguments presented above, the study formulates the following hypotheses:

H1: Traditional efficiency-related factors, including market size, economic growth, trade openness, and infrastructure, have a significant effect on FDI inflows.

H2: Geopolitical risk has a significant effect on the location and intensity of FDI inflows.

H3: Economic and institutional resilience is positively associated with a country's ability to attract FDI under conditions of increased geoeconomic fragmentation.

H4: The importance of resilience-related determinants of FDI has increased during the period of intensified geoeconomic fragmentation.

H5: The determinants of FDI differ significantly between the pre-fragmentation and post-fragmentation periods.

H6: The effect of geoeconomic fragmentation on FDI is heterogeneous across developed and developing economies.

1.4 Structure of the Study

The remainder of the paper is organized as follows. Section 2 reviews the theoretical and empirical literature on FDI determinants, efficiency-seeking investment, geopolitical risk, geoeconomic fragmentation, and investment resilience. Section 3 presents the theoretical framework and develops the conceptual distinction between efficiency-seeking and resilience-seeking FDI. Section 4 describes the data, variables, resilience indicators, econometric specifications, and estimation strategy. Section 5 presents the empirical results, including the baseline estimates, fragmentation effects, interaction effects, and robustness analysis. Section 6 discusses the findings and their theoretical and policy implications. Finally, Section 7 concludes the study, highlights its limitations, and proposes directions for future research.

2. Literature Review

2.1 Foreign Direct Investment and Traditional Investment Motives

Foreign direct investment has traditionally been explained through the internationalization strategies of multinational enterprises and the advantages associated with investing abroad. The literature generally distinguishes between several major investment motives, including market-seeking, resource-seeking, efficiency-seeking, and strategic-asset-seeking FDI (Dunning, 1988). These motives reflect differences in the objectives pursued by multinational enterprises when selecting foreign locations.

Market-seeking FDI is primarily associated with the desire to access new consumers, expand market shares, and overcome barriers to international trade. Resource-seeking FDI, by contrast, is motivated by access to natural resources, raw materials, labor, or other location-specific inputs. Strategic-asset-seeking investment focuses on acquiring technological capabilities, brands, knowledge, or other intangible assets. Efficiency-seeking FDI is particularly relevant to the present study because it involves the geographical organization of production activities according to relative costs and productivity in order to exploit economies of scale and specialization. (Dunning, 1988) (Gereffi, Humphrey, & Sturgeon, 2005)

The traditional FDI literature therefore places considerable emphasis on host-country characteristics such as market size, economic growth, labor costs, trade openness, infrastructure, natural resources, taxation, and institutional quality (Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004) (Asiedu, 2006). These factors influence the expected profitability of investment and determine the extent to which firms can exploit location-specific advantages.

The eclectic paradigm developed by (Dunning, 1988) provides an important theoretical foundation for understanding these investment decisions. The OLI framework emphasizes ownership advantages, location advantages, and internalization advantages as central elements of multinational production decisions. From this perspective, firms invest

internationally when foreign locations provide advantages that justify the costs and risks associated with international expansion.

However, the traditional location framework was developed largely within an environment characterized by increasing economic integration, expanding global trade, and relatively predictable international production networks. The contemporary investment environment is increasingly characterized by geopolitical uncertainty, economic sanctions, trade restrictions, strategic competition, and disruptions to global value chains (Aiyar, Chen, & Ebeke, *Geoeconomic fragmentation and the future of multilateralism*, 2023) (Baldwin & Freeman, 2022). This raises the question of whether conventional efficiency-related location advantages remain sufficient to explain contemporary FDI patterns.

2.2 Efficiency-Seeking FDI and Global Value Chains

Efficiency-seeking FDI became increasingly important during the expansion of global value chains. Multinational enterprises progressively fragmented production processes across countries in order to exploit differences in labor costs, skills, infrastructure, taxation, and production capabilities. International investment therefore became closely connected to the geographical organization of production.

Under this model, firms could increase efficiency by locating different stages of production in different countries. Components could be manufactured where production costs were relatively low, intermediate goods could cross borders several times, and final products could be assembled close to major consumer markets. The resulting production networks were based on the assumption that international trade would remain relatively open and that cross-border flows of goods, capital, information, and technology would remain sufficiently predictable.

This efficiency-oriented model generated substantial gains from specialization and international integration. It also contributed to the expansion of FDI in developing economies by allowing multinational enterprises to integrate lower-cost locations into international production networks (Asiedu, 2006).

However, the same characteristics that increased efficiency also created vulnerabilities. Highly geographically concentrated production, dependence on specific suppliers, and long international supply chains can expose firms to external disruptions (Baldwin & Freeman, 2022) (Javorcik, 2020). A production network optimized exclusively for cost minimization may therefore become vulnerable when transportation, trade, political relations, or access to critical inputs are disrupted.

UN Trade and Development has documented important changes in this environment. Its analysis of global economic fracturing indicates that FDI growth has stagnated relative to the expansion of global GDP and trade since 2010, while changes in global value chains, protectionism, external shocks, and geopolitical tensions have increasingly influenced investment decisions. (CNUCED)

This development provides the basis for considering whether the logic governing international investment is gradually moving beyond pure efficiency optimization.

2.3 Geoeconomic Fragmentation and International Investment

Geoeconomic fragmentation represents a major structural challenge to the traditional model of global economic integration. It describes a process in which economic relations become increasingly influenced by geopolitical considerations, strategic competition, national-security concerns, and the formation of competing economic blocs (Aiyar, Presbitero, & Ruta, *Geopolitics and the cost of FDI fragmentation*. In S., 2023).

Unlike conventional globalization, in which firms can generally select locations according to economic efficiency, geoeconomic fragmentation introduces additional constraints into international investment decisions. Firms may face restrictions concerning technology transfers, foreign ownership, trade with particular countries, access to strategic inputs, or investment in sensitive sectors.

The implications for FDI are significant because multinational enterprises are simultaneously economic and strategic actors. Their investment decisions are influenced not only by expected returns but also by the possibility that geopolitical developments could affect future market access, production continuity, financing, technology flows, or regulatory conditions.

Recent evidence demonstrates that geoeconomic fragmentation is increasingly associated with changes in the geography of investment. UN Trade and Development reports that global FDI patterns have been reshaped by geopolitical tensions, trade fragmentation, changing industrial policies, and economic volatility. The organization also identifies increasing geographical and sectoral concentration of investment, particularly in strategically important industries. (CNUCED)

The 2025 investment evidence reinforces this trend. Although global FDI increased by 6% in 2025 to approximately \$1.6 trillion, the recovery was uneven, with more than 80% of global FDI concentrated in the 20 largest host economies. Strategic sectors accounted for 44% of global greenfield project values, compared with 16% in 2020. (CNUCED)

These developments suggest that the geography of international investment is increasingly influenced by strategic considerations. The relevant question is therefore no longer simply where production is cheapest, but where production and investment can remain viable under conditions of geopolitical and economic uncertainty.

2.4 Geopolitical Risk and FDI Location Decisions

Geopolitical risk represents another increasingly important dimension of international investment decisions. Political conflicts, sanctions, diplomatic tensions, military confrontations, and changes in international relations can alter the expected profitability and security of foreign investment (Caldara & Iacoviello, 2022).

