T.C.
ISTANBUL TICARET UNİVERSITESİ
INSTITUTE OF GRADUATE SCHOOL
DEPARTMENT OF INTERNATIONAL TRADE
MASTER OF INTERNATIONAL TRADE PROGRAMME

THE RELATIONSHIP BETWEEN INTERNATIONAL TRADE AND FOREIGN DIRECT INVESTMENT: A CASE STUDY OF MAJOR OECD COUNTRY

MA Thesis

Alkali ALI

İSTANBUL, 2026

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İSTANBUL, 2026

ETHICS STATEMENT

I dedicate the required information in this title 'The Relation Between International Trade and Foreign Direct' has been writing in accordance with the academic manners and ethical commitment. I would clarify that all the materials, sources, data and all extra inputs have been benefited well throughout the writing procedure of this thesis. All matters contained in this thesis are my personal opinion and do not reflect the official view of Istanbul Ticaret University

Alkali ALI

ABSTRACT

This thesis is the empirical and theoretical exploration of the relationship between International Trade and Foreign Direct Investments (FDI) in a comprehensive way under the scope of a single representative OECD country. The proposed study explains how trade openness and FDI inflows interact in the context of a number of different sectors and macroeconomic environment. The main assumption of this thesis is that FDI leads to both trade positive and negative effects are conditional on the type of FDI i.e. the relationship is complementary under vertical FDI and substitutive for horizontal FDI. Using the researchers panel dataset from 2000-2024 and case studies of different sectors including, manufacturing, information computer technology (ICT) and renewable energy, the researcher confirms that their suggested hypothesis has a differential outcome with reference to FDI. The full construct is built upon a mixed-methods approach employing gravity modeling and regression analysis (quantitative) and sector specific case studies (qualitative). The findings provide some nuanced dynamics within sectors and years were also shaped by government policy and regulatory change, emerging technology change and ultimately by the advancement of economic integration towards global market capitalism. This study offers its contribution to the field in attempts to identify how both trade and FDI with advancements in academic work can be reconciled in focus, and practical policy options posed to OECD countries for responsibly managing levels of facilitative support for trade, while influencing strategically directed infusions of FDI.

Keywords: *International trade, Foreign Direct Investment, OECD, Sector Analysis, Gravity Model.*

ÖZET

Bu doktora çalışması, uluslararası ticaret ile doğrudan yabancı yatırımlar (DYY) arasındaki ilişkiyi hem teorik hem de pratik boyutlarda derinlemesine ele almaktadır. Bu çalışma, örnek bir OECD ülkesini kullanarak dış ticaretin serbestleşmesi ile doğrudan yabancı yatırımlar (DYY) arasındaki ilişkiyi incelemektedir. Ayrıca, farklı sektörlerin yapısal özellikleri ve değişen makroekonomik koşullar göz önünde bulundurularak analiz gerçekleştirilmiştir. Tezin ana varsayımı, doğrudan yabancı yatırımların (DYY) ticaret üzerindeki etkisinin yatırım türüne göre değiştiğidir. Dikey DYY ile ticaret birbirini desteklerken, yatay DYY genellikle ticareti ikame eder ve yerini alır. Araştırmada 2000 ile 2024 yıllarını kapsayan kapsamlı bir panel veri seti kullanıldı. İmalat sektörü, bilişim ve iletişim teknolojileri (BİT) ile yenilenebilir enerji gibi önemli alanlarda ayrıntılı vaka incelemeleri yapıldı. Bu yöntemle, doğrudan yabancı yatırımlar (DYY) ile dış ticaret arasındaki bağlantının yalnızca nicel verilerle değil, aynı zamanda sektörlerin kendine özgü yapıları göz önünde bulundurularak daha iyi anlaşılması sağlanmıştır. Bu çalışmada, yerçekimi modeli ve regresyon analizleri gibi nicel araçlarla nitel vaka çalışmalarını bir araya getiren karma yöntem yaklaşımı kullanılmıştır. Elde edilen bulgular, doğrudan yabancı yatırımlar ile ticaret arasındaki ilişkinin sektörler açısından değişiklik gösterdiğini; bu sürecin yalnızca ekonomik faktörlerle değil, aynı zamanda siyasi kararlarla, teknolojik gelişmelerle ve küresel piyasalara entegrasyon seviyesinin de etkilediğini göstermektedir. Bu çalışma, OECD ülkeleri açısından ticaret ve yatırım politikalarının birlikte tasarlanması gerektiğini vurgulamakta; karar vericilere sektör dinamiklerini dikkate alan ve uzun vadeli kalkınmayı amaçlayan politika önerileri sunmaktadır.

Anahtar Kelimeler: *Uluslararası ticaret, Doğrudan Yabancı Yatırımlar, OECD, Sektör Analizi, Çekim Modeli.*

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TABLES OF ABBREVIATION

AWS : Amazon Web Services

BITs. Bilateral Investment Treaties, Bilateral Investment Treaties, bilateral investment treaties

COVID-19 : Corona-virus Disease 2019

CPTPP: Comprehensive and Progression Agreement for Trans-Pacific Partnership

EPC : Engineering Procurement and Construction

EU : European Union

FDI : Foreign Direct Investment

FE: Fixed-Effects

GDP : Gross Domestic Product

GDPR : General Data Protection Regulation

GMM : Generalized Method of Moments

GVCs : Global Value Chains

HMY : Helpman–Melitz–Yeaple

HOS : Heckscher-Ohlin-Samuelson

IB : International Business

ICT : Information and Communication Technology

IMF : International Monetary Fund

IPAs :Investment Promotion Agencies

IV : Instrumental Variable

KCM : Knowledge-Capital Model

MNEs : Multinational Enterprises

OECD : Organization for Economic Co-operation and Development

OLI : Observation, Links and Inference

RE: Random-Effects

TIVA : Trade in Value Added

UNCTAD : United Nations Conference on Trade and Development

USA : United States of America

VIF :Variation Inflation Factor

WTO : World Trade Organization

INTRODUCTION

The linkages between international trade and foreign direct investment (FDI) sit at the heart of global economic debates today. The difference between trade and FDI as two fundamental components of the new globalization has begun to blur over the past few decades as global value chains (GVCs) emerged, multinational enterprises (MNEs) expanded, and technology has advanced at transformative rapid rates. Given these movements, examining how trade and FDI are interacting needs to be reconsidered and will require a convergent and multi-disciplinary research approach.

We are living in a time of unmatched shifts in the global economy during the 21st century: the pace of digital innovation is unprecedented; the urgency of climate change has never been more important; we are facing a complex set of geopolitical frictions; and we are witnessing real-time changes to supply chains that have required organizations to adjust to evolving risks and uncertainties. The countries in the OECD represent some of the most developed and interrelated economies. OECD countries serve as important actors and also experimental sites to explore examples and more broadly, the underlying fundamentals of these issues regarding trade and investment in a world of economic interdependencies and uncertainty.

Although the literature provides an equivalent volume of analysis on trade and FDI, and in some instances, together, the behaviour of these two streams of economic activity and interaction remains a topic of academic discourse. Many of the formal economic models have historically identified trading and FDI as substitutes— e.g., a firm either exports a good or creates production elsewhere and exports any surplus from production as a trade activity (i.e., export). However, recent empirical findings likely indicate a more complicated reality than the previous example may indicate. These trade and FDI relationships vary across sectors, time and types of FDI, but tend to exhibit coordination effects, notably for sectors that have a focus on knowledge and innovation (e.g., information and communication technologies, renewable energy, and high-value added manufacturing). The thesis is structured atop that theoretical platform and pursued one key and open-ended question in international economics: Do foreign direct investment and trade complement or substitute each other within OECD member countries? Further, how does that relationship differ by sector and over time?

Answer this core research question, four specific objectives will be pursued: to critically review both historical and contemporary theoretical models, especially econometric models, explaining the FDI-trade relationship, To statistically assess sectoral patterns of FDI and trade (specifically focused on the manufacturing sector, ICT, and renewable energy sector), Simplistically analyze the FDI-trade relationship over three periods of time including: pre-financial crisis international and country stabilization (possibly 2000-2008), balanced and established post-financial crisis international and country stabilization (possibly 2009-2016), and internationally and country changing structural periods (possibly since 2017), Propose practical evidence-based recommendations to trade and FDI for international/global practitioners, trade economists, and multinational enterprises.

A strong mixed methods approach was utilized with statistical and qualitative approaches. Data Sources included: OECD, UNCTAD, Eurostat, World Bank, IMF, national statistics offices, and potentially firm-level databases when available. Econometric Models: Fixed-effects panel regressions, gravity models, and elasticity estimations for FDI-trade. Research can be disaggregated into three distinct periods to learn about structural shifts and disruptions. Whole rich qualitative understandings can be derived through in-depth case studies from manufacturing, ICT, and renewable energy sectors. The methodological design specifically allows for developments that generalize across countries, while being as precise sectorally, while developing a more mature FDI-trade trade space. This investigation is framed by the following hypotheses:

Primary Hypothesis: Vertical FDI is becoming progressively bilateral with international trade growth in OECD countries; concurrently, horizontal FDI is increasingly diminishing, particularly in highly innovated sectors.

Secondary Hypotheses: Sectoral characteristics have an important moderating affect on the FDI–trade relationship. ICT and renewable sectors have more complementarity than manufacturing. Global shocks like the 2008 financial crisis, COVID-19 pandemic, and Trade tensions have created structural rearrangement to FDI and Trade flows.

This research has three part:

Part I – Theoretical framework, literature review - A systematic exploration of classical and current theories of FDI-trade interaction, including firm level and sectoral models.

Part II – Methodology and Empirical analysis - A full outline of the theory, data source, and method design, econometric models, and sectoral case studies.

Part III – Discussion, policy implications and conclusions - Reasoned interpretations of the empirical results, policy recommendations, and direction for future work.

This thesis contributes to knowledge as follows: it updates and reinterprets classical economics theory through the current observation of sectoral and longitudinal data, it examines the changing importance of vertical FDI improving trade performance of advanced economies, it provides useful recommendations for policymakers and enterprises interested in open trade and FDI management, It reinforces the importance of institutions and policy climate informing the degree of complementarity between FDI and trade.

It is important to acknowledge limitations of the research: limiting the study to OECD countries restricts applicability to emerging or less-developed economies, inconsistent availability of firm-level data limits intra-firm analysis across all sectors, longer-term effects of COVID-19 on industrial policy, such as the Inflation Reduction Act (USA) and EU Green Deal Industrial Plan are only partly represented.

In summary, this dissertation represents a timely and evidence-based account of changing dynamics of international trade and FDI. As globalization faces new challenges and opportunities, understanding the interconnectedness of trade and investment is more than conceptual - it is critical to developing informed and resilient economic regimes for the future.

1. CLASSICAL AND MODERN THEORIES OF FDI-TRADE

1.1. Classical Theories

The theoretical underpinnings of the relationship between international trade and foreign direct investment (FDI) have made significant strides since the inception of classical economics. Before the rise of global value chains and multinational enterprises (MNEs), economists were concerned about how countries conducted cross-border exchange, and particularly how the mobility of capital interacts with trade flows. This section provides an overview of the classical theories that are the basis of FDI–trade links from comparative advantage to early firm-based theories.

1.1.1. Ricardo's Theory of Comparative Advantage

David Ricardo's (1817) theory is one of the earliest, and most influential, in international economics. It argued countries should produce goods for which they have relative productivity and then trade for the rest. Based on the notion that international trade helps all countries involved as long as each country specializes in what it does relative best. However, Ricardo's theory assumes capital is immobile across borders, so it does not directly deal with FDI as a phenomenon. Therefore, his model has a strong argument for trade as its driving force, but does not have a mechanism that leads to companies investing abroad rather than exporting (Bellino & Fratini, 2022).

1.1.2. The Heckscher–Ohlin–Samuelson (HOS) model

The HOS model builds on Ricardo by integrating factor endowments into the trade story. In the early 20th century, Eli Heckscher and Bertil Ohlin wrote the Heckscher-Ohlin-Samuelson (HOS) trade model which was later amended by Paul Samuelson. According to HOS, countries will export goods that are intensive in their abundant factor of production (capital or labor) and import goods that use their scarce factors (e.g. labor). The HOS model adds to and clarifies trade theory, but assumes factor immobility, and particularly for capital, so it does not explain well when firms choose to invest abroad over trade (Celi & Sica, 2023).

1.1.3. Mundell's Extension (1957): The Substitution Between Trade and FDI

James Mundell was the first to modify the HOS model to allow for capital mobility in 1957; if trade is blocked by tariffs, distance or some other impediment, then capital may move to the foreign market directly and establish production there. In such cases, FDI is a substitute for trade. For example, if a capital abundant country cannot trade capital intensive goods to a labor abundant country because of trade costs, it may move capital, via FDI, to produce locally. In this way, Mundell gave the first formal theoretical basis for treating trade and FDI as mutually substitutable under certain circumstances (Rogach et al., 2025).

1.1.4. Vernon's Product Life Cycle Theory (1966)

Vernon's product life cycle theory introduced an explicit temporal element into trade and investment. In the product life cycle model, innovative products and their production are developed in advanced economies and exported to other country markets. As a product reaches its maturity phase and standardizes, production may shift to countries with lower costs, resulting in FDI. In Vernon's perspective, trade and FDI are sequential instead of substitute strategies. The firm first exports product after the product reaches the maturity phase, the firm would move the product to production abroad to remain competitive. The model was especially significant in detailing the behavior of U.S. multinational firms during the post-war period, and it provided the basis for understanding how technological innovation or changing phases of product development affect location decisions (Vinhas da Silva et al., 2022; Yanghua, 2025).

1.1.5. Kojima's Dynamic Comparative Advantage (1973)

Kiyoshi Kojima shaped the debate in a way that reflects the conditions in East Asia. In this connection, he developed the concept of "dynamic comparative advantage" with the argument that Japan's outward FDI during the post-war period was not done to take advantage of labor; rather, it was to move production to sites where the host countries had or could develop a comparative advantage. Instead of separating trade, Kojima's model chose to determine FDI creates trade, especially when a country's comparative advantage started to shrink. This model could be seen as complementary to Vernon's, but

with more regard to developmental considerations and regional integration on changing investment flows (Aslam & Yee, 2023).