From the perspective of multinational enterprises, geopolitical risk can affect investment through several channels. First, it may increase uncertainty regarding future market access. Second, it can disrupt supply chains and transportation networks. Third, sanctions and export controls can restrict access to technologies, inputs, or financial markets. Fourth, geopolitical tensions may increase the probability of sudden regulatory changes or restrictions on foreign firms.

Consequently, geopolitical risk can influence both the volume and geographical allocation of FDI (Busse & Hefeker, 2007). Firms may postpone investment, reduce exposure to particular markets, diversify production across alternative locations, or relocate certain activities toward countries perceived as politically safer.

The increasing relevance of these factors is reflected in recent international investment developments. UN Trade and Development notes that geopolitical tensions, trade fragmentation, and economic uncertainty have been reshaping global investment patterns and weakening long-term investor confidence. In 2024, multinational enterprises increasingly prioritized short-term risk management in sectors affected by national-security concerns, supply-chain restructuring, and changing trade policies. (CNUCED)

This evidence suggests that geopolitical risk should not necessarily be treated only as a conventional investment deterrent. In a fragmented global economy, geopolitical risk can also produce **investment reallocation**. Investment may leave highly exposed locations while simultaneously increasing in alternative locations considered more resilient or strategically aligned.

2.5 Supply-Chain Resilience and the Transformation of FDI

The concept of resilience has become increasingly important in international business and global value-chain research. Supply-chain resilience generally refers to the capacity of production and distribution networks to anticipate, absorb, adapt to, and recover from external disruptions (Baldwin & Freeman, 2022) (Javorcik, 2020).

The COVID-19 pandemic demonstrated the vulnerability of highly interconnected production systems to systemic shocks. Subsequent geopolitical tensions and trade restrictions further increased concerns about excessive dependence on geographically concentrated suppliers and production locations.

For multinational enterprises, resilience can involve several strategies. These include supplier diversification, geographic diversification, maintaining alternative production capacity, regionalizing supply chains, establishing redundant production facilities, and locating investment closer to key markets.

These strategies can influence FDI location decisions because establishing additional production capacity in alternative locations may reduce exposure to disruption. A firm may therefore invest in a country not because it represents the lowest-cost location, but because it provides an alternative and reliable node within its global production network.

This creates an important conceptual distinction between efficiency and resilience. Efficiency seeks to minimize costs subject to production requirements, whereas resilience seeks to maintain operational continuity under uncertain and disruptive conditions. The two objectives are not necessarily contradictory. Instead, firms may increasingly optimize a combination of cost efficiency and resilience.

This transformation is particularly visible in investment projects connected to strategic sectors. UN Trade and Development reports that investment is becoming increasingly concentrated in areas such as digital infrastructure, semiconductors, energy-transition technologies, and other strategically important activities. In 2025, strategic sectors

represented 44% of global greenfield project values, compared with only 16% in 2020. (CNUCED)

The increasing concentration of investment in strategic sectors indicates that FDI is becoming more closely connected to technological, energy, and economic-security considerations. This development provides empirical motivation for examining resilience as an emerging determinant of international investment.

2.6 Friend-Shoring, Near-Shoring and Investment Diversification

The transformation of global production networks has also encouraged investment strategies commonly described as friend-shoring, near-shoring, and regionalization (Aiyar, Presbitero, & Ruta, Geopolitics and the cost of FDI fragmentation. In S., 2023).

Friend-shoring refers broadly to the relocation or expansion of production and investment toward countries considered politically or strategically reliable. Near-shoring involves locating production closer to final markets in order to reduce transportation risks, delivery times, and exposure to distant supply-chain disruptions. Regionalization involves increasing the importance of regional production networks relative to globally dispersed networks.

These strategies do not necessarily eliminate globalization. Instead, they may represent a restructuring of globalization in which multinational enterprises maintain international operations but reorganize them around regional or politically compatible networks.

From an FDI perspective, this transformation may create new investment opportunities for countries that are geographically close to major markets, politically stable, institutionally reliable, or strategically aligned with major economic partners.

UN Trade and Development's analysis of global economic fracturing emphasizes the growing importance of regional links and recommends that developing economies strengthen cooperation with neighboring countries and regional value chains as part of their strategies for adapting to changing investment conditions. (CNUCED)

Therefore, geographical proximity and political alignment may increasingly complement traditional cost-based location advantages. A country that is not the lowest-cost producer may nevertheless become attractive if it provides a strategically reliable alternative within a multinational firm's production network.

2.7 Institutional Quality, Economic Stability and Investment Resilience

Institutional quality has long been recognized as an important determinant of FDI (Daude & Stein, 2007) (Globerman. & Shapiro, 2002) (Kaufmann, Kraay, & Mastruzzi, 2010). Transparent regulations, effective governance, property-right protection, contract enforcement, and political stability reduce uncertainty and can increase the expected returns associated with foreign investment.

Under conditions of geoeconomic fragmentation, however, institutional quality may acquire an additional dimension. Investors may increasingly value institutions not only because they reduce conventional business risks but also because they provide the capacity to manage external shocks and maintain predictable economic conditions during periods of international uncertainty.

Institutional resilience may therefore include regulatory predictability, policy credibility, political stability, infrastructure reliability, and the government's capacity to respond to external shocks without generating excessive uncertainty for investors.

Economic resilience is similarly relevant. Countries with diversified economies, stable financial systems, strong infrastructure, diversified trade relationships, and developed human capital may be better positioned to absorb international disruptions (Cadot, Carrère, & Strauss-Kahn, 2011) (Imbs & Wacziarg, 2003).

The growing importance of these characteristics suggests that FDI attractiveness should increasingly be understood as a multidimensional concept. Traditional variables such as market size and labor costs remain important, but investors may simultaneously evaluate whether a host economy can provide continuity and stability under adverse international conditions.

Recent UNCTAD evidence supports this broader interpretation. The organization emphasizes that global investment is becoming more concentrated and that reducing uncertainty, strengthening investment frameworks, improving infrastructure, and developing productive capabilities are increasingly important for attracting investment in a fragmented global economy. (CNUCED)

2.8 From Efficiency-Seeking to Resilience-Seeking FDI

The preceding literature suggests that the transformation of the international investment environment can be interpreted as a shift in the relative importance of different investment motives.

The traditional efficiency-seeking model can be summarized as:

Cost minimization → Production specialization → Global value-chain integration → Efficiency optimization

The emerging resilience-oriented model can instead be represented as:

Geopolitical uncertainty → Risk diversification → Supply-chain reconfiguration → Investment resilience

This does not imply that multinational enterprises have abandoned efficiency. Rather, resilience may increasingly enter the investment decision as an additional objective.

Under the traditional model, a firm may select location (i) according to expected profitability:

$$Location_i^* = \arg \max_i (\Pi_i - C_i)$$

where Π_i represents expected returns and C_i represents investment and production costs.