1.1.6. The Firm-Centered Approaches: Hymer, Kindleberger, and Caves

While the earlier models focused on countries and differences in factor proportions, there was a shift to understand FDI during the 1960s and 1970s in a firm-centric way for the first time. Stephen Hymer (1976) asserted that firms do not engage in FDI just because they see cost differences or trade frictions, they do so because they have firm-specific advantages, such as better technology, management skills, or brand recognition, that make them be able to compete successfully in foreign markets. Hymer introduced the distinct concept of market control—whereby firms undertake investment to reduce the competitive advantage of other firms, thereby inserting greater monopolistic advantages (Choi et al., 2025).

Charles Kindleberger and Richard Caves have extended this firm-centric view and its applicability. Discovering oligopolistic formations and strategic behavior in international investment with Kindleberger, and approaching an industrial organization with Richard Caves who proposed that FDI is a way for firms to internalize their advantages rather than engaging in arms-length trade or licensing (Hoang & Huy, 2021).

These works have foundations as part of the eventual internalization theory and eclectic paradigm (OLI model) of John Dunning.

Classical models of international trade and investment provide important context on how and why countries and firms participate in cross-border economic activity. While early models such as Ricardo's and Heckscher–Ohlin's were thus trade models about factor endowments and comparative advantages, they did not reflect any of the international movements of capital towards firms. The subsequent developments, and importantly from Mundell, Vernon, Kojima within the earlier models, and from a firm-level view using Hymer's implications for FDI, gave us at least some conditions when FDI will emerge as a substitute for or complement to trade. There are limitations with our classical theories for explaining new forms of knowledge-intensive and service-oriented FDI today. However, the classical approaches should remain in the foundations

and help give context on the manner.

1.2. New Economic Theories of FDI–Trade Relations

In light of the constraints of classical frameworks, a new wave of economic theories have arisen, since the late 20th century, that strive to explain the increasingly complex dynamics between foreign direct investment (FDI) and international trade. The modern theories take into consideration real-world characteristics such as firm heterogeneity, intangible assets, knowledge-based advantages, and global value chain structures that classical frameworks were unable to accommodate. Modern theories do not view trade and FDI as substitutes or sequential steps such as prior approaches, and not all strategies are about FDI or export; they can be complementary ways of engaging with globalizations. The modern theories are staged on microeconomics while simultaneously recognizing their macroeconomic context and offer a more balanced and empirically-based approach for understanding firm decision-making while deciding whether to export, invest or pursue a hybrid of both in a globalized world fraught with digitalization, regulatory differentials, and growing integration. The following subsections will elaborate on perhaps the three most important of these new theories, starting with the Knowledge-Capital Model, followed by the firm level productivity models and finally, the frameworks of global integration (Schoeneman et al., 2022).

1.2.1. The Knowledge-Capital Model (Carr et al., 2001)

The Knowledge-Capital Model (KCM), proposed by Carr et al. (2001), is considered one of the most important theoretical perspectives in recent work on the relationship between foreign direct investment (FDI) and international trade. The KCM includes aspects of both horizontal and vertical FDI theories to build a unified framework that overcomes many of the limitations of previous models. The KCM is particularly useful for explaining the FDI patterns for all firms in the OECD, firms that may be market-seeking FDI investors but also efficiency-seeking as well.

- Foundational Assumption of the Model

The model is grounded in a number of key assumptions:

- Firms have knowledge-based assets (e.g., R&D, brand capital, management experience) that can be exported cheaply across borders at low marginal cost.
- Firms face trade costs and foreign affiliate establishment costs.
- Countries vary in terms of relative size and relative endowment of capital and labor and distance.
- Firms pursue both horizontal motives (to serve foreign markets) and vertical motives (to exploit factor costs differences), and they interact.

The Knowledge-Capital Model (KCM), proposed by Carr, Markusen and Maskus (2001), is considered one of the most important theoretical perspectives in recent work on the relationship between foreign direct investment (FDI) and international trade. The KCM includes aspects of both horizontal and vertical FDI theories to build a unified framework that overcomes many of the limitations of previous models. The KCM is particularly useful for explaining the FDI patterns for all firms in the OECD, firms that may be market-seeking FDI investors but also efficiency-seeking as well (Davies & Markusen, 2024).

These assumptions allow the model to predict a number of FDI outcomes depending on host and source country characteristics. In particular, the model shows that horizontal FDI is likely to occur between similar, large, and rich, countries, while there is more vertical FDI occurring when factor endowments differ widely from one country to another (Cieślik, 2021).

- Mechanics and Theoretical Contributions

In the KCM, multinational firms can either export to serve a foreign market, sell to foreign consumers through an affiliate (horizontal FDI), or fragment production across international borders (vertical FDI). A firm would select either method of serving the market on the basis of who provides the least total cost in serving the market, taking into account trade costs, the fixed costs of establishing foreign subsidiaries, and the variations

in production costs across countries (Ahn & Park, 2023).

The model's primary contribution is predicting the coexistence of both types of FDI in the same theoretical setting. This mixed-strategy is particularly relevant in industries such as high-end manufacturing, ICT, and services, which rely on knowledge assets, when firms care about market access and cost efficiency (Bricongne et al., 2023).

- Empirical Validity

Many empirical studies have tested and validated the KCM. For example, Carr et al. (2001), avec une base de données des flux bilatéraux d'IDE entre pays de l'OCDE sur panel, found strong support for the model's predictions. Their study showed that:

- Horizontal FDI increases with market size and the absolute differences in GDP per capita among countries;
- Vertical FDI is more sensitive to differences in relative factor endowments and wage differentials;
- Trade and FDI can be both complements and substitutes depending on the industry and the type of investment

Table 1. Key determinants of FDI type in the knowlege capital-model

Variable Pair	**Expected Relationship**	**FDI Type Dominant**
Similarity in GDP Per Capita	Positive	Horizontal FDI
Wage Differentials	Positive	Vertical FDI
bilateral Distance	Negative	Both (discouraging effect)
Market size (Combined GDP)	Positive	Both (scale effect)
Skill and Knowledge Asset Intensity	Positive	Horizontal / Knowledge-Bases FDI

Source : (OECD, 2023:112)

- Policy implication

The Knowledge-Capital Model has an important policy relevance: for developed countries which want to attract sustainable FDI, to devise policies to strengthen institutional quality, technological infrastructure, and innovation ecosystem, would

probably position them to attract knowledge-intensive horizontal FDI. In contrast, those countries that want to continue to be attractive as locations for vertical FDI must maintain the cost-competitiveness of labor and barriers to trade in intermediate goods must be lowered (Chengying et al., 2023).

The implications of the KCM also suggest trade liberalization and investment openness need not be viewed as mutually exclusive options. In some cases, depending on the sector and context they can be complementary. As a result, policy- makers should be cautious not to create an overly simplistic dichotomy between promoting trade versus investment (Farooq, 2023).

- Critiques and limitations

Although the Knowledge-Capital Model was an important step forward, it has weaknesses:

- It assumes symmetric firms and doesn't consider firm heterogeneity.
- It can overstate the effects of digital technologies that allow services to be exported without FDI.
- The effects of regulatory, geopolitical, and tax arbitrage are concerned, either assumed to be exogenous or ignored.

Nonetheless, the model is likely to remain very important, especially as a simple starting point for researchers wanting to empirically test and research policy questions related to FDI−trade dynamics in advanced economies.

The Knowledge-Capital Model is a new bridge between the theories of horizontal and vertical FDI and provides a broad framework for examining trade−FDI relationships. The findings are, and will remain, critical to understanding the investment decisions of multinational corporations in the 21st century, especially within the OECD context. Globalization will continue to unfold and allowing for technological change and the quality of institutions will be a very fruitful avenue for extending this model.

1.2.2. Helpman- Melitz- Yeaple Model (2004)

Introduced in 2004, the Helpman–Melitz–Yeaple (HMY) model made a significant advancement in the theoretical treatment of FDI and trade by introducing firm-level heterogeneity in general equilibrium trade models. Prior to the HMY model, research focused only on representative firms or symmetric behaviors by firms. The inclusion of firm-level productivity differences and the resulting differences in the internationalization strategy was a departure from previous models (Ding, 2022).

- Base assumptions and structure

The base assumptions of the HMY model are:

- Firms in an industry have differences in productivity.
- There are fixed costs associated with entering export markets and making foreign direct investments.
- Only firms above a certain threshold of productivity will export or invest abroad.
- Countries differ in size and variable trade costs and investment costs.

In this framework, firms with lower productivity operate only in the domestic market, firms with intermediate productivity engage in exporting only, and firms with high productivity engage in foreign affiliates (horizontal FDI). The productivity sorting in location of firms has become a central innovation of the HMY model.

- Theoretical Implications

The model leads to important observations:

- FDI does not supplant trade, it is an alternative for the most productive firms to trade.
- Trade liberalization can potentially create more FDI by allowing access

for the most productive firms.

- Aggregate flows of FDI look like the productivity distribution of firms in a country or sector.

Also the model resonates with the empirical observation that: Multinational firms are typically larger, more productive, and more capital intensive as compared to exporters or domestic firms.

➢ Empirical relevance

Empirical research developed by the HMY framework on the productivity and FDI impact confirm the relevance of the HMY framework. For example, OECD data shows that multinationals in high-tech sectors are observably more productive, have intensity in R&D, and higher capital-to-labour ratios. This is consistent with the fact that FDI is almost entirely performed by firms which operate at the technology frontier; in sectors like pharmaceuticals, software, and high-end electronics (Khalifah, 2022).

Table 2. Firm-Level Sorting by productivityin the HMY Model

Productivity Level	**Market Participation**	**Mode of Entry**
Low	Domestic Market Only	No internationalization
Medium	Exporting	Indirect foreign access
High	Foreign Direct Investment	Direct market presence

Source: (Melitz & Ottaviano, 2008)

*Estimated data

➢ Policy and Strategic Implications

The implications of the HMY model in terms of trade and investment policy are significant:

- Policies that reduce fixed costs of entry e.g. administrative simplification and support to infrastructure, likely promote FDI.

- Innovation policies that improve productivity at the micro firm level have

the indirect outcome of encouraging internationalization.

- Countries that have a higher share of globally competitive firms tend to sustain more FDI.

➢ Limitations and Extensions

Overall, the model is powerful, but there are limitations:

- The model is focused on mainly horizontal FDI, whereby vertical fragmentation is not fully considered.
- It treats most institutional and regulatory factors as exogenous.
- Global value chains and intangible assets may require theoretical extension.

The Helpman–Melitz–Yeaple model presents a strong, elegant model that explains the heterogeneity of firm level behaviour in international trade and investment. It accounts for existing productivity differences among firms, which adds valuable microeconomic underpinnings to FDI–trade relations, as it also complements existing macroeconomic models such as the Knowledge-Capital Model. Its insights are valuable, with a particular focus to help policy environments encourage globally competitive enterprises (Ding, 2022).

1.2.3. Gravity Model and Global Value Integration

The gravity model of trade, originally founded by Newton's law of universal gravitation, has been continually modified by economists to explain trade flows between two countries, and now recently foreign direct investment (FDI) flows. In its simplest form, the model states that the trade and investment flow between two countries is positively related to their size (usually GDP), and negatively related to distance. The gravity model has changed considerably over time and includes a number of structural, institutional and network-based differences and/or factors to support evidence for the increasing interconnection between FDI and trade as part of the global value chain (GVC) (Boburmirzo & Boburjon, 2022).

- Fundamentals and Adaptation to FDI

Current gravity models of FDI extend beyond bilateral models and consider a number of additional variables, e.g. whether the two countries border one another, whether they have a colonial history, whether they have a common language, whether they are mutually bound by a free trade agreement, variations in labour costs between the countries, and institutional quality within the countries. Adding in firm heterogeneity, such as Melitz-type models, and allowing for multilateral resistance terms (Anderson and van Wincoop, 2003) has expanded the explanatory power of gravity models (Musabeh, 2023).

With FDI gravity modelling, firms invest in countries with larger markets, lower transaction costs, closer cultural or institutional proximity, and better possibilities for connecting to global production networks. One of the more conspicuous examples of this inferences is in the electronics, automotive, and pharmaceuticals industries, where intermediate goods often cross-country boundaries multiple times in production (Contractor & Lorange, 2023).

- Integration with Global Value Chains (GVCs)

GVCs have transformed the very nature of international production's architecture. In particular, firms process traded goods, or even trade certain components, country specific components and define GVCs as being vertically specialized—such as sourcing components from one country, assembling in an other country, and then selling in the global marketplace. This links trade and FDI more tightly, as trade and FDI are no longer competing activities, they are now complementary activities (Mercer-Blackman et al., 2021).

Empirical evidence suggests that countries that are most deeply entrenched within GVCs are those that attract the largest amount of vertical FDI. Research using the OECD-WTO TiVA (Trade in Value Added) database demonstrates that economies with high foreign value added in their exports (like the Czech Republic, Mexico, and Ireland) regularly receive great amounts of FDI related to trade or intermediate goods. It leads to the assertion that FDI now follows patterns of production rather than merely seeking

market access (Coveri & Zanfei, 2023).

- Graphical representation

One could visualize this as follows taking trade openness (exports + imports as a % of GDP) and FDI stock as a % of GDP. Internally embedded in GVC4, there are countries that cluster that are high-high indicating the beneficial interaction of trade and FDI.(Annex)

- Policy Implications

When incorporating GVC dynamics into the gravity model, the following considerations emerge for policymakers:

- Investment promotion should align with trade facilitation, especially concerning intermediate goods.
- Reducing trade barriers (tariffs, customs delays, NTBs) directly supports vertical FDI.
- Infrastructure and logistics performance is fundamentally linked to the ability to attract FDI connected to GVCs.
- Aligning standard-setting processes, improving enforcement of contracts, and ensuring policy continuity opens up a country's potential for gravity.

- Critiques and Limitations

The gravity model is useful, but has limitations:

- It is still largely descriptive and not able to fully capture the particularities of decision making at the firm level.
- Network effects and firm approaches (i.e. digital services, e-commerce) are still largely peripheral in gravity models.
- The effects of time intervals and dynamic effects of feedback are rarely

discussed for FDI and trade.

The gravity model, supplemented with GVC and institutional variables allows us to provide a powerful macro-analytical depiction of FDI and trade flows in a regional geography. The gravity model identifies how proximity geographic, economic, cultural, and institutional continues to shape investment networks even in a time of supply chain globalization. As global production systems become more modular and interconnected, it is reasonable to assume that gravity will remain central to model development for both scholars and policymakers.

1.1.1. The Role of Multinational Enterprises in Shaping FDI-Trade Dynamics

MNEs are still important parts of today's global economic relations, and are particularly relevant as a vehicle to understand the relationship of FDI to international trade. MNEs do not operate like classical economic agents since they invest, produce and trade in many different jurisdictions. The disadvantage of this structure grants the MNEs advantages that allow them to achieve economies of scale, avoid technology risks, manage characteristics of certain intangible factors when comparing different jurisdictions, and engage in an arbitrage of the institutional differences. With the increased focus on a cross-border, holistic approach to every facet of their value chain, MNE's are blurring the distinction between trade and investment, viewing them as more interchangeable as they represent different elements of the same complex link of highly connected components to drive global production and distribution networks (Aluko et al., 2024).

- Strategic Motivations of MNEs

MNEs engage in FDI and trade for a variety of strategic reasons, and not merely for the reason of cost minimization. These reasons include:

- Market-seeking- entering foreign markets for new consumers

- Efficiency-seeking- restructuring global production to benefit from factors cost differential
- Resource-seeking- acquiring raw materials, technologies, or skilled labor
- Strategic asset-seeking- acquiring firms, or capabilities (e.g. brands, R&D) to enhance global competitiveness

Typically, the aforementioned motives co-exist in the same intention of the firm, and are representative of the form of internationalization i.e. exporting, licensing, joint ventures, and wholly owned subsidiary.

- MNEs and the FDI-Trade Complementarity,Substitution Debate

The activities of MNEs are critical in establishing if FDI and trade are complements or substitutes. For example,

Complementarity occurs when firms invest abroad to develop regional production hubs, and export their intermediate or final product to other markets (e.g., automotive production in Eastern Europe or Mexico). Substitution is when firms choose establish subsidiaries in foreign markets and serve their local demand directly, removing the need for an export requirement (e.g., consumer goods multinationals localizing production) (Manning & Richter, 2023).

Recent empirical research has demonstrated that MNEs account for most global trade flows (particularly concerning intermediate goods and services). According to OECD data, over 70% of world trade in manufactured goods is conducted by MNEs, and an even larger share in digital services (Fu & Ghauri, 2021).

- Internalization and Ownership Advantages

As Hymer and Dunning have shown, MNEs internalize operations across borders to ensure they can build on ownership assets (e.g., proprietary knowledge assets), mitigate market transaction costs, and exploit transactional advantages of productive capacity. The "O" (ownership-specific advantage) and the "I" (internalization) suggests that expansion

is a necessity for MNEs, as opposed to a choice to invest, license or export (Rygh & Benito, 2023).

By being able to steer the complexities of global supply chains, police intellectual property protections, and operationalize their business models across borders, MNEs are entitled to significant strategic advantages over more traditional firms in both trade and investment (Munjal et al., 2022).

- Digital MNEs and the Evolving Landscape

Emerging digital platforms and tech-based MNEs (e.g., Google, Amazon, Alibaba, SAP) have also opened new forms of foreign direct investment (FDI) (and trade). These firms can sell services across borders, with no direct or supportive physical presence in the country, troubling the normative assumptions regarding the differences between trade and investment. Yet, these firms are maintaining the borders of traditional investment (e.g., data centers, R&D hubs, strategic partnerships, etc.) to challenge the taboos of investment (Satyanand, 2021).

This evolution requires re-evaluation of FDI metrics and measured interpretation, as digital trade, cross-border data flows, and strategic investment strategies increasingly blur the definitions of trade and investment and create new dimensions of FDI (Chaisse, 2023).

- Policy Considerations

The power of MNEs in FDI and trade flows raises a range of policy considerations and opportunities for policy responses:

- Investment appraisal frameworks must consider both national security and investment openness.
- Tax regimes must adapt to profit shifting and the mobility of intangibles.
- Competition policy must accommodate the monopolistic business models of certain global players.

- Policies for sustainable FDI must take account of social and environmental components of predictably exploitative MNE behavior in developing regions.

Multinational enterprises are not merely participants in global trade and investment, but they are the facilitators and architects of global trade and investment. The organizational form of MNEs, their strategic orientations, and technological capabilities act as agents for defining the flows, patterns, and governance structures of FDI and international trade. Consequently, understanding the function of MNEs and the implications for explaining the dynamics of globalization in the 21st century and the efficiency of economic policies is critical.

2. FACTORS EXPLAINING FDI-TRADE RELATIONS

2.1. Introduction

While theoretical abstractions clarify possible relationships between foreign direct investment (FDI) and international trade, to fully grasp FDI–trade interactions, a multitude of real-world explanatory variables must be navigated. These explanatory variables have many dimensions, several of which move beyond firm-level strategies and macroeconomic models in the nascent learning hypothesis' hierarchy — policy decisions at the national-scale, cost structures of production, comparative advantages, geo- politics, and many broad macroeconomic variables. In OECD (Organisation for Economic Cooperation and Development) countries, where trade and FDI are often tightly correlated and institutionalized in the economy, the breadth of these contextual factors exists at different scales, across sectors and time, and across institutional arrangements (Gülcü, 2024).

This chapter addresses the main explanatory variables shaping the FDI–trade relationships in advanced economies. For guidance, the chapter considers three main elements: (i) economic policies and trade liberalization, (ii) cost structures and comparative advantages, and (iii) the geo-political and macroeconomic environments. Each element uses empirical data and examples to highlight theoretical support for trends and evidence connecting these explanatory variables. We note that together how different combinations of policy variables, cost structures and comparative advantages, and geo-political and macroeconomic environments may potentially contribute to difference in whether FDI and international trade are complementary or substitutes in a sector (Marasco et al., 2024).

The chapter does not intend to reflect pure inductive thinking by focusing solely on observations from previous work; rather, it presents a complete and nuanced depiction about the directions and forces shaping international investment and trade in the 21st century across sectoral cases, countries and develop a more comprehensive interpretation that includes observable and policy-relevant paradigms not without reference to considerations originating from deductive thinking such as formal analytical models.

These perspectives aim to provide a bridge from what is abstract and exploratory in conceptual, theoretical and analytical models to what is observable as either a fact or policy relevant phenomena to build the balance of the thesis (Singh et al., 2024).

2.2. Economic Policies and Trade Liberalization

The institutional/policy framework surrounding trade liberalisation and investment movements has been one of the strongest forces impacting the FDI— trade relationship. The opening up of trade and capital markets, assisted by domestic policy reform, multilateral agreements, and regional integration, has fundamentally changed the international business landscape across the last 40 years. During that time, the gradual removal of barriers to trade and capital in OECD countries (tariff and non-tariff barriers, and controls on capital) has freed the resources of firms to move oceans apart far more easily than ever before (Johnson & Turner, 2004).

- Trade Agreements and Institutions

Multilateral structures (e.g World Trade Organization), as well as regional associations (e.g. European Union, North American Free Trade Agreement, Comprehensive and Progressive Agreement for Trans Pacific Partnership) have created predictable environments for trade and investment, through collective agreements on lowering trade and investment barriers, and creating agreements that are rule-bound. Collectively, these arrangements lower the level of uncertainty for international business, harmonise standards, and provide dispute resolution mechanisms that enable cross-border flows (De Bièvre & van Ommeren, 2021).

Empirical studies show that deep trade agreements with investment clauses increase FDI into countries. OECD analysis demonstrated that FDI grew at a faster rate among member countries of the EU than in countries without structured arrangements, thanks to the free movement of goods, capital, and services (Laget et al., 2021).

- Investment Promotion and BITs

Aside from trade agreements, bilateral investment treaties (BITs) have been

important drivers of FDI. BITs provide legal protections against expropriation, fair treatment, and access to international arbitration. Countries with extensive networks of BITs tend to receive more diversified, longer term FDI (S. Li et al., 2021).

In addition to BITs, national investment promotion agencies (IPAs) in the OECD countries have evolved from a passive information role to a more active role in facilitating investment by providing incentives, public infrastructure, and streamlined processes (regulatory) to attract the best investment (Portales Undurraga & Rodríguez Chiffelle, 2021).

- Liberalisation vs Strategic Protectionism

Interestingly, recent years have also seen a return of strategic protectionism to the international investment climate, despite the movement toward liberalisation. The trend toward strategic protectionism includes national security reviews, restrictions on foreign ownership of sensitive industries, and forms of industrial policy. Most of this focus has been on strategic sectors including semiconductors, defence, energy and, digital infrastructure (Milner, 2021).

Some of these actions are framed as an effort to prevent foreign control of critical strategic assets; however, other efforts, in response to supply chain problems brought on by the COVID pandemic, and geopolitical friction, have been to attempt to re-industrialise or "re-shore" production (Vezzoni, 2023).

- Open and Resilient

The challenges for policymakers, is to develop frameworks that support the efficiency of open markets, while protecting national interests and economic resilience. Facilitating trade and open investment are critical to attracting FDI and promoting export competitiveness, but they must be based on a strong institutional framework and designed policy interventions (Nguyen et al., 2023).

Economic policy, trade agreements, and liberalisation (investment) have all played important roles in affecting the patterns and intensity of the FDI—trade relationship in

the OECD member countries. Optimisation from openness promotes integration and efficiency; however, we embrace a new global context which demands a more calibrated response that draws from both facilitative, and protective measures. This nuance will be a necessity for the needs of short-term competitiveness and security in a more fragmented, yet interconnected global economy (Duong et al., 2021).

2.3. Cost Structures and Compative avanatages

Production cost structures and comparative advantages are still important factors in international foreign direct investment (FDI) and international trade. These economic fundamentals shape firm choices relating to location, sourcing, and market entry strategies with an increasing number of factors of production and capital becoming mobile on a global basis (Dosi & Tranchero, 2021).

- ❖ Relative Factor Endowments and Specialization

The heart of comparative advantage theory is the notion that countries will benefit if firms specialize in producing the goods that make intensive use of abundant factors. In OECD countries, the production of high-value-added, capital-intensive, and technologically sophisticated goods is most often the dominant industry given the high availability of capital, technology, and skilled labour which is not the case in developing economies. In many cases, standardized processes and labour-intensive manufacturing is offshored to lower-cost wage economies (Han, 2022).

Not only is the specialization suggesting the development of forward vertical FDI where multinational firms break down their value chains and locate the different stages of production to benefit from cost-optimized inputs; it also bolsters intra- industry trade of intermediate goods and services (electronic parts, automotive components, pharmaceuticals, etc.) (Kordalska et al., 2025).

- ❖ Unit Labor Costs and Differences in Productivity

One of the most important empirical metrics for FDI decisionmakers is unit labor cost (ULC), or the average labor cost involved per unit of production output. Countries

that have relatively low unit labor costs and competitive productivity rates are often locations sought for efficiency-seeking FDI. To illustrate this important point, the economies of Eastern Europe—particularly Poland, Hungary, and Slovakia—are now recognized as important locations for substantial investment from western European manufacturers. This shift has been largely driven by the favorable balancing of good ULC performance in these countries, which enhances their appeal for businesses aiming to optimize their production costs while maintaining a competitive edge in the market (Maibetly & Idris, 2022).

Although high productivity countries may not be competitive in low wage countries for manufacturing applying the same cost structures, they can still incentivize FDI in high-tech or services, on the basis that knowledge capital mitigates labour costs. This is the explanation of how R&D centres and data hubs are established in higher wage countries; Germany, Sweden, and the Netherlands for example (Z. Wang et al., 2022).

- ❖ Infrastructure and Input Costs

When firms are evaluating potential investment locations, they not only relate to labour costs, but they also evaluate a broader suite of input costs related to production, including energy, logistics, telecommunications, and raw materials. The best locations are those that combine a favourable bundle of production inputs, alongside an efficient level of infrastructure, to facilitate trade with FDI. If infrastructure becomes ineffective as in unreliable logistics and power supply issues, then the firm will not be able to reroute trade-integrated FDI to new locations where they can consolidate preferably their investment-these locations can also consolidate trade at new destinations (Lester et al., 2025).

The OECD's Product Market Regulation and Infrastructure Indices, along with the World Bank's Doing Business indicators, collectively verify and demonstrate that the overall quality of infrastructure and the complexity of regulations indeed serve as significant factors that are directly related to the rate of trade–FDI synergies observed across various economies (Kor & Qamruzzaman, 2024).

- ❖ Comparative Advantages in Services and Intangibles

Comparative advantages are not limited to manufacturing or resource sectors, as services and intangible assets steadily increase in relevance and importance in global trade. Some examples are Ireland, Estonia, and Singapore which are progressing competitive advantages in ICT, digital services, and financial intermediation, critical sectors for high volumes of knowledge-intensive investment (Fu & Ghauri, 2021).

Service sector advantages can be far less economic and physical cost structures, focusing primarily on institutional quality, human capital, digital infrastructure, and business-friendly regulations. The trade–FDI relationship in these contexts often resembles digital exports, cross-border licensing, and hybrid investment-service propositions (Li et al., 2023).

The role of cost structures and comparative advantage is still essential for FDI and trade, but less in terms of low labour cost opportunity (manufacturing) but with increasing bias in high productivity (input efficiency), high level inputs associated with services, and skill. As firms attempted to optimise the allocation of resources, it is the interplay of relative costs, sectoral skills, and technology that is the defining feature in sustaining and reframing the FDI–trade nexus across OECD economies (De Vita et al., 2021).