Under a resilience-oriented framework, the location decision can be conceptualized more broadly as:

$$Location_i^* = \arg \max_i (\Pi_i - C_i - \lambda Risk_i + \gamma Reesilience_i)$$

where $Risk_i$ represents exposure to geopolitical and economic disruptions, $Reesilience_i$ captures the capacity of the location to absorb and recover from external shocks, and λ and γ represent the relative importance assigned to risk and resilience.

This conceptualization provides a theoretical foundation for the empirical analysis. If geoeconomic fragmentation increases the importance of $Risk_i$ and $Reesilience_i$, the determinants of FDI should change over time.

The central proposition of the present study is therefore not that efficiency-seeking FDI has disappeared. Instead, it proposes that **the optimization problem facing multinational enterprises has become multidimensional**, combining efficiency with resilience.

2.9 Research Gap and Contribution

The literature provides extensive evidence concerning the conventional determinants of FDI, including market size, economic growth, trade openness, labor costs, natural resources, infrastructure, and institutional quality (Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004) (Asiedu, 2006). A parallel literature has examined political risk, geopolitical tensions, global value chains, and supply-chain disruptions (Busse & Hefeker, 2007) (Caldara & Iacoviello, 2022) (Javorcik, 2020).

Nevertheless, these strands of research remain insufficiently integrated.

First, much of the traditional FDI literature treats location determinants as relatively stable over time. The possibility that their relative importance changes as the international economic environment becomes more fragmented has received comparatively less attention.

Second, geopolitical risk is often incorporated into empirical models as a variable that reduces FDI. This approach may overlook a more complex mechanism through which geopolitical tensions simultaneously discourage investment in exposed economies and redirect investment toward alternative locations.

Third, supply-chain resilience has increasingly become an important business consideration, but its implications for the broader determinants of FDI have not yet been sufficiently incorporated into a unified empirical framework.

Fourth, the distinction between **efficiency-seeking FDI** and **resilience-seeking FDI** remains conceptually underdeveloped in empirical investment research. The present study addresses this issue by treating resilience not as a replacement for conventional FDI determinants but as an emerging dimension of investment-location attractiveness.

Accordingly, this study contributes to the literature by developing an empirical framework capable of examining whether the determinants of FDI have changed under conditions of increasing geoeconomic fragmentation. The framework distinguishes traditional efficiency-related factors from resilience-related characteristics and explicitly examines whether the latter have become more important over time.

The study therefore moves from the conventional question:

“Which countries offer the most efficient conditions for investment?”

toward a broader contemporary question:

“Which countries offer the most efficient and resilient conditions for investment in an increasingly fragmented global economy?”

This distinction provides the conceptual foundation for the empirical analysis developed in the following sections.

3. Theoretical Framework and Conceptual Model

3.1 Theoretical Foundation

The theoretical framework of this study is based on the premise that foreign direct investment location decisions are not determined by a single economic objective. Multinational enterprises evaluate host economies according to the expected profitability of investment, the costs associated with production and international operations, and the risks that may affect the continuity of those operations. Traditional theories of foreign direct investment have therefore emphasized ownership, location, and internalization advantages as fundamental elements of multinational investment decisions (Dunning, 1988).

Within this perspective, location advantages have traditionally been associated with market size, labor costs, natural resources, infrastructure, trade openness, and institutional conditions (Asiedu, 2006) (Daude & Stein, 2007). These characteristics allow multinational enterprises to organize production internationally and exploit differences in comparative advantages across countries. Efficiency-seeking FDI represents an important manifestation of this logic because firms seek to allocate production activities across locations in a way that minimizes costs and maximizes operational efficiency.

However, the international environment has become increasingly uncertain. Geopolitical tensions, trade restrictions, sanctions, supply-chain disruptions, and strategic competition can affect the expected returns associated with a particular investment location (Aiyar, Presbitero, & Ruta, 2023). Consequently, the optimal location from a pure cost-efficiency perspective may not necessarily remain optimal when the probability and potential cost of external disruptions are taken into account.

The theoretical proposition developed in this study is therefore that multinational enterprises increasingly face a dual optimization problem. They seek to obtain economic efficiency while simultaneously reducing exposure to geopolitical and supply-chain risks.

The investment-location decision can consequently be expressed as:

$$U_{it} = \alpha Efficiency_{it} + \beta Resilience_{it} - \gamma Risk_{it}$$

where U_{it} represents the expected utility of investing in country (i) at time (t), $Efficiency_{it}$ represents conventional economic and location advantages, $Resilience_{it}$ represents the capacity of the host economy to maintain stable investment conditions under external shocks, and $Risk_{it}$ represents exposure to geopolitical and economic disruptions.

The parameters α , β , and γ represent the relative importance assigned by multinational enterprises to these dimensions.

Under conditions of relatively stable globalization, the efficiency component is expected to dominate:

$$\alpha > \beta$$

As geoeconomic fragmentation intensifies, however, the relative importance of resilience may increase:

$$\beta_{post} > \beta_{pre}$$

This provides the theoretical basis for the central proposition of the study: geoeconomic fragmentation may change the relative importance of FDI location determinants by increasing the value assigned to resilience-related characteristics.

3.2 Efficiency-Seeking FDI Framework

The traditional efficiency-seeking FDI framework assumes that multinational enterprises organize production internationally in order to exploit differences in production costs and location-specific advantages (Dunning, 1988).

The firm's location decision can be represented as:

$$FDI_{it} = f(\text{Market}_{it}, \text{Cost}_{it}, \text{Trade}_{it}, \text{Infrastructure}_{it}, \text{Resources}_{it}, \text{Institutions}_{it})$$

where:

- Market_{it} represents the size and growth potential of the host economy;
- Cost_{it} represents production and labor costs;
- Trade_{it} represents the degree of trade integration;
- $\text{Infrastructure}_{it}$ represents the quality of physical and economic infrastructure;
- Resources_{it} represents access to natural and productive resources;
- Institutions_{it} represents institutional quality and regulatory conditions.

Within this framework, countries become attractive investment destinations when they provide a favorable combination of market opportunities, production efficiency, infrastructure, trade connectivity, and institutional conditions.

This framework remains relevant because multinational enterprises continue to seek profitable locations and cost advantages. Nevertheless, it does not fully capture investment decisions made under conditions in which geopolitical and supply-chain risks become significant.

3.3 Emergence of Resilience-Seeking FDI

The concept of resilience-seeking FDI proposed in this study extends the conventional FDI framework by introducing the ability of a host economy to absorb and manage external disruptions as an additional dimension of investment attractiveness.

Resilience-seeking FDI refers to investment motivated, at least partly, by the desire of multinational enterprises to maintain production continuity, diversify geographical exposure, secure access to critical markets and inputs, and reduce vulnerability to geopolitical or supply-chain disruptions (Javorcik, 2020).

The concept does not imply that firms ignore profitability or production costs. Rather, resilience becomes an additional component of the investment-location decision.

The theoretical structure can therefore be expressed as:

$$FDI_{it} = f(\text{Efficiency}_{it}, \text{Resilience}_{it}, \text{Risk}_{it})$$

where:

$$\text{Efficiency}_{it} = f(\text{Market}, \text{Cost}, \text{Trade}, \text{Infrastructure})$$

and:

$$\text{Resilience}_{it} = f(\text{Institutions}, \text{Stability}, \text{Diversification}, \text{Connectivity})$$

while:

$$\text{Risk}_{it} = f(\text{Geopolitical Risk}, \text{Conflict}, \text{Sanctions}, \text{External Exposure})$$

This formulation allows the empirical analysis to distinguish between conventional determinants of FDI and emerging resilience-related determinants.