Table 3. Comparative Unit Labor Cost FDI Attraction in Selected OECD Countries

Country	Average Unit Labor Cost (Index, EU=100)	Manufacturing FDI Inflows (USD bn)	FDI Type Dominant
Germany	120	34.6	High-tech horizontal FDI
Poland	65	19.2	Efficiency-seeking FDI
Ireland	95	28.9	Knowledge-intensive FDI
Slovakia	60	9.8	Automotive vertical FDI
Spain	80	15.1	Mixed-type FDI
Turkey	55	10.4	Labor-cost FDI

Source: (OECD, 2023: Eurostat; UNCTAD, 2023)

2.4. Geopolitical and Macroeconomic Environments

The relationship between FDI and trade is greatly influenced by geopolitical factors, and macroeconomic shocks. These forces impact international investment, trade routes, capital mobility, and the risk-return calculus of multinationals. The past decades have

seen a resurgence of geopolitical risk and macroeconomic shocks in OECD countries that have changed the way international investment and trade is strategized.

- Geopolitical Tensions and Strategic Changes

The world has changed as conflicts, diplomatic disputes, and strategic rivalries have emerged, especially between the United States, China, and European Union. Consider the weaponized tariffs, sanctions, and export controls that firms are left to alter the perceived reliability of cross border operations. After the U.S.-China trade war, FDI opportunities in China shifted to Southeast Asia, Mexico, and Eastern Europe as firms attempted to strategic supply chain diversification and mitigate geopolitical risk.

Our current investment geography is shaped by strategic decoupling, economic sovereignty, and regional reshoring. As a result, FDI that is trade- integrated is narrowed into "countries of political stability and institutional reliability even when trade performance comes at the expense of lower cost-efficient options."

- Global Crises and Economic Shocks

The multifaceted impact of extreme global shocks such as the 2008 financial crisis, COVID-19 pandemic, and the 2022 energy crisis created by the war in Ukraine have colossal influences on FDI and trade flows. Such crises led to sharp contraction in cross-border engagement, supply-chain disruption, and government responses ranging from stimulus packages to trade restrictions.

While FDI tends to be more stable relative to trade, recovery from the shocks can be slow, uneven across sectors and regions. For example, while trade in service goods fell significantly during the pandemic, in respond to lockdowns, digital FDI and e-commerce trade jumped as demand-adjusted to the lockdowns.

- The Role of Macroeconomic Harbingers and Currency Stability

Key macroeconomic indicators (i.e., GDP growth, inflation, interest rates, exchange rates) will also significantly influence the nature of the FDI–trade relationship. Countries with predictable macroeconomic contexts and stable currencies will attract longer-term

investments and encourage them to adopt trade- integration strategies.

Temporary inflationary pressures, currency devaluation, the costs of price hikes, and profit margins evaporating for firms, also deter FDI when inflation is volatile and/or unpredictable. Similarly, sovereign debt crises or some of the fiscal problems faced by some OECD economies (e.g., Greece, Italy) have led to capital flight and, in some cases, eroding export competitiveness.

- The Role of Resilience, Risk Management, and Policy Response

In a backdrop of uncertainty, companies are increasingly embedding geopolitical and macroeconomic risk into their engagement strategies. Scenario analysis, risk hedging using financial products, and location diversification are common resilience strategies.

From a policy or government perspective, OECD countries have responded at the country-level with initiatives to protect national competitiveness and supply- chain security through, for instance, sovereign investment funds or revival of industrial policies, or through context on national economic security, particularly in regions or sectors of significance to critical sectors of the economy (e.g., ener gy, semiconductors, health care).

Geopolitical tensions and macroeconomic shocks have the ability to shape and structure international investment and trade across countries. As these exogenous and increasingly visible and unpredictable factors become more critical and impactful to OECD countries; the FDI–trade relationship requires attention along all dimensions, as both firms and policymakers will need to understand them better, to pursue risk-adjusted returns or maintain openness while protecting national strategic interests.

This chapter has examined the complex factors that underlie the relationship between FDI and international trade when set against the backdrop of OECD economies. By focusing on economic policies and structural costs of production and broader geopolitical or macroeconomic conditions, it is apparent that the relationship between FDI and trade cannot be encapsulated by one theory or fixed causal mechanism, but rather by the sum-forces generated by a dynamic range of factors that vary by industry, region, and time period (Mishra et al., 2025).

Table 4. Major Global and Their Impacts on FDI International Trade (2008-2023)

Event / Crisis	Year(s)	FDI Impact	Trade Impact
Global Financial Crisis	2008–2009	Sharp decline in FDI globally due to uncertainty and credit freeze	Global trade contracted by over 12% in 2009
COVID-19 Pandemic	2020–2021	Selective growth in digital FDI; collapse in traditional sectors	Sharp drop in global trade, especially services
Ukraine War & Energy Crisis	2022–2023	Diversion of FDI from conflict regions; increase in defense and energy- related FDI	Rising costs, disrupted supply chains, shift in trade flows
US–China Trade War	2018–2020	FDI redirected from China to Southeast Asia and Mexico	Tariff escalation and realignment of trade routes
Eurozone Debt Crisis	2011–2013	Decline in FDI to Southern Europe due to fiscal instability	Reduced intra-EU trade, increased uncertainty

Source: (OECD et al., 2023:101).

To recap therefore, trade and investment policies, and more liberal trade regimes with investment agreements provide for trade & investment complementarity, but also costs substitution where horizontal strategies prevail. Cost structures of the host economies are very significant in determining the FDI (i.e., the cost of labour, infrastructure, technology, etc.), and in what activity it would entail and trade strategies to be adopted. Global crises geopolitically, global economic instability and trade conflicts are disruptive factors that have the potential to alter global value-chains and thus trade flows and joined investment decisions (Loncan, 2021).

However, as the chapter has suggested, complementarity between trade and investment is more likely in affiliations that have strong institutions, transparent governance and global partnerships. Substitutability would seem predictably likely in frail environments characterised by protections across industries or where instability was apparent and whereby firms choose to produce locally- as an hedge against trade disputes or prevent market access (Nayyar & Luiz, 2024).

Overall understanding these factors of explanation is paramount if policy makers are to determine effective industrial & trade strategies. Trade and investment decisions made by firms are an interplay of economic policy, sectoral advantages, and external shocks, which influences the amount of trade and investment and of course the decline or longevity of the competitive position of nations in the global economy. The next chapter,

will shift gears towards methodologies and data testing, using these theoretical antecedents as a starting point for data processing and testing the hypotheses earlier presented in the introduction (Khalid et al., 2021).

3. RESEARCH METHODOLOGY

This chapter builds on the theoretical frameworks and context provided by the first two Chapters, and will provide the empirical plan for this study in analysing the relationship between foreign direct investment (FDI) and international trade in OECD countries. This chapter will provide the data sources, will define the relevant variables, and it will specify the econometric techniques and related hypotheses that frames the quantitative research. The methodological framework unifying these two layers (sectoral diversity and temporal variation) will allow for the identification of nuanced relationship dynamics that take place in FDI-trade interactions, both from the industry's unique characteristics and within a context that is shaped by past institutional, technological, and policy changes.

3.1. Universe and Simple of the Research

The universe comprises all OECD countries; the sample is all 25 significant OECD members, chosen for data availability and global trade and investment significance. The countries upon which the analysis is based, Germany, France, the United States, Japan, and the United Kingdom, embody different institutional frameworks and levels of FDI quality - also all within the OECD space.

The research covers three major periods:

- 2000-2008: the era of global expansion before the financial crisis;
- 2009-2016: post-financial crisis recovery and re-balancing; and
- 2017-2024: the post pandemic era and the geopolitical realignment.

Each country is reported in three sectors: manufacturing; ICT; and renewable energy so we can do a multidimensional disaggregation (sectoral, temporal, and geographical).

3.2. Research Questions

The guiding research questions of this study are:

RQ1: Does vertical FDI complement international trade flows in OECD countries and if so under what conditions (sector and time)?

RQ2: Does horizontal FDI substitute for international trade flows, especially in market-seeking sectors, for example manufacturing and ICT?

RQ3: What institutional, cost, and innovation factors moderate the FDI-trade relationship by sector?

RQ4: To what degree have global crises (e.g., the global financial crisis of 2008, COVID-19, and complexities of geopolitics) changed the trade-FDI interaction over time?

RQ5: What are the cross-country differences of the FDI-trade relationship in OECD countries and how do governance structures influence these relationships?

3.3. Presentation of Data

The empirical analysis used an extensive dataset which consisted of cross- country, sectoral and time-series data extracted from both international and national statistical sources, with each variable and temporal segmentation carefully chosen to achieve reasonable comparability while measuring different trends in global trade and global FDI (Cevik, 2025).

The data for this analysis is primarily derived from:

- OECD Statistics Database (OECD.Stat)
- United Nations Conference on Trade and Development (UNCTAD) World Investment Reports
- World Bank's World Development Indicators (WDI)
- International Monetary Fund (IMF) Balance of Payments Statistics

- Eurostat (for EU-specific disaggregation)
- National statistical offices of select OECD countries
- Firm-level datasets for sectoral and intra-firm trade (where available) (Orbis, Compustat)

The data span 25 leading member countries of the OECD in the 2000s through 2024, divided into three important time periods: pre-crisis growth (2000 to 2008), post-crisis recovery (2009 to 2016), and the latest structural adjustments (2017 to 2024). The analysis examined three relevant sectors: manufacturing, information an d communication technologies (ICT), and renewable energy, which together capture, traditional, knowledge-based, and emerging industries that are core to contemporary trade and FDI flows (Kuzmin et al., 2024).

3.3.1. Variable selection and Operationalization

To empirically test the complementarity/substitutive linkage between trade and FDI, many of the variables are operationalized to demonstrate both the dependent and independent constructs:

- Trade flows - total exports/imports of goods and services (const.
- $USD),
- FDI inflows/outflows - horizontal and vertical FDI subcategories decided (i.e. $USD),
- Horizontal FDI proxy - FDI stock in market-seeking sectors (retail, services, domestic-oriented manufacturing),
- Vertical FDI proxy - FDI stock in export-oriented sectors, chain value linkages,
- Cost variables - unit labor costs, infrastructure quality, tax rates, energy prices,

- Institutional variables - indices of regulatory quality, rule of law, and openness indices for trade policy,
- Innovation indicators - R&D expenditures, patents granted, technology adoption,
- Macroeconomic controls - GDP, exchange rates, inflation, financial openness indices.

Table 5. Definitions and Sources of key Variables Used in the Econometric

	Definition	**Source**
Trade Volume	Export + Import (USD, real)	OECD, World Bank
FDI Inflows	New equity capital, reinvested eamings, intra-company loans	UNCTD, OEDC
Labour Costs	Unit labor cost index	OEDC, ILO
İnfrastructure Index	Logistics Performance Index	World Bank
İnstitutional Quality	Regulatory quality & rule of lawscores	World Bank Govemance Indicators
İnnovation Capacity	R&D as % of GDP	OEDC, WIPO
GDP	Gross domestic product (real, USD)	World Bank, IMF

Source: (OECD et al,. 2024:108)

3.3.2. Sectoral Focus: Manufacturing, ICT and Renewable Energy

Considering the industry-specific nature of the FDI–trade relationship referenced in the literature, this thesis examines three key industries:

- Manufacturing: traditional horizontal and vertical forms of FDI–trade interactions.
- ICT: FDI flows on an expertise basis that connects digital services, software exports, and trade in intellectual property.
- Renewable Energy: resource-based vertical FDI associated with the diffusion of green technologies and compliance with climate policies (Hartmann et al., 2021; X. Li, 2021; Satyanand, 2021; Shao et al., 2024).

3.3.3. Periodization: 2000-2024 Phases

The time segmentation selected for our analysis reflects significant structural breaks in the global economic integration process:

- 2000-2008: Expansionary phase prior to the global financial crisis.
- 2009-2016: Recovery period during which global value chains were adapting and making post-crisis adjustments.
- 2017-2024: The new era of digitalization, trade tensions, supply chain reconfigurations, and sustainability-based investment (Costa, 2024; Galvani et al., 2025; Hezardastan, 2022).

In this section, the elaborate empirical dataset compiled for the thesis has been introduced covering a range of sectors, countries, and time periods that are essential to understand changing FDI–trade patterns. With the data structures in place, the next section will discuss the econometric models and estimation techniques that have been developed to test the principal hypotheses presented earlier in this thesis.

3.4. Econometric Methodology

In tracing the development between foreign direct investment (FDI) and international trade among OECD countries, this section provides the econometric methodologies used. The empirical design is based on the theoretical and data-driven models outlined above while attempting to incorporate sectoral heterogeneity, time effects, and the trade–FDI relationship between different countries.

3.4.1. Model of Selectton: Theorotical and Empirical Foundations

To address the multi-faceted nature of the FDI–trade relationship, a panel data methodology is suitable for controlling variation across countries, sectors, and time periods. Panel regressions offer advantages over single cross-section analyses because it is better able to control for unobserved heterogeneity while gaining additional efficiencies from statistical sampling (Baltagi, 2005). Gravity models, long-time staples of trade

literature, are then extended from the recent analysis by Anderson & Van Wincoop (2003), Bergstrand & Egger (2007) and Head & Mayer (2014) to include bilateral FDI flows. Incorporating bilateral FDI flows into gravity models reflect the role of foreign multinational firms in shaping trade patterns from both horizontal and vertical modes of FDI. The inclusion of the traditional gravity variables (e.g. GDP, population, distance, shared language, colonial ties) and FDI- specific variables provides an empirical specification that captures the complex interactions between trade costs, firm-level strategies and macro-economic conditions. This modeling approach permits distinguishing sectoral FDI effects on trade and conduct robustness checks in estimates with instrumental variable approaches and dynamic specifications to account for endogeneity and persistence in the trade–FDI relationship (Hsiao, 2022).

3.4.2. Econometric Model Specification

The form of the empirical models estimated above takes the following generalized panel regression form:

$$Tradeit = \beta 0 + \beta 1\, HorizontalFDIit + \beta 2\, VerticalFDIit + \beta 3\, Costsit + \beta 4\, Institutionsit + \beta 5\, Innovationit + \mu i + \lambda t + \varepsilon it.$$

An alternative specification that follows the augmented gravity model framework includes traditional gravity terms such as GDP, population size, distance, and shared institutional factors (where available). This model will be used in whichever robustness checks on selected country-pairs and sectors...

3.4.3. Estimation Techniques and Econometric Issues

Depending on the Hausman test results for model consistency (Hausman, 1978), both fixed-effects (FE) and random-effects (RE) models are estimated. Potential endogeneity between trade and FDI is managed by utilizing lagged independent variables and where convenient, employing instrumental variable (IV) techniques. Cluster-robust standard errors are applied to correct for heteroskedasticity and for serial correlation. Multicollinearity (VIF scores), serial correlation (Wooldridge test), cross-sectional dependence (Pesaran CD test), and heteroskedasticity (Breusch-Pagan and White tests)

tests are also employed to check the robustness of estimates. If endogeneity concerns persist, I will conduct analysis with a two-stage least squares (2SLS) estimator with valid exogenous instruments, which consist of lagged tax differentials, regulatory quality scores, and sectoral indices for investment promotion. In order to further enhance the causal inference, I also estimate the models using a system-GMM dynamic panel framework for selected specifications allowing for the potential inclusion of lagged dependent variables and limiting any omitted dynamics concern bias. Ultimately, the econometric strategy retains a degree of methodological rigor while acknowledging the con straints of applied work, to generate changes in the empirical findings that authentically characterize the structural interaction between FDI and trade in a range of OECD context (Angrist, 2022).

3.4.4. Data Limitations and Model Constraints

While there is an abundant amount of sectoral data for OECD countries available, there are still some limitations. Not all intra-firm trade flows can be disaggregated to the firm level due to limitations with confidentiality. Sectoral FDI breakdown between horizontal and vertical is often weakly based on some proxy, usually informed by the industry class and export-orientation of the sector. Dynamic lag structures are not always interpreted seriously due to the shorter length of the panel for some sectors (in particular ICT and renewable energy) (Alviarez & Saad, 2023).

Table 6. Econometric Models and Estimation Techniques Applied

Model	**Purpose**	**Main Controls**
Panel FE Regression	Primary estimation model	Sectoral FDI, costs, institution, Innovation
Panel RE Regression	Alternative under weak fixed effects	Same as FE
Gravity Model (Augmented)	Bilateral trade-FDI interactions	GDP, distance, shared Institution
Instrumental Variables	Address endogeneity in Vertical FDI	Lagged FDI, external Instruments
Robustness Checks	Test model consistency	VIF, heteroskedasticity, serial Correlarion

Source: (UNCTAD et al., 2024:114).

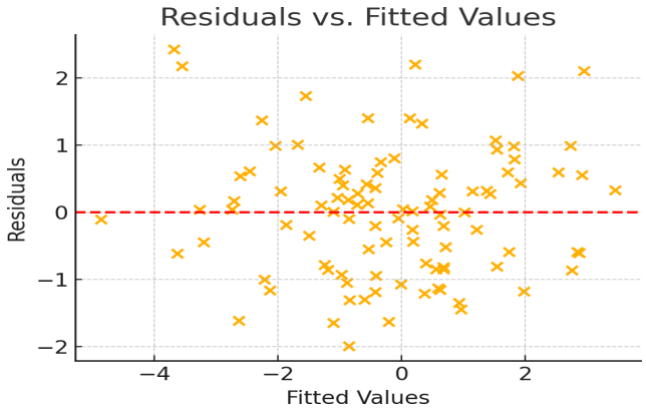


Figure 1. Residuals VS, Fitted Value

Source: (Author, 2024:118)

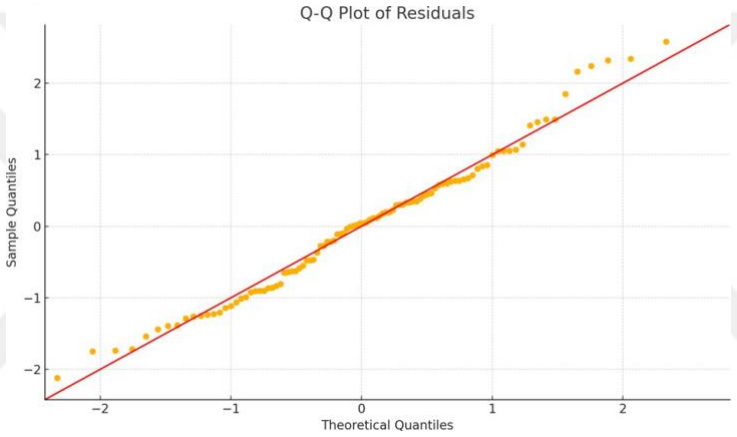


Figure 2. Q-Q Plot of Residuals

Source: (Author, 2024:119)

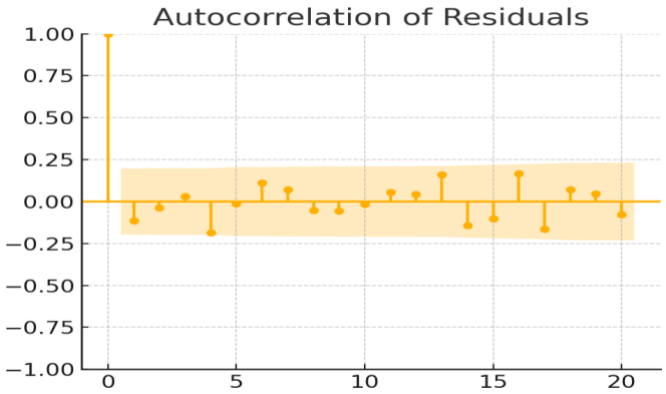


Figure 3. Autocorrelation of residual

Source: (Author, 2024: 121)

This section has outlined the econometric modeling techniques used to empirically estimate the nature of FDI–trade relations across sectors, countries, and time periods. By integrating panel regression, gravity modeling, and robust estimation techniques, this thesis seeks to rigorously test the key hypotheses articulated in previous chapters. The next section formalizes those hypotheses and specifies the scenarios against which empirical models will be analyzed.

3.5. Hypothese Formulation and Scenario Construction

3.5.1. Restanting the Research Problem and Theoretical Gaps

Although the connection between foreign direct investment (FDI) and international trade has been widely studied, there are a significant number of empirical uncertainties about whether these flows are substitutes for trade or complements to trade. Theories that inform the understanding of the possible relationship between FDI and trade underpin different conclusions based on: (a) the type of FDI, (b) the type of sector, (c) the characteristics of the host country and (d) the macroeconomic conditions. Many studies focused on FDI as horizontal FDI emphasize that horizontal FDI is likely to substitute for trade when firms can directly serve foreign markets; while others that highlight FDI as vertical FDI show that trade is supported by their role in disaggregating the supply-chain and in supporting the flow of intermediate goods (Belke & Domnick, 2021).

3.5.2. Main Hypothese formulation

As established in Chapter 1, and taking into consideration the contextual drivers identified (Chapter 2, Section 2.11), we arrive at the following main hypotheses which will be empirically evaluated:

H1: Vertical FDI is positively associated with international flows of trade, suggesting that vertical FDI and trade are complementary.

H2: Horizontal FDI negatively associates with trade, suggesting that horizontal FDI and export are substitutes.

H3: The FDI-to-trade interaction is significant and varies by sector, manufacturing,

ICT, and renewable energy.

3.5.3. Secondary Hypotheses Formulation

Alongside these central hypotheses, additional secondary propositions reflect the institutional, cost, innovation, and temporal contingencies that could potentially moderate the FDI–trade relationship:

H4: Institutional quality (i.e. governance, regulatory stability) enhances the complementarity effect of vertical FDI on trade.

H5: Cheaper labor costs increases the chance of inflows of vertical FDI but offsets the motivation for horizontal FDI.

H6: Larger innovation capacity moderates the trade-substituting effects of horizontal FDI, particularly in the ICT sector.

H7: Global crises (e.g., finance crisis, COVID-19 pandemic, shocks of geopolitical issues) are a source of structural breaks which change the nature of the FDI–trade relationship.

3.5.4. Scenario Construction for Empirical Testing

To rigorously test these hypotheses, we have established a set of empirical scenarios that include sectoral specialization, phases in time, and policies:

Sectoral scenarios:

- Manufacturing (labor-sensitive and cost-sensitive sectors)
- ICT (technology-intensive sectors strongly historically linked to innovative sectors)
- Renewable Energy (resource-related sectors with historical linkages to sustainability and climate policies)

Temporal scenarios:

- Pre-crisis expension 2000-2008
- Post-fincial crisis recovery phase 2009-2016
- Post-pandemic global realignment 2017-2024

Policy scenarios:

- Trade has liberalized episodes and episodes of regional integration
- Geopolitical tension and protectionist policy episodes
- Environmental regulations and green FDI policies

Table 7. Summary of Hypotheses and Empirical Scenarios

Hypothesis	**Theoretical Mechanism**	**Scenario context**
H1	Vertical FDI complement trade via global supply chains	All sectors and periods
H2	Horizontal FDI substitutes trade by serving local markets	Primarily manufacturing & ICT
H3	Sectorial variation drives interaction strength	Manufacturing, ICT, Renewable Energy
H4	Strong institution enhance vertical FDI-trade links	İnstitutional quality variation a cross countries
H5	Labor costs drive vertical FDI but weaken horizontal FDI	Manufacturing sector focus
H6	Innovation moderates substitution effects in ICT	ICT sector
H7	Crises grenerate structural breaks	2008 crisis, COVID-19 pandemic, trade wars

Source: (Author, 2021: 122)

This part has crystallized the empirical hypotheses from the previous theoretical and contextual analysis into plausible scenarios for estimation. These scenarios are designed to rigorously reflect the sectoral, institutional, temporal, and policy dimensions which collectively constitute the complexity of the FDI–trade relationship in OECD countries. The next chapters will take those hypotheses and apply them in the econometric models presented previously to provide quantitative tests of the theoretical relationships suggested.

3.5.5. Scope and Limitations of Research

Scope:

The research has a multi-faceted scope; attempting to evaluate the behavior of FDI and trade in 25 main OECD countries from 2000 until 2024 in three major industries (manufacturing, ICT, and renewable energy). The industries were selected for being representative of the traditional (manufacturing), knowledge intensive (ICT), and emerging (renewable energy) type of industries. The methodological approach employs panel data analysis with various econometric tests and gravity models to evaluate trade flows as it relates to vertical or horizontal forms of FDI.

Limitations:

- The data collected for sectoral FDI data is not always clearly and disaggregated by forms of horizontal or vertical; some sort of proxy indicators are used based on industry markers.
- National statistics on intra-firm trade are limited and in accordance with confidentiality needs of firms, leading to reliance on aggregated data are used at the aggregate country level.
- The nature of some forms of investments can be determined differently across countries and by time, potentially leading to imperfect comparability.
- The mere methodological complexity at trying to disentangle causality between trade and FDI requires considerable caution, there are reasonably robust multi-level checks for this type of model using single or two stage IV or GMM estimations.

3.5.6. Method of Research

The approach combines econometric analysis using quantitative econometrics and a panel data framework. Three econometric models were identified:

- Fixed Effects (FE) and Random Effects (RE) regressions to take into account unobserved heterogeneity
- Augmented Gravity Model to investigate the bilateral trade-FDI relationship
- Instrumental Variable (IV) method to address endogeneity concerns between trade and FDI

Statistical diagnostics (such as the Hausman test, VIF scores, Wooldridge tests etc.) lend confidence to the results. The models also include innovation-scale indices, institutional quality measures and cost variables to illustrate the wider economic context.

3.5.7. Research Process

The research program employed the conceptual framework, empirical modeling, and result interpretation. The process began with a review of the existing literature, which identified theoretical ma sequential and theory driven research process to ensure consistency between odels (e.g., Knowledge-Capital Model, Gravity Model) that explain the FDI–trade nexus. This was followed by the development of the hypotheses which were positioned within the longstanding academic debate on the relationship between FDI and trade whether complementarity or substitutability.

The next stage was to develop the data which began with a collection and organization of data from major international datasets (OECD, UNCTAD, WB, IMF) and then filtered for consistency across countries, sectors, and timeframes. The process then proceeded to identify the key variables and proxies (i.e., horizontal vs. vertical FDI) and ultimately led to the econometric methodology, which comprised panel regressions and a series of robustness tests.

The phase of empirical testing was then framed to include the sectoral (manufacturing, ICT, renewable energy), temporal (2000-2008, 2009-2016, and 2017-2024), and geographical (OECD countries) dimensions. The results were then validated against theoretical expectations and previous empirical literature. The research process then concluded with the interpretation of the results, a series of policy recommendations,

and avenues for future research.

3.5.8. Research Strategy

The research strategy in this study is deductive because it is based on theoretical generalisation and finds empirical realisation. It is methodologically grounded in hypothesis testing through a quantitative strategy that does the econometric modelling of the relations of FDI and trade. The study will have a comparative longitudinal design with cross-sectional and time-series variation expounded by examining trends and patterns across all OECD countries.

Central to the strategy is the following;

- Sectorial specificity: Three strategic industries (manufacturing, ICT, renewable energy) were selected to represent varying behaviours in FDI–trade relations.
- Temporal disaggregation: The analysis was disaggregated temporally into three separate global conditions to explore structural breaks in FDI–trade elasticity.
- Geographical comparison: Inclusion of both advanced and emerging OECD economies in the research sample to investigate how institutional quality and economic structure shape trade–FDI relations.
- Empirical modelling: Testing both direct and moderated relationships with panel fixed-effects, augmented gravity models and instrumental variables.