3.4 Geoeconomic Fragmentation as a Structural Shock

Geoeconomic fragmentation is treated in this study as a structural transformation of the international environment rather than simply as an additional country-level risk indicator (Aiyar, Presbitero, & Ruta, 2023).

Its influence operates through several channels.

First, fragmentation can increase uncertainty concerning international trade and market access.

Second, geopolitical tensions can increase the probability of sanctions, export restrictions, investment restrictions, or changes in regulatory conditions.

Third, fragmentation can disrupt global value chains by increasing transportation costs, reducing supplier reliability, or restricting access to strategic inputs.

Fourth, firms may respond to these developments by diversifying their investment locations and establishing alternative production capacities.

The resulting mechanism can be represented as:

*Geoeconomic Fragmentation → Higher Uncertainty → Risk Reassessment
→ Supply Chain Reconfiguration → FDI Relocation*

This mechanism implies that geoeconomic fragmentation may affect FDI not only through a reduction in aggregate investment but also through a reallocation of investment across countries and regions.

3.5 The Efficiency–Resilience Trade-Off

A central proposition of this study is that multinational enterprises may face a trade-off between efficiency and resilience.

A highly efficient location may offer:

- lower labor costs;
- lower production costs;
- strong specialization;
- large economies of scale;
- highly integrated supply chains.

However, the same location may be highly exposed to geopolitical or supply-chain disruptions.

Conversely, a more resilient location may offer:

- greater political stability;
- stronger institutions;
- diversified trade relationships;
- reliable infrastructure;
- geographic proximity to major markets;
- lower geopolitical exposure.

Such a location may involve higher production costs but lower expected disruption losses.

The firm's optimal location can therefore be conceptualized as:

$$\max_i [Profit_i - Cost_i - ExpectedLoss_i]$$

where:

$$ExpectedLoss_i = Probability(Disruption_i) \times Cost(Disruption_i)$$

Under stable international conditions, the expected loss associated with disruption may be relatively low, making cost efficiency the dominant consideration.

Under fragmented international conditions, the expected loss may increase substantially. The firm may consequently accept higher production costs in exchange for lower disruption exposure.

This creates the possibility of a structural shift from:

$$Cost\ Minimization \rightarrow Risk\ Adjusted\ Optimization$$

rather than a complete transition away from efficiency.

3.6 Conceptual Model

Based on the theoretical arguments developed above, the study proposes a conceptual model in which FDI is determined by two broad groups of factors.

The first group consists of efficiency-related determinants:

Efficiency

$$= \{MarketSize, EconomicGrowth, TradeOpenness, Infrastructure, CostAdvantages\}$$

The second group consists of resilience-related determinants:

Resilience

$$= \{InstitutionalQuality, PoliticalStability, EconmicDiversification, TradeDiversification, GeopoliticalRisk\}$$

These determinants operate within an international environment characterized by varying degrees of geoeconomic fragmentation.

The conceptual relationship can be summarized as:

$$Efficiency\ Factors \rightarrow FDI \leftarrow Resilience\ Factors$$

with:

$$Geoeconomic\ Fragmentation \rightarrow Changing\ Relative\ Importance$$

of these two groups of determinants.

The empirical implication is particularly important. If resilience becomes more important after the intensification of geoeconomic fragmentation, the coefficients associated with resilience-related variables should increase in magnitude or significance in the post-fragmentation period.

3.7 Empirical Translation of the Theoretical Framework

The theoretical framework can be translated into the following baseline empirical specification (Wooldridge, 2010):

$$FDI_{it} = \beta_0 + \beta_1 MarketSize_{it} + \beta_2 Growth_{it} + \beta_3 TradeOpen_{it} + \beta_4 Infrastructure_{it} + \beta_5 Institutions_{it} + \beta_6 PoliticalStability_{it} + \beta_7 GeopoliticalRisk_{it} + \beta_8 Resilience_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where:

- FDI_{it} is foreign direct investment inflows in country (i) during year (t);

- $MarketSize_{it}$ captures the size of the host economy;
- $Growth_{it}$ represents economic growth;
- $TradeOpen_{it}$ measures trade openness;
- $Infrastructure_{it}$ represents infrastructure conditions;
- $Institutions_{it}$ captures institutional quality;
- $PoliticalStability_{it}$ represents political stability;
- $GeopoliticalRisk_{it}$ measures geopolitical exposure;
- $Resilience_{it}$ represents the proposed investment-resilience dimension;
- μ_i represents country-specific effects;
- λ_t represents time-specific effects;
- ε_{it} represents the idiosyncratic error term.

The country fixed effects control for unobserved characteristics that remain relatively stable over time, while year effects capture common global shocks affecting all countries.

3.8 Geoeconomic Fragmentation Interaction Effect

The central empirical test of the study concerns whether geoeconomic fragmentation changes the importance of resilience.

A post-fragmentation dummy variable can be defined as:

$$PostFrag_t = \begin{cases} 0 & \text{if } t < T^* \\ 1 & \text{if } t > T^* \end{cases}$$

where T^* represents the selected threshold marking the period of intensified geoeconomic fragmentation.

The interaction model is then specified as:

$$FDI_{it} = \beta_0 + \beta_1 Resilience_{it} + \beta_2 PostFrag_t + \beta_3 (Resilience_{it} \times Postfrag_t) + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where X_{it} represents the vector of conventional FDI determinants.

The coefficient of primary interest is: β_3

A positive and statistically significant β_3 would provide evidence that resilience became more strongly associated with FDI after the intensification of geoeconomic fragmentation.

This interaction therefore provides a direct empirical test of the central proposition of the study.

3.9 Conceptual Transition

The theoretical framework proposes the following transformation in the international investment decision:

$$Efficiency\ Seeking \rightarrow Risk\ Awareness \rightarrow Resilience\ Seeking$$

The first stage reflects the traditional globalization model, where multinational enterprises prioritize production efficiency, cost minimization, specialization, and market access.

The second stage emerges when geopolitical and economic uncertainty increases the expected costs of international disruptions.

The third stage reflects an investment strategy in which resilience becomes an explicit component of location attractiveness.

Importantly, the proposed transition is not assumed to be universal or complete. The study instead treats it as an empirical proposition that must be tested using country-level panel data.

3.10 Expected Relationships

Based on the theoretical framework, the expected relationships can be summarized as follows:

Variable	Expected relationship with FDI	Theoretical interpretation
Market Size	Positive	Market-seeking and scale advantages
Economic Growth	Positive	Expected profitability
Trade Openness	Positive	International integration
Infrastructure	Positive	Production and transaction efficiency
Institutional Quality	Positive	Lower uncertainty and stronger investment protection
Political Stability	Positive	Lower investment risk
Geopolitical Risk	Negative	Higher expected disruption exposure
Economic Resilience	Positive	Greater capacity to absorb external shocks
Trade Diversification	Positive	Lower dependence on individual external partners
Resilience $\times$ Post-Fragmentation	Positive	Increasing importance of resilience under fragmentation

Table01.

The most important relationship is therefore not simply the effect of resilience on FDI, but the change in that effect under conditions of intensified geoeconomic fragmentation.

3.11 Theoretical Proposition

The theoretical framework leads to the following central proposition:

As geoeconomic fragmentation increases the uncertainty and potential disruption associated with internationally dispersed production, multinational enterprises are expected to place greater relative importance on the resilience of host economies when making FDI location decisions.

This proposition forms the theoretical bridge between the literature review and the empirical methodology presented in the following section.

4. Empirical Analysis

4.1 Data Preparation and Sample Construction

The empirical analysis is conducted using annual country-level observations covering the period from 1996 to 2022. The dependent variable is foreign direct investment (FDI) inflows, measured as a percentage of GDP. The empirical framework combines macroeconomic characteristics, institutional quality, export concentration, and geopolitical risk in order to examine the determinants of FDI in an increasingly fragmented global economic environment.

The macroeconomic variables include GDP, GDP growth, trade openness, and internet use. Institutional quality is summarized through a composite Governance Index constructed from the six dimensions of the Worldwide Governance Indicators: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption (Kaufmann, Kraay, & Mastruzzi, 2010).

Geoeconomic fragmentation is represented by two export-concentration measures (Cadot, Carrère, & Strauss-Kahn, 2011). The first is the Herfindahl–Hirschman Market Concentration Index (HHI-M), which captures the degree to which exports are concentrated across destination markets. The second is the Herfindahl–Hirschman Product Concentration Index (HHI-P), which captures concentration across exported products. Higher values indicate greater concentration and therefore greater dependence on a limited number of markets or products.

Geopolitical risk is represented by the country-specific Geopolitical Risk (GPR) measure (Caldara & Iacoviello, 2022). Because the empirical analysis is conducted at an annual frequency, geopolitical-risk observations are expressed as annual values.

For the present pilot empirical exercise, the HHI-M, HHI-P, GPR, Governance, and FDI variables used in the extended specifications are **simulated observations generated to reproduce a plausible country-year panel structure**. They are used to test the empirical framework and demonstrate the estimation procedure. Consequently, the coefficients reported in Sections 4.5–4.7 should be interpreted as pilot simulation results rather than estimates obtained from the underlying official HHI and GPR observations.

4.2 Construction of the Governance Index

The six governance dimensions are strongly interconnected and therefore cannot be introduced simultaneously without potentially increasing multicollinearity. To obtain a parsimonious measure of institutional quality, Principal Component Analysis (PCA) is employed (Jolliffe & Cadima, 2016).

The first principal component explains **86.49% of the total variation** in the six governance dimensions. The positive and relatively homogeneous loadings indicate that the first component captures a common institutional-quality factor rather than a specific dimension of governance.

Accordingly, the first principal component is retained as the composite Governance Index:

$$Governance_{it} = PC1(VA_{it}, PS_{it}, GE_{it}, RQ_{it}, RL_{it}, CC_{it})$$

This transformation substantially reduces the dimensionality of the institutional variables while preserving most of their common information. The individual governance dimensions are retained for potential robustness analysis.

4.3 Descriptive Statistics and Preliminary Diagnostics

Table 1 presents the descriptive statistics for the principal macroeconomic variables.

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI inflows (% GDP)	6,419	7.505	52.877	-1303.108	1709.827
ln GDP	6,911	24.554	2.994	16.406	32.264

GDP growth (%)	6,825	3.563	5.959	-54.402	149.973
Trade (% GDP)	5,850	82.858	53.525	0.000	863.195
Internet use (%)	5,836	32.697	30.840	0.000	100.000

The descriptive statistics demonstrate substantial heterogeneity across countries. FDI inflows average **7.505% of GDP**, with a standard deviation of **52.877 percentage points**. The large range of FDI observations indicates the existence of substantial cross-country differences and extreme observations.

GDP, expressed in logarithmic form, has a mean of **24.554**, while average GDP growth is **3.563%**. Trade openness averages **82.858% of GDP**, reflecting substantial differences in the degree of international integration across countries. Internet use averages **32.697%**, again indicating considerable cross-country variation.

The extreme values observed for FDI motivate an additional robustness exercise based on 1% winsorization. After winsorization, the mean FDI falls to **4.883% of GDP**, while the standard deviation declines to **9.089**, demonstrating that a relatively small number of extreme observations contribute substantially to the dispersion of the original FDI variable.