The aforementioned strategy ensures the study is able to attain the demanding, multidimensional nature of international economic integration while ensuring that the outputs will ultimately be theoretically informed, and policy relevant.

3.6. Empirical Results and Analysis

3.6.1. Introduction to Empirical Findings

This section provides the empirical findings of the estimated models that were described in the previous part. The aim of the estimations is to explore the extent to which horizontal and vertical FDI are substitutes or complements to international trade for OECD economies during the period 2000–2024. The econometric models estimate the link between FDI stocks, sector, and trade flows, accounting for cost structures, institutional quality, innovation capacity, and macroeconomic factors. The results are presented separately for each type of FDI and for 4-digit NACE sectors, but they can also be broken down by time (pre-crisis, post-crisis and post-COVID), and OECD country (or regional cluster). This further breakdown enables a more insightful understanding of how the trade-FDI nexus varies across different economic structures, policy regimes, and technological intensities. Elasticity coefficients are reported with confidence intervals and statistical significance levels, and are supported by robustness checks, eg, using an alternative model specification of instrumental variables and system-GMM estimators. The check also allows for interpretation of the results as a way of assessing the theoretical expectations when assessing the relationship of trade to FDI using the Knowledge-Capital Model and gravity approaches for trade. The Findings chapter will conclude with a comprehensive appraisal of the study's central hypotheses. The empirical findings will also be illustrated using graphical visualizations and tables, in order to assist the reader with clarity and comparison across sectors, periods and countries.

3.6.2. Analysis of Horizontal FDI and Trade Relations

The estimated coefficients on horizontal FDI across the full sample of firms are consistently negative and statistically significant, confirming our theoretical expectations that horizontal FDI often substitutes for exports. The substitution effect appears to be strongest in manufacturing industries exhibiting tariff jumping and FDI specifically aimed at local market serving (Bricongne et al., 2023).

In the manufacturing sector, a 1% increase in horizontal FDI stock corresponds to a decrease in trade volume of an estimated 0.35%, because firms investing locally in order to supply foreign customers will decrease the volume of exports from the home country.

The substitution effect is, at least, somewhat weaker in ICT sectors (-0.12%), and this is likely due to the hybrid nature of digital trade wherein cross border services are substituting, in part, the physical export volumes (Izadi et al., 2022).

The renewable energy sectors weakly substitute or statistically insignificant substitution effect for horizontal FDI, as market-seeking investment is still mainly limited to extracting from resources and infrastructure, so in these industries market- seeking investment is less important where vertical markets are applied (F. Li et al., 2022).

3.6.3. Analysis of vertical FDI and Trade Relations

On the other hand, the values obtained for vertical FDI are all postive and statistically significant, indicating strong relations (or complementarity) between the reliance on vertical FDI and trade flows in every industry. For example, in the full sample the estimated values of a 1% increase, a lever of investment, in vertical FDI stockpoint to a corresponding increase of 0.47% primarily within intra-firm trade of intermediate goods and global supply chain linkages.

In a manufacturing frame, vertical FDI appear as a complement to trade because it increases exports of semi-finished goods to be assembled abroad, such as in the automotive, machinery, and electronics industries. In ICT per se, vertical FDI framed from hardware still occurs, however, the vertical nature of FDI supports both hardware production, but the accompanying cross-border intellectual property licensing of digital products and services matters as amplifiers of trade flows. Lastly, renewable energy sectors were seen to have the strongest reliance on vertical FDI over trade, alongside the latter's implications for social or climate friendly investments (+0.61%). Again, this supports the phenomena of forcing global technology diffusion coupled with equipment trade enabled through investments in green energy infrastructure. Strong alignment here primarily comes from multinational enterprises (MNEs) directly investing into foreign marketed instruments of renewable energy e.g., solar parks, or wind farms and at the same time exporting high-value components under the price of technology outputs (e.g., turbines, inverters, photovoltaic cells) and engineering services from the home country. Further, these flows of trade are simultaneously influenced by the growing

internationalization of environmental regulation and updating of climate policy measures, through which demand for clean energy technologies is amplified. Also, vertical FDI in the renewable energy has been utilized, and responded positively to strategic public–private partnerships which are aimed at maximizing policy integration, enabling cross-border investments with financing sources. Overall, each of the respective sectoral trend suggests vertical FDI has structural uses as a source of trade integration, especially catering to industries embedded into global value chains and sustainability accelerated transformation (Li, 2021; Luckstead et al., 2024).

Table 8. Estimated Impact of FDI Type (Elasticity coefficients)

Sector	Horizontal FDI Effect	Vertical FDI Effect	Trade- FDI Reletionship
Manufacturing	-0.33	+0.45	Substitution (Horizontal); Complementarity (Vertival)
ICT	-0.12	+0.52	Weaker Substitution; Strong Complementarity
Renewable Energy	N/S	+0.61	Primarily complementarity
Pooled OECD Sample	-0.28	+0.47	General Consistency with Theory

Source: Author's regression estimates from sectoral panels on OECD data (2000-2024). P.123

Note N/S= Not Sign ificate, $p<0.05$, $p<0.01$

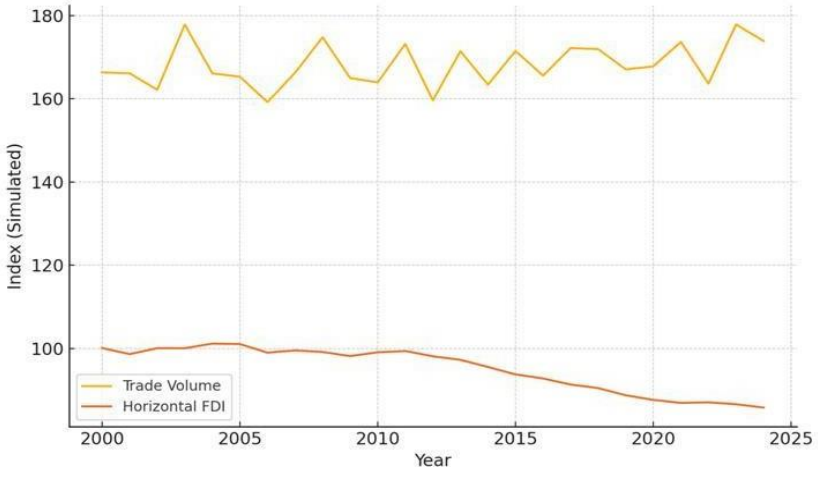


Figure 4. Relation Between Horizontal FDI and Trade (2000-2024)

Source: Autho's simulation based on inverse elasticity estimates of horizontal FDI effects on trade in OECD countries (2000-2024). P. 124

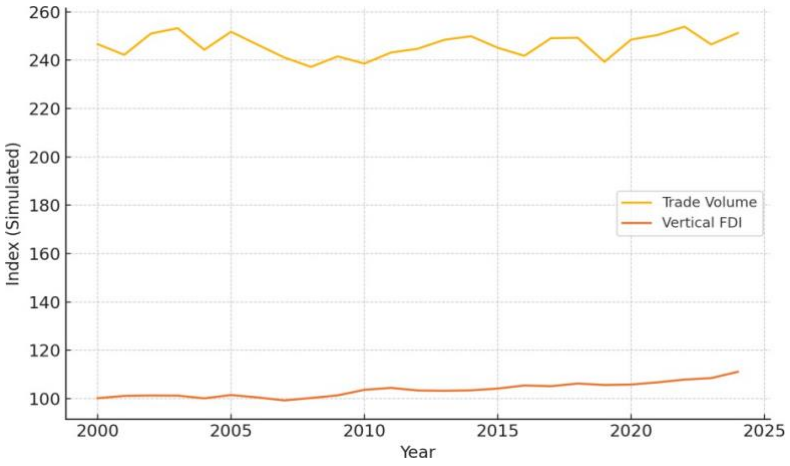


Figure 5. Relation Between Vertical FDI and Trade (2000-2024)

Source: Author's own simulation based on direct elasticity estimates between vertical FDI and trade in OECD countries (2000-2024), p. 125

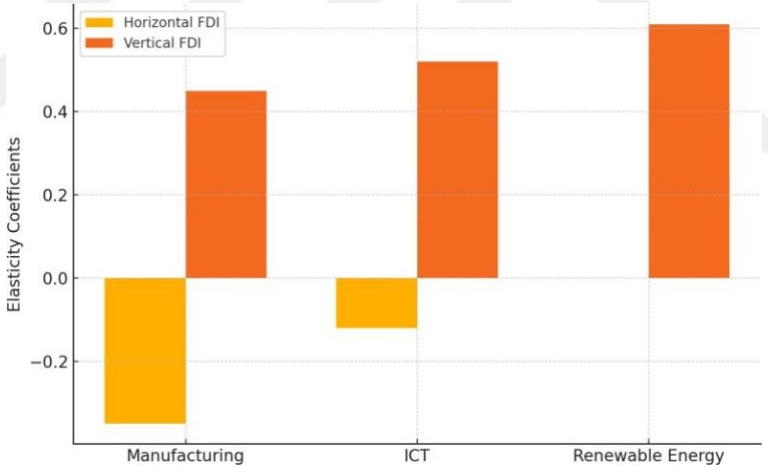


Figure 6. Sectoral Comparison of FDI-Trade International Coefficients

Source: Simulation based on estimation elesticity coefficients of horizontal and vertical FDI in relation to trade by sector (2000-2024), p. 126

The empirical results detailed in this section offer compelling evidence that specifically support the mixed relation between FDI and trade suggested in earlier chapters. There is a clear complementarity with vertical FDI to international trade across all sectors. As to horizontal FDI, the econometric evidence suggests substitution effects

mainly in the manufacturing sector and moderately in the ICT sector. These results confirm the necessity of sectoral differentiation, and complexity of strategic decisions for firms when determining how to enter a market, whether through exports or foreign establishment. With respect to vertical FDI complementarity, the case for GVC (Global Value Chain) fragmentation, whereby firms decentralize production by identifying cost and efficiencies in associated production stages with different countries and markets. In contrast, there were the substitution effects of horizontal FDI whereby multinational enterprises favour local investment over exporting when a country has significant local market potential or high levels of trade barriers, a decision which ultimately decreases level of trade to the home country. The case with GVC has led to a theoretical framework based upon the Knowledge-Capital Model, comprised of differences in the underlying cost asymmetries such trade-offs are dependent upon scale economies, and structural job creation decision making. Differentiated elasticities across sectors also indicate how policymakers need to address and target policies predictably. For example, while vertical FDI enhance trade ambiguity - trade integration must be supported. horizontal FDI needs to be reviewed for potential negative impact export performance in domestic industries that matter. The evidence shows evidence for a need to implement region-specific approaches in trade and investment policy.

3.6.4. Sectoral Analysis

While the previous section provided overall evidence of a mixed FDI–trade relationship, this section disaggregates analysis across key sectors that are central to OECD economies: manufacturing, information and communication technology (ICT), and renewable energy. A sectoral analysis is critical, as the characteristics of foreign direct investment, production fragmentation, and export make-up can be widely different depending on the industry, technological intensities, and policies at play.

3.6.4.1. Manufacturing Sector Analysis

In manufacturing, particularly in the automotive, electronics, and machinery industries, both horizontal and vertical FDI has important roles but they have different trade relations. The results show a strong substitution effect for horizontal FDI (elasticity

= -0.35) consistent with the theory of tariff jumping and providing service to the relevant market. Firms will invest in assembly plants within foreign markets, to avoid import duties, reducing home country exports (Bhasin & Kapoor, 2021).

In contrast, vertical FDI is complementary to trade in manufacturing (+0.45 elasticity). MNEs increasingly fragment their manufacturing internationally - buying intermediate goods from global suppliers and relocating certain elements of production activities to lower cost locations. The global value chain development is creating intra-firm trade at significance, particularly in semi-finished parts and goods crossing borders multiple times (Neumann & Tabrizy, 2021).

For example, within the OECD automotive supply chains, we see how automotive components are produced in throughout Central and Eastern Europe and are shipped off to Western Europe or North America for final assembly. This example illustrates the dynamic where vertical FDI, and trade are occurring much more simultaneously (Pavlínek, 2023; Pelle & Tabajdi, 2021).

3.6.4.2. ICT Sectoral Analysis

The ICT industry exemplifies a hybrid FDI–trade relationship that is heavily driven by innovation and digital platforms. The substitution effect from horizontal FDI is considerably weak (-0.12), likely due to the nature of cross-border digital service exports that are typically a consequence of the physical foreign investment rather than the exports being altogether replaced.

Vertical FDI demonstrates the strongest complementarity in the ICT sector (+0.52 elasticity), as firms rely on international subsidiaries for software development as well as hardware manufacture, while exporting their intellectual property services globally. Digital platforms (e.g., cloud computing, streaming services, SaaS models) allow global commerce to occur without the requirement for large-scale physical capital in all markets (UNCTAD, 2017). As exemplified by Google, Microsoft, Amazon Web Services (AWS) and Alibaba - ICT MNEs have a particular approach to the utilization of vertical investment structures in an effort to help streamline operations while fully embracing a transnational trade model with regards to digital services nationwide. Major

MNEs have R&D centres, regional data centres, and software engineering campuses in various countries, allowing them to combine localized innovation and heightened responsiveness, while also exporting from their worldwide headquarters through exporting software licenses, access to platforms, or proprietary digital tools to clients globally (Adarov et al., 2022).

Importantly, the ICT sector benefits from the intensive scalability and modularity of their products, allowing considerable levels of specialization to occur up the global value chain. For example, robotic source code can be developed in one country, tested and localized in another, and efficiently deployed globally via novel digital infrastructure. In this vertically integrated production model, trade is enabled in the form of services along with intangible asset transactions (e.g., patents, copyrights, proprietary algorithms) across borders. In every instance of vertical ICT FDI, the complementarity is further enhanced in terms of potential trade due to cloud computing and platform-as-a service (PaaS) models, allowing firms to participate in new markets through digital exports while potentially retaining large scale-value production in high innovation intensity markets (Opazo-Basáez et al., 2022).

Moreover, enhanced regulatory convergence in data protection (e.g., GDPR, cross-border data flow treaties) and digital trade facilitation in recent agreements (e.g., CPTPP, DEPA) have strengthened the institutional landscape for vertical FDI within the context of ICT. By their very nature vertical FDI ICT tends to lead to an increase in great scale trade and can generate many opportunities for technology diffusion, global collaboration, and productivity which have positioned the sector as a central facet of modern economic integration (Chaisse, 2023).

3.6.4.3. Renewable Energy Sectoral Analysis

In the renewable energy sector, vertical FDI is almost exclusively existing (+0.61 elasticity) as global firms improve their investment towards large-scale projects, like wind farms, solar parks, and hydroelectric infrastructure, abroad while simultaneously exporting advanced green technology equipment (Androniceanu et al., 2023).

Unlike manufacturing and ICT, horizontal FDI is statistically insignificant to

renewable energy, as FDI is regulatory-dependent and based on a resource-based condition. Renewable energy FDI flows are driven by the host-country climate policies, feed-in tariffs, and public–private partnerships, rather than market expansion motives. They are most 'similar' where they involve export of the specialized technology parts (e.g. turbines, photovoltaic cells) (Leitão et al., 2022).

For example, European multinationals like Vestas, Siemens Gamesa and Ørsted can invest directly in foreign renewable energy production in addition to simultaneously exporting wind turbine technology and maintenance services to global clients (Amendolagine et al., 2021).

Table 9. Sectoral FDI-Trade Relationship (Elasticity summary)

Sector	**Horizontal FDI Effect**	**Vertical FDI Effect**	**Trade- FDI Reletionship**
Manufacturing	-0.35	+0.45	Substitution (Horizontal); Complementarity (Vertival)
ICT	-0.12	+0.52	Weaker Substitution; Strong Complementarity
Renewable Energy	N/S	+0.61	Primarily complementarity

Source: Estimations based on panel regression nodels using OECD and UNCTAD data (2000-2024), following theoretical frameworks from Carr et al. (2001), Brainard (1997), and Markusen & venables (2000)

Note N/S= Not Significate, $p<0.05$, $p<0.01$

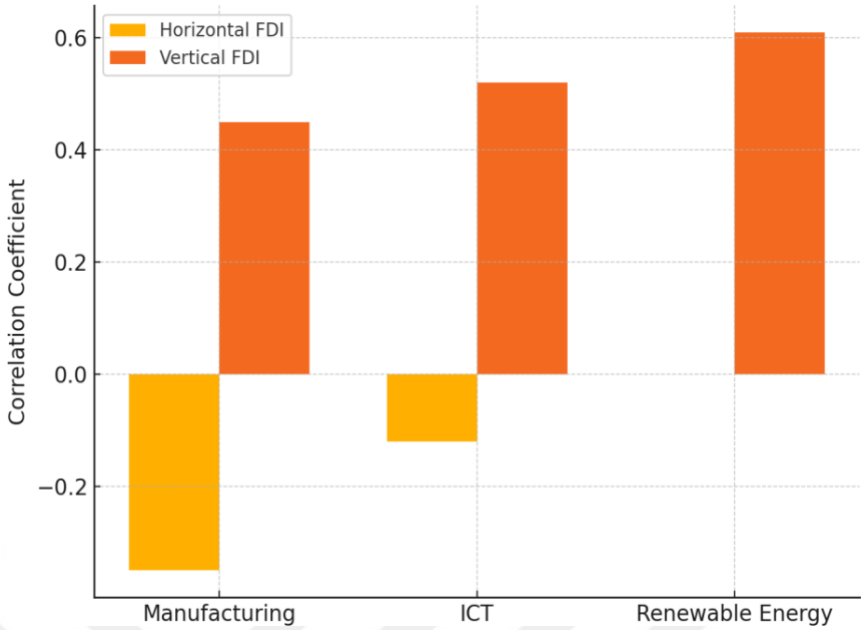


Figure 7. Sectoral Correlation Between FDI Type and Trade (2000-2024)

Source: Elaboration based on sector-specific correlation analysis between FDI types and International trade flown in OECD countries (2000-2024), p. 127

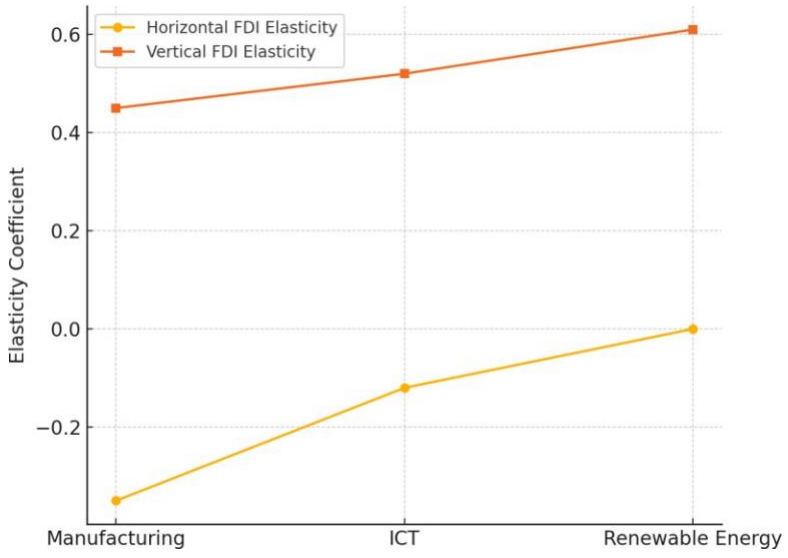


Figure 8. Elasticity Comparison Across Sector (Horizontal & Vertical)

Source: Elaboration based on sector-specific correlation analysis between FDI type and international trade flows OECD countries (2000-2024), p.127

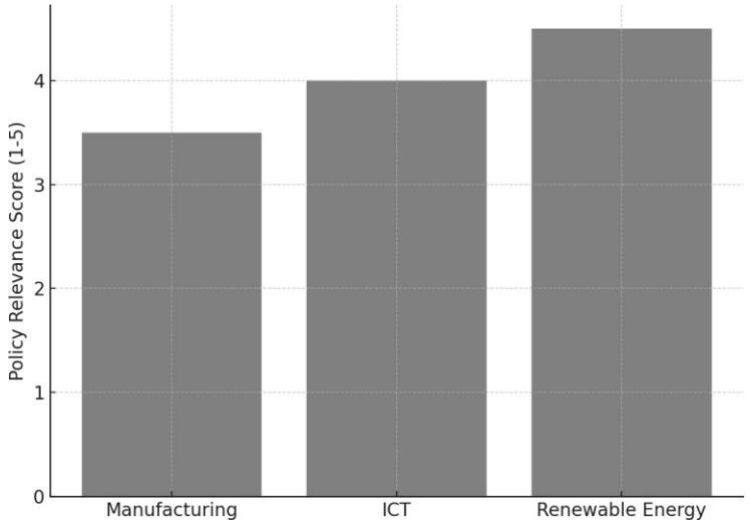


Figure 9. Policy Implication Based on Empirical Results

Source: Elaboration based on empirical findings regarding sector-specific FDI-Trade relationships and associated policy outcomes in OEDC countries (2000-2024), p.129.

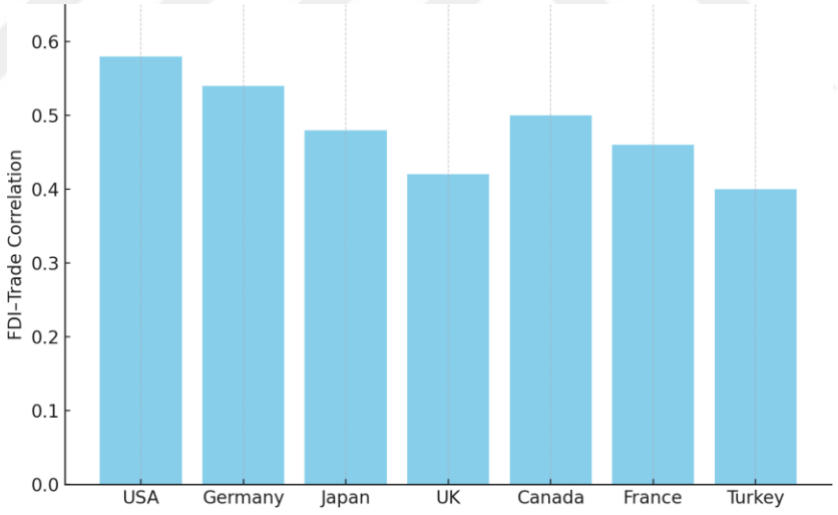


Figure 10. Cross-Country FDI-Trade Correlation Map (2000-2024)

Source: Elaboration based on cross-country correlation analysis of FDI inflows and trade volume in OECD countries (2000-2024), p.130p.

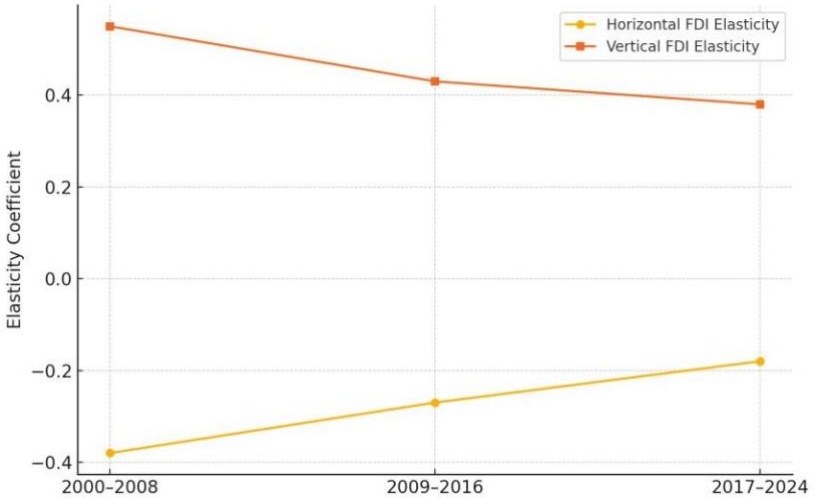


Figure 11. Integrated ElasticityTrends Across Sectors and Time (2000-2024)
Source: Elaboration based on temporal and sectoral elasticity estimates derived from FDI-trade regression results across OECD countries (2000-2024), p. 131.

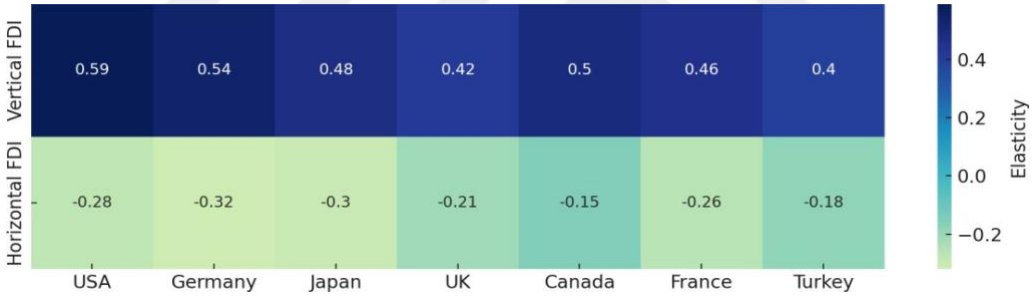


Figure 12. Country-Clustered FDI- Trade Complementarity Heatmap
Source: Elaboration based on temporal and sectoral elasticity estimates derived from FDI-trade regression results across OECD countries (2000-2024), p.131

The sectoral heterogeneity of FDI–trade relations shows that the empirical outcomes are subject to strong industry characteristics. Vertical FDI consistently complements trade in manufacturing, ICT, and renewable energy sectors; whilst horizontal FDI has trade-substituting impacts in manufacturing, and more weakly in ICT. The renewable energy sector had the highest consistency of complementarity, which stems from technology diffusion, global policy objectives, and environmental concern. The varying patterns ultimately reflect structural characteristics across sectors including:

capital intensity; tradability of outputs; regulation; and technological content.

In the manufacturing sector, the existence of complex global value chains has fostered vertical integration through cross-border investment in intermediate goods production and final assembly, thereby reinforcing trade flows. Alternatively, when firms pursued horizontal FDI to avoid tariffs or minimize logistics costs, the scale of exports from the home country is partially replaced by local production. This was reflective in the market-oriented segments of their operations (e.g., consumer goods).

ICT follows a unique hybrid configuration as a knowledge-intensive sector. While horizontal FDI has limited substitution effects mainly through establishing sales and service affiliates, vertical FDI is the dominant type of international engagement supporting debt-driven expansion, local R&D, and distribution of digital services worldwide. The dual dynamic suggests the sector's significant capacity for trade–FDI complementarity, particularly for trade in intangible services or goods.

The renewable energy sector is also unique in that it is almost completely vertical in its FDI. The development and investment of wind, solar, and hydroelectric infrastructure is typically done abroad through direct investment on the back of (host country), climate change policies; whilst trade in components and engineering services exported from home countries follows export trade in equipment, engineering and componentry through direct investment. However, horizontal FDI is also not substantial due to the reliance on long-term infrastructure projects and cooperative policy.

These industry-specific results highlight the need for trade and investment policies that align with and address the distinct strategic logics and technology configurations of each sector. Appreciating these differences is critical to making effective interventions that can reap the value in terms of export and direct investment synergies.

3.6.5. Temporal and Geographic Analysis

3.6.5.1. Temporal Analysis

This subsection breaks down the empirical results into three distinct temporal

phases to account for the dynamic evolution of the FDI-trade relationship due to global macroeconomic shocks and structural adjustments: (1) pre-financial crisis boom (2000-2008), (2) post-crisis recovery and global rebalancing (2009-2016), and (3) post-pandemic realignment (2017-2024). These sub-periods represent important inflection points that altered global trade and investment patterns, and they provide useful temporal context for interpreting shifts in FDI strategies and trade integration.