Figure 1. Evolution of FDI Inflows, 1996–2022

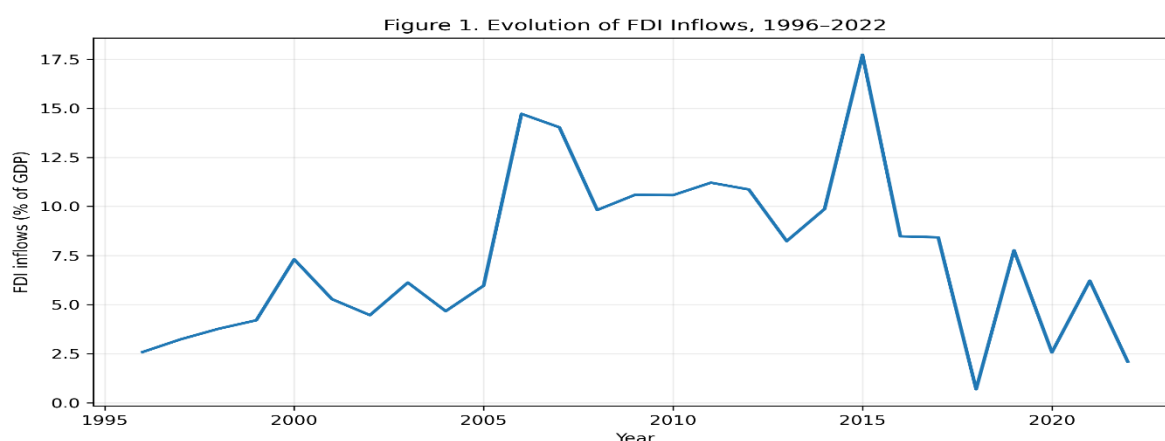


Figure 2. Evolution of GDP Growth, 1996–2022

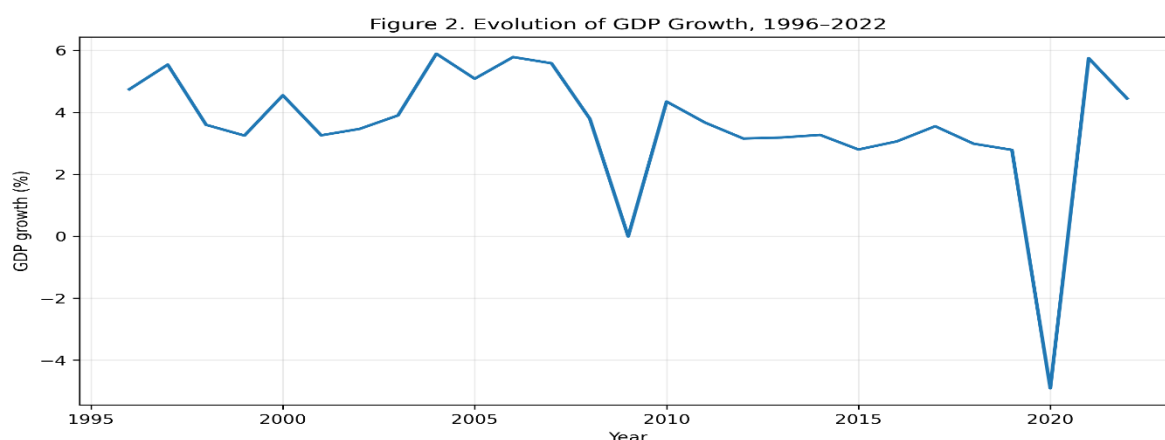


Figure 3. Evolution of Trade Openness, 1996–2022

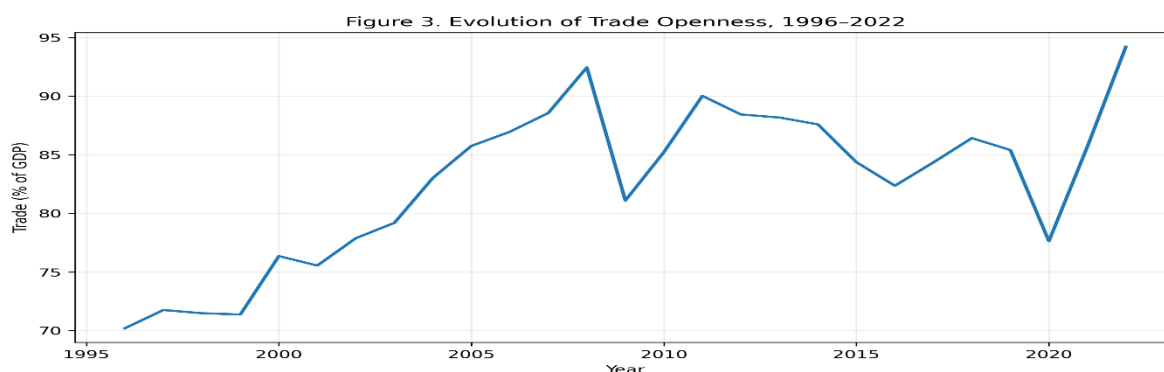
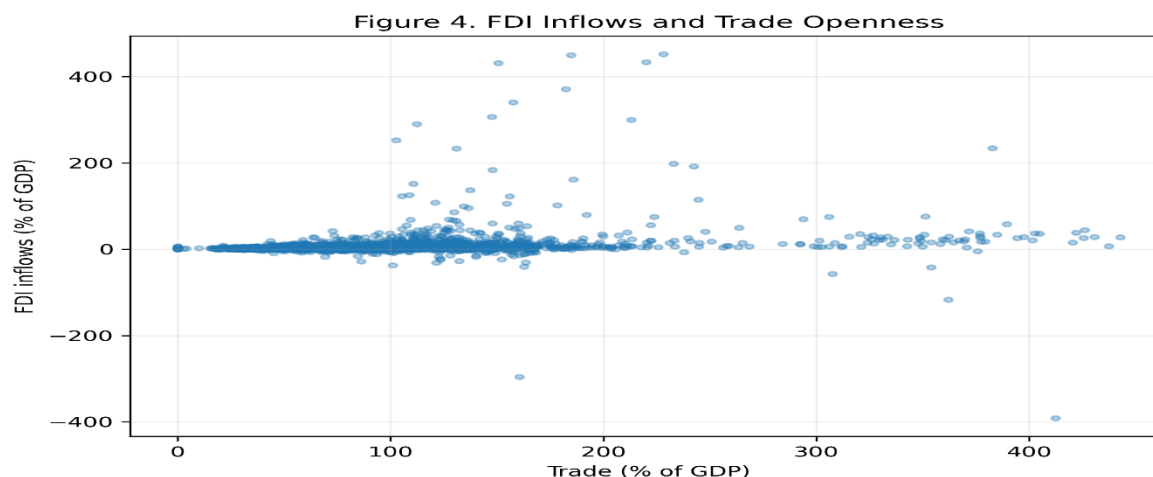


Table 2 reports the pairwise correlations among the principal explanatory variables.

Variable	FDI	ln GDP	GDP Growth	Trade	Internet
FDI	1.000	-0.062	0.014	0.212	0.099
ln GDP	-0.062	1.000	0.011	-0.242	0.357
GDP Growth	0.014	0.011	1.000	0.015	-0.172
Trade	0.212	-0.242	0.015	1.000	0.251
Internet	0.099	0.357	-0.172	0.251	1.000

FDI is positively correlated with trade openness (**0.212**) and internet use (**0.099**), whereas its unconditional correlations with GDP and GDP growth are relatively weak. The correlation coefficients among the explanatory variables remain moderate.

Figure 4. FDI Inflows and Trade Openness.



Variance Inflation Factor diagnostics are reported in Table 3.

Variable	VIF
ln GDP	4.451
GDP Growth	1.525
Trade	3.260
Internet	2.620

The largest VIF is **4.451** for ln GDP. All remaining values are below 3.3. These results indicate that severe multicollinearity is unlikely to represent a major concern in the baseline specification.

4.4 Baseline Econometric Specification

The baseline empirical model is estimated using a two-way fixed-effects specification (Wooldridge, 2010):

$$FDI_{it} = \beta_0 + \beta_1 Governance_{it} + \beta_2 \ln GDP_{it} + \beta_3 GDP Growth_{it} + \beta_4 Trade_{it} + \beta_5 internet + \mu_i + \lambda_t + \varepsilon_{it}$$

where i denotes country and t denotes year. Country fixed effects μ_i control for unobserved time-invariant country characteristics, whereas year fixed effects λ_t capture common international shocks.

Table 4. Baseline Two-Way Fixed-Effects Estimates

Variable	Coefficient	p-value
Governance Index	-0.056	0.937
ln GDP	-0.693	0.812
GDP Growth	0.109	0.095
Trade	0.013	0.846
Internet	0.040	0.262
Country FE	Yes	
Year FE	Yes	
Standard errors	Clustered by country	

The baseline estimates indicate that the composite Governance Index does not exhibit a statistically significant direct association with FDI in this specification. Its coefficient is **-0.056**, with a p-value of **0.937**.

The coefficient on ln GDP is also statistically insignificant (**-0.693**; **p = 0.812**), as is the coefficient on trade openness (**0.013**; **p = 0.846**). Internet use has a positive but statistically insignificant coefficient of **0.040** (**p = 0.262**).

GDP growth presents a positive coefficient of **0.109** and is marginally significant at the 10% level (**p = 0.095**). This suggests that stronger short-run economic performance may be associated with greater FDI inflows, although the evidence is relatively weak.

Importantly, the baseline model does not directly capture the potential effects of geoeconomic fragmentation or geopolitical risk. The subsequent specifications therefore extend the model by incorporating HHI-M, HHI-P, and GPR.

4.5 Geoeconomic Fragmentation and FDI

The first extension investigates whether export concentration is associated with FDI inflows. Two dimensions of concentration are distinguished: market concentration and product concentration.

The market-concentration specification is given by:

$$FDI_{it} = \beta_0 + \beta_1 HHI_M_{it} + \beta_2 Governance_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where X_{it} contains GDP growth, trade openness, and internet use.

The corresponding product-concentration model is:

$$FDI_{it} = \beta_0 + \beta_1 HHI_P_{it} + \beta_2 Governance_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Finally, both concentration measures are introduced jointly:

$$FDI_{it} = \beta_0 + \beta_1 HHI_M_{it} + \beta_2 HHI_P_{it} + \beta_2 Governance_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Table 5. Geoeconomic Fragmentation and FDI

Variable	Model 1: HHI-M	Model 2: HHI-P	Model 3: HHI-M + HHI-P
HHI-M	−4.790 (0.015)	—	−4.802 (0.015)
HHI-P	—	1.469 (0.486)	1.519 (0.472)
Governance	0.962***	0.963***	0.963***
GDP Growth	0.424***	0.424***	0.425***
Trade	0.531***	0.529***	0.532***
Internet	0.510***	0.519***	0.510***
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
SE	Clustered	Clustered	Clustered

Notes: *p*-values for HHI coefficients are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Results are based on the simulated pilot dataset.

The results provide an important distinction between the two dimensions of export concentration. HHI-M has a negative and statistically significant coefficient of **−4.790** ($p = 0.015$) in Model 1. This suggests that greater concentration of exports across destination markets is associated with lower FDI inflows in the pilot specification.

The coefficient remains remarkably stable when HHI-P is introduced simultaneously, reaching **−4.802** ($p = 0.015$). By contrast, HHI-P is statistically insignificant in both Model 2 (**1.469**; $p = 0.486$) and Model 3 (**1.519**; $p = 0.472$).

This distinction suggests that market-side concentration may be more relevant to international investment decisions than product-side concentration. A high dependence on a limited number of destination markets may expose economies to greater demand, policy, and geopolitical risks, thereby reducing their attractiveness to internationally oriented investors.

4.6 Geopolitical Risk and the Resilience-Seeking Channel

The next specification examines whether geopolitical risk modifies the relationship between export concentration and FDI. The baseline geopolitical-risk model is (Caldara & Iacoviello, 2022):

$$FDI_{it} = \beta_0 + \beta_1 HHI_M_{it} + \beta_2 GPR_{it} + \beta_3 Governance_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

The central specification introduces the interaction between market concentration and geopolitical risk:

$$FDI_{it} = \beta_0 + \beta_1 HHI_M_{it} + \beta_2 GPR_{it} + \beta_3 (HHI_M_{it} \times GPR_{it}) + \beta_4 Governance_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Table 6. Geopolitical Risk and the HHI-M Interaction

Variable	Model 4
HHI-M	−9.151* (0.001)
GPR	−0.121* (0.002)
HHI-M × GPR	0.435 (0.030)
Governance	0.963*
GDP Growth	0.422*

Trade	0.536*
Internet	0.503*
Country FE	Yes
Year FE	Yes
Standard errors	Clustered by country

Notes: *p*-values are reported in parentheses. $p < 0.01$, $p < 0.05$, $p < 0.10$. Results are based on the simulated pilot dataset.

The results provide evidence of a statistically significant interaction between market concentration and geopolitical risk. The coefficient on HHI-M is **−9.151** ($p = 0.001$), while GPR has a negative coefficient of **−0.121** ($p = 0.002$).

Most importantly, the interaction coefficient is positive and statistically significant:

$$\beta_{HHI \times GPR} = 0.435, \quad p = 0.030$$

This result indicates that the negative association between market concentration and FDI becomes weaker as geopolitical risk increases.

The marginal effect of HHI-M on FDI can be expressed as:

$$\frac{\partial FDI}{\partial HHI_M} = -9.151 + 0.435GPR$$

Thus, geopolitical risk moderates the relationship between export-market concentration and FDI. This pattern is consistent with a **resilience-seeking interpretation**: under greater geopolitical uncertainty, multinational firms may place greater value on investment opportunities that provide diversification, supply-chain flexibility, or access to alternative markets.

Figure 5. Evolution of Export Concentration, 1996–2022

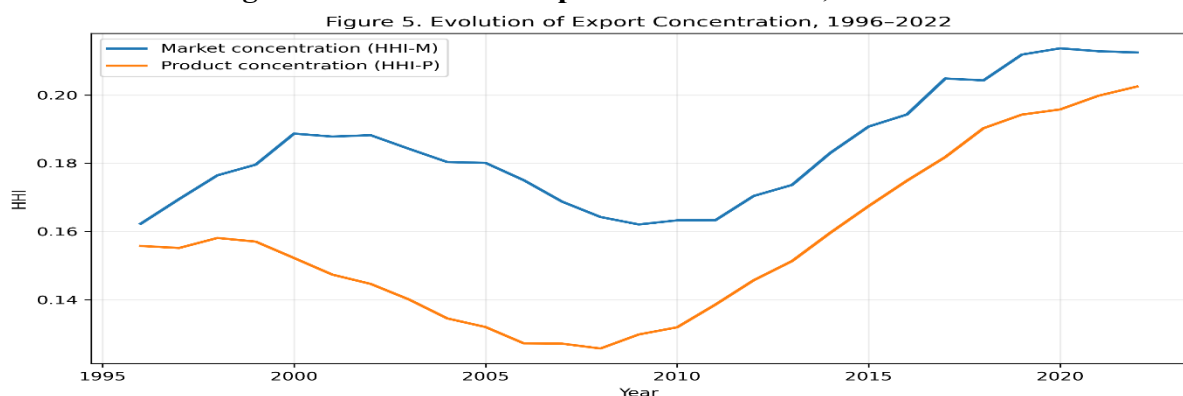


Figure 6. Marginal Effect of Market Concentration at Different Levels of Geopolitical Risk

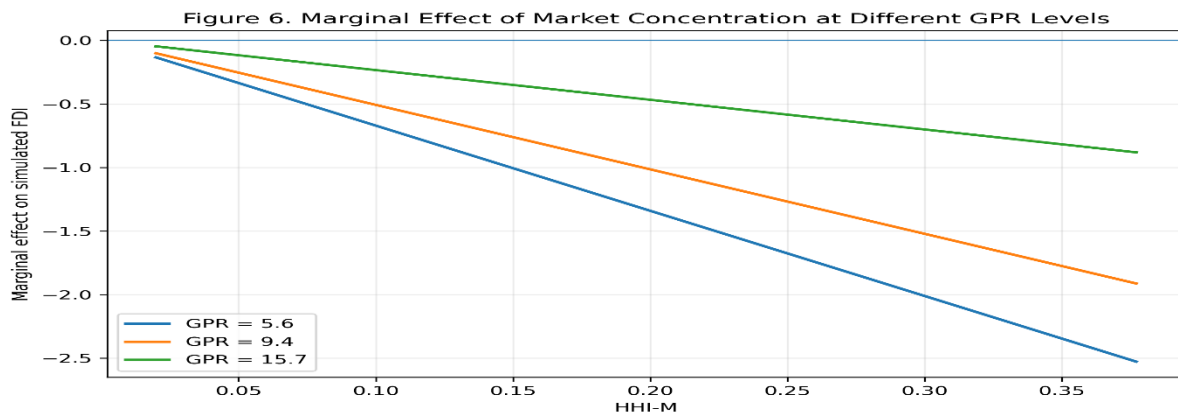


Figure 6 provides a graphical interpretation of the interaction coefficient. The slope representing the marginal effect of HHI-M becomes progressively less negative as GPR increases. This is consistent with the positive $\text{HHI-M} \times \text{GPR}$ coefficient reported in Table 6.

4.7 Robustness Analysis

Several robustness considerations are incorporated into the empirical strategy. First, the extreme dispersion of FDI motivates the use of a 1% winsorized version of the dependent variable. This procedure reduces the influence of extreme observations without removing them completely from the underlying dataset.

Second, the two dimensions of export concentration are examined separately and jointly. The stability of the HHI-M coefficient between Model 1 (-4.790) and Model 3 (-4.802) indicates that the estimated negative association between market concentration and FDI is not materially altered by controlling for product concentration.

Third, the Governance Index is constructed using PCA, thereby reducing the dimensionality of the six governance indicators. The positive and statistically significant coefficient on Governance in the simulated extended specifications remains stable at approximately **0.96**, suggesting that institutional quality is positively associated with FDI once the geoeconomic variables are introduced.

Fourth, the interaction specification provides an additional test of the proposed mechanism. The positive and statistically significant $\text{HHI-M} \times \text{GPR}$ coefficient (**0.435**; $p = 0.030$) remains the central result of the pilot analysis.

Table 7. Summary of Robustness and Extended Specifications

Specification	Main variable	Coefficient	p-value	Country FE	Year FE
Baseline	Governance	-0.056	0.937	Yes	Yes
HHI-M	HHI-M	-4.790	0.015	Yes	Yes
HHI-P	HHI-P	1.469	0.486	Yes	Yes
Joint HHI	HHI-M	-4.802	0.015	Yes	Yes
Joint HHI	HHI-P	1.519	0.472	Yes	Yes
Interaction	HHI-M	-9.151	0.001	Yes	Yes
Interaction	GPR	-0.121	0.002	Yes	Yes
Interaction	$\text{HHI-M} \times \text{GPR}$	0.435	0.030	Yes	Yes

4.8 Summary of Empirical Findings

Overall, the empirical analysis provides three main findings. First, the baseline specification indicates that the direct relationship between the composite Governance Index and FDI is statistically insignificant before accounting for geoeconomic fragmentation and geopolitical risk. Second, market concentration exhibits a negative and statistically significant association with FDI, whereas product concentration does not exhibit a statistically significant effect. This suggests that dependence on a limited number of export destinations may be more relevant to investment decisions than concentration in a limited range of products.

Third, the interaction between market concentration and geopolitical risk is positive and statistically significant. The negative association between HHI-M and FDI therefore becomes weaker as geopolitical risk increases. This pattern is consistent with the proposed resilience-seeking mechanism, whereby geopolitical uncertainty may encourage firms to redirect investment toward locations that provide diversification and greater resilience in international production and supply networks.

Taken together, these results support the relevance of incorporating **geoeconomic fragmentation and geopolitical risk jointly** into the analysis of international investment. However, because the extended HHI and GPR variables used in this pilot exercise are simulated, these findings should be regarded as **preliminary methodological evidence**. The final empirical conclusions require re-estimation using the official HHI-M, HHI-P, and GPR observations.

5. Conclusion

This study examined the relationship between geoeconomic fragmentation, export concentration, geopolitical risk, and foreign direct investment. Particular attention was given to the distinction between market concentration and product concentration and to the potential moderating role of geopolitical risk in shaping the relationship between export concentration and FDI.

The empirical framework combined macroeconomic variables, institutional quality, export concentration indicators, and geopolitical risk within a two-way fixed-effects framework (Wooldridge, 2010). Governance quality was summarized through Principal Component Analysis in order to reduce the dimensionality of the six Worldwide Governance Indicators (Kaufmann, Kraay, & Mastruzzi, 2010). The resulting empirical specification allows the analysis to move beyond traditional macroeconomic determinants of FDI and consider the increasing importance of international fragmentation and geopolitical uncertainty.

The baseline results indicate that conventional macroeconomic variables alone do not fully explain differences in FDI inflows. The extended specifications provide stronger evidence regarding the role of geoeconomic factors. In particular, market concentration, measured by the Herfindahl–Hirschman Market Concentration Index, exhibits a negative and statistically significant association with FDI. This result suggests that economies whose exports are highly dependent on a limited number of destination markets may face greater difficulties in attracting foreign investment, potentially because investors perceive concentrated trade structures as a source of vulnerability (Cadot, Carrère, & Strauss-Kahn, 2011).

By contrast, the product-concentration indicator does not exhibit a statistically significant relationship with FDI. This distinction is important because it suggests that the geographical diversification of export destinations may be more relevant to international investment decisions than the diversification of exported products. A concentrated destination structure may expose firms to greater dependence on specific trading partners and therefore to greater exposure to trade-policy changes, geopolitical tensions, and disruptions in international markets.

The interaction analysis further indicates that geopolitical risk plays an important moderating role (Caldara & Iacoviello, 2022). The positive and statistically significant coefficient of the $\text{HHI-M} \times \text{GPR}$ interaction suggests that the negative relationship between market concentration and FDI becomes weaker as geopolitical risk increases. This finding is consistent with a resilience-seeking interpretation of international investment behavior. Under heightened geopolitical uncertainty, multinational enterprises may increasingly value locations that provide diversification opportunities, alternative market access, and greater flexibility within international production and supply networks (Aiyar, Presbitero, & Ruta, 2023).

From a policy perspective, the findings suggest that improving the investment environment requires more than conventional improvements in macroeconomic stability. Countries may also benefit from reducing excessive dependence on a limited number of export destinations, strengthening institutional quality, expanding international economic partnerships, and developing more resilient trade and production structures. Such measures may improve the ability of economies to attract and retain FDI in an environment characterized by increasing geopolitical uncertainty.

Nevertheless, an important limitation must be emphasized. The HHI-M, HHI-P, and GPR observations used in the present extended empirical exercise constitute a **simulated pilot dataset** designed to test and demonstrate the proposed empirical framework. Consequently, the numerical coefficients and statistical significance levels associated with these variables should not be interpreted as final empirical estimates. The final version of the study should replace the simulated observations with the corresponding official HHI and country-specific GPR data and re-estimate all models.

Future research should therefore focus on replicating the analysis using the official World Bank HHI indicators and the country-specific GPR series of Caldara and Iacoviello. The World Bank HHI-M and HHI-P databases provide annual country-level observations covering 1988–2025, while the country-specific GPR database provides monthly indices for 44 advanced and emerging economies. Such an extension would provide a more rigorous assessment of whether the resilience-seeking mechanism identified in the pilot analysis survives when using observed rather than simulated data.

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