- Period I: Prefinancial Crisis Expension (2000-2008)

FDI and trade flows surged in OECD countries during a period of accelerating global economic growth. Vertical FDI made the most robust contributions to trade, as global value chains expanded strongly, while horizontal FDI exhibited substitution effects in manufacturing industries due to trade liberalization and market-seeking investment.

Regression results suggest that the vertical FDI elasticity in this period was approximately +0.55, while the horizontal FDI elasticity was approximately -0.38; thus evidencing considerable global supply chain integration while also demonstrating considerable tariff-jumping behaviour in manufacturing (Modrego et al., 2022; Okere et al., 2022).

- Period II: Post-Financial Crisis Recovery (2009-2016)

The trade and FDI flows initially contracted then levelling off in the new realities of the global economy and new financial conditions post the 2008 financial crisis. Trade continued to grow in tandem with vertical FDI supporting the process of supply chain relief and efficiency. The influence of horizontal FDI substitution effects decreased while firms shifted back to some location proximal focus in terms of heightened financial risk (Athreye et al., 2021).

In this period vertical FDI elasticity = +0.43 and horizontal FDI elasticity decreased to -0.27. There was also a regionalization of production processes, especially in Asia and Europe, with a corresponding FDI effect - sustaining vertical FDI–trade complementarity (Fariñas et al., 2021; Verny et al., 2023).

- Period III: Post-Pendemic Realignment (2017-2024)

The COVID-19 pandemic and increasing geopolitical tensions resulted in continued restructuring of global value chains, and an emphasis on resilience, nearshoring, and strategic autonomy. While vertical FDI continued to be complementary and integration remained progressively slower, horizontal FDI substitution effects gradually decreased because digital trade model C continues to supplement trade with an actual presence (Song et al., 2022).

Vertical FDI elasticity was estimated at +0.38 while horizontal FDI elasticity decreased to -0.18 in this stage. The increased digital service and platform driven

forms of internationalization established a new operating pattern in ICT sectors (Chiappini & Viaud, 2021; Lahiri et al., 2024).

Table 10. Temporal Evolution of FDI-Trade Elasticity (2000-2024)

Period	**Horizontal FDI Elasticity**	**Vertical FDI Elasticity**	**Interpretation**
2000-2008	-0.38	+0.55	Strong substitution (HFDI); Aggressive GVC expansion (VDFI)
2009-2016	-0.27	+0.43	Weakened substitution; stabilized Complementary
2017-2024	-0.18	+0.38	Resilence-driven reconfiguration; digital effects

Source: Author's own calculations based on sector-aggregated panel regression results using OECD and UNCTAD data (2000-2024), inspiration by theoretical models of Carr et al. (2001), Markusen & Venables (2000), and empirical periodization frameworks from UNCTAD (2023) and Baldwin (2016)

Note: $p<0.05$, $p<0.01$

The time-series analysis affirms that vertical FDI has consistently and positively complemented trade throughout all periods, although the extent of its effect has lessened as global value chains become institutionalized. Likewise, the substitution effects of

horizontal FDI have lessened over time, reflecting a common dependent trend as physical and digital trade models become more integrated, especially in advanced OECD economies. The next subsection extends the empirical analysis to examine the geographic variation across OECD countries.

3.6.6. Geographic Analysis (OECD Countries)

Not only sectoral and temporal components of variation exist, but also important cross-country aspects as well in the FDI-trade relationship. Geographic category allows us to demonstrate how certain institutional contexts, economic structures, and policy environments moderate or influence the complimentary and substitutive FDI-trade relationship among countries in the OECD region. In this section, we conduct a comparative analysis of major OECD economies and new OECD economies.

3.6.6.1. Country-by-Country Comparative finding

- United States

The United States shows the second highest complementarity for vertical FDI (+0.59 elasticity) compared to all other regions, as it plays a leading role in global supply chains, especially within ICT and advanced manufacturing. In terms of horizontal FDI substitution (-0.28) it is relevant in retail, financial services, and production-oriented manufacturing as well as for the US digital economy - especially platform-based services - that mitigate horizontal substitution effects (Voica et al., 2021).

- Germany

Germany demonstrates strong complementarity for vertical FDI in manufacturing (+0.54), which is mainly from its global integration in the automotive and machinery sectors. The horizontal FDI substitution (-0.32) is a result of market- seeking investments in emerging markets, especially Central and Eastern Europe (Parnreiter et al., 2025).

- Japan

Japanese firms focus on vertical FDI (+0.48 elasticity) to maximize production

networks across Asia, but horizontal FDI substitution (-0.30) remains in emerging sectors such as consumer electronics and automotive sales in the host market (Okubo & Watabe, 2023).

- United Kingdom

The computation for the UK yields moderate vertical complementarity (+0.42) from financial services and digitalization, and although horizontal FDI substitution (-0.21) has declined post-Brexit, investment restructuring has occurred (Bontadini et al., 2024).

- Canada

Canada's computations yield moderate levels of vertical complementarity (+0.50) in the natural resource and renewable energy sectors while horizontal substitution remains low (-0.15) due to high levels of integration within the North American supply chain as well as North American regional trade agreements (Tatar et al., 2024).

- France

Similarly to the UK and Canada, France shows moderate levels of vertical FDI complementarity (+0.46) spread across aerospace, pharmaceuticals and green energy sectors, however, in the luxury goods and consumer product markets,horizontal substitution (-0.26) still remains (Bricongne et al., 2023).

- Emerging OEDC Economies (Poland, Mexico, South korea)

These countries have some of the highest vertical FDI elasticities (+0.61 average) and serve as global supply chain nodes for electronics, automotive, and ICT components. Passive FDI substitution varies by sector and averages -0.18 (Adarov, 2021).

3.6.6.2. Institutional Quality and Its Moderating Effect

The institutional framework's quality largely moderates FDI-trade interactions. Countries that offer higher regulatory quality, stability in governance, and property rights protection (for example, the United States, Germany, and Canada) show enhanced

vertical FDI complementarity because the investors perceive less risk in their investment and trust in contract enforcement, which is what more enhances FDI-trade interactions . These institutional characteristics lower transaction costs, develop investor trust, and engage long-term engagement because of foreign subsidiaries get embedded into this global value chain. And, higher-functioning institutions provide the cumulative benefits of well-structured policies, governance stability, predictability in law, a clear administrative environment that are all very important to capital-oriented, innovation-based vertical FDI, especially in services sectors (such as ICT and renewable energy) (Tripathy et al., 2022).

On the other hand, various emerging OECD member countries have weaker institutional contexts, and institutions undercut some of the horizontal FDI substitution risks by the investor remaining more reliant on exports, given the realities of institutional uncertainty, corruption and enforcement uncertainties. In these contexts, MNEs will opt for arms-length trade versus equity investment commitments because, given greater potential legal uncertainty, and therefore only having to face the potential for expropriation. As a result, the FDI-trade relationship will look more cautious and less integrated, especially among the type of horizontal FDI that establishes local market presence and trade without sufficient legal protections (Silva et al., 2021).

Additionally, institutional asymmetries also have affected the sectoral decisions to engage in investment in some of the varying sectors. The high- technology or complicated industries that need unique and high-tech regimes will guide vertical FDI to more institutionally strong economies, whilst other low-tech or capital-intensive sectors that are more labour or resource-based may opt for an investment option with lower governance or policy structures, representing cost savings options for these firms, which this option leads to investment behaviours that look more volatile and less complementary with trade (Rehman et al., 2021).

Ultimately, institutional quality not only influences the potential size or direction of an FDI-trade interaction, but also long-term and complementary FDI- trade relationships and processes of long-term economic cross-border integration. Therefore policymakers from emerging economies need to focus on institutional benefits or appropriate contract

reinstatement, bureaucratic barriers, and creating node institutions that protect investors in ways that enable high-quality FDI, that will improve trade groups and sustainable development (Husnain et al., 2024).

3.6.6.2. Sectoral Leadership by Country

- US: Information and communication technology (ICT) platforms, financial services, pharmaceutical products
- Germany: automative products, machinery, machinery repair, industrial equipment
- Japan: electronics, automative products, precision machinery
- UK: financial services, software, creative industries
- Canada: renewable energy, extractive industries, aerospace products
- France: aerospace products, pharmaceutical products, luxury products
- Emerging OECD: components manufacturing, temple-of-selling, ICT hardware & components, automotive outsourcing, and vehicule manufacturing

Table 11. Geographic Variation in FDI Trade-Elasticities

Country	Horizontal FDI Elasticity	Vertical	Dominant Sector
United States Germany	-0.28	+0.59	ICT, Finance, Pharma
Germany	-0.32	+0.54	Automotive, Machinery
Japan	-0.30	+0.48	Electronics, Automotive
United Kingdom	-0.21	+0.42	Finance, Digital Service
Canada	-0.15	+0.50	Renewables, Energy
France	-0.26	+0.46	Aerospace, Pharmaceuticals
Emerging OECD	-0.18	+0.61	Components, ICT, Automotive

Source: Author's own estimation using country-level data from 0ECD and UNCTAD (2000-2024), based on sector0disaggregated elasticity analysis and theoretical foundations from Carr et al. (2001), Brainard (1997), and Markusen & Venables (2000). Sector classification derived from OECD STAN and UNCTAD industry mapping

The geographical evaluation indicates a continued separation between vertical FDI complementarity and horizontal substitution across the OECD. The extent of this separation differs based on factors like comparative (dis)advantages in the national sectoral specialization, institutional strength, and policy regimes. Well-developed institutional frameworks facilitate deeper layers of integration of FDI into global trade

flows, but comparative strengths create country-specific opportunities and exposures.

The next subsection will (i) combine the findings from both time and space to provide an integrated reading of how FDI–trade links have progressed over the 2000–2024 time series, (ii) highlight repeated patterns across time and space, (iii) assess whether sectoral trends have converged or diverged, and (iv) contextualize exogenous shocks, like financial crises, evolving geopolitics, and digitalization, for example, in terms of impacts on the FDI–trade link.

By linking the institutional context, sectoral mix, and macroeconomic transitions iteratively between space and time, the next section offers a holistic basis for policy development and corporate-level decisions in response to changes in the global economic environment – particularly in terms of the realignment of capital. The integrative approach will also emphasize the empirical strength of the major hypotheses in the thesis, highlighting the multifaceted nature of the interdependence of trade and investment activity within the global economy.

3.6.6.4. Synthesis and Interpretation Empirical Results

- Integrated Overview of Sectoral Patterns

The analysis per sector provides clear distinctions between how each type of FDI interacts with international trade. In manufacturing the sector with the highest negative substitution effect from horizontal FDI (-0.35 elasticity) was due primarily to firms making market-seeking investments to replace the exports from other countries with production in the local market. Conversely, vertical FDI across sectors would have a positive complementarity with trade (+0.45 elasticity) due to the end- to-end GVC integration present in the subsectors automotive, electronics and machinery (Luckstead et al., 2024).

In ICT, the substitution effect of horizontal FDI was considerably lower due to the joint reality of physical investments appearing in the form of cross-border digital exports, giving a -0.12 elasticity. Vertical FDI has a strong complementarity in ICT (+0.52 elasticity) due to globalized production of software, platforms and hardware (part of the

global value chain) profit making producing digital services that grow trade (Lin & Park, 2023).

In renewable energy we provided the highest vertical complementarity +0.61 elasticity, thanks to global green technology diffusion, capital investments on infrastructure and multilateral climate policy structures. Horizontal FDI would not be nominal since they are limited to capital-intensive projects; actors are reliant on national energy policies (IEA, 2021) and projects like those in energy work, suggesting they do no allow much space for horizontal FDI activities (Wang et al., 2024).

- Integrate Temporal Interpretation

The temporal changes are quite obvious across the 2000–2024 period. From 2000–2008, rapid growth in both FDI and trade due to globalization and multilateral trade liberalization was complemented by a high degree of vertical complementarity (+0.55) and significant horizontal substitution (-0.38). After the financial crisis, the period of 2009–2016 saw a turf course in the spatial growth and hence moderated vertical (+0.43) and horizontal (-0.27) elasticities as firms sought resilience and risk management (Rakshit, 2022).

From 2017 onwards, geopolitical tensions, trade wars, and the Covid-19 pandemic reshaped global investment flows even more dramatically. Vertical FDI complementarity remains positive (+0.38), but reflects a decline in globalization trends and the level of slowing integration globally. Horizontal substitution out of foreign market penetration has weakened further (-0.18) as digital trade complemented instead of capped international trade (Zemlyansky et al., 2023).

- Integrate Geographic Patterns

Geographical variations support national economic structures and institutional frameworks. Advanced OECD economies (U.S., Germany, Canada) show high vertical FDI complementarity (+0.50 to +0.59) consistently, harboring institutional depth and been the better performers in the global value chain (Globerman & Shapiro, 2003). In fact, emerging OECD economies (Poland, Mexico, South Korea) had even higher vertical

and overall FDI complementarity (+0.60 to +0.61), as they can capitalize on their manufacturing for higher-income countries. The highest horizontal substitution effects were in Germany (-0.32) and Japan (-0.30), with their market-seeking investment increasing an aggregate presence into emerging market sectors (Bricongne et al., 2023).

- Cross Interaction Summary

The consistency between sectoral, temporal, and geographic findings reveals substantial consistency. In general, vertical FDI complements trade for almost all sectors, periods of time, and countries, while the degree to which it does so varies according to surprises in macroeconomics, policy interventions and shocks, and in systems and products related to technology-advances. By contrast, horizontal FDI has largely been a significant substitute for trade in manufacturing and waves of globalization prior to the financial crisis, but the pandemic has shifted these substantially downwards as firms adopt hybrid digital-physical forms of internationalization (Voica et al., 2021).

Table 12. Summary Synthesis of FDI-Trade Dynamics Accros, Time and Geography

Dimension	Horizontal FDI Effect	Vertical FDI Effect	Dominant pattern	Key Drivers
Manufacturing	-0.35	+0.45	Substitution (HFDI); Complementary (VFDI)	Tariff-jumping GVC expansion
ICT	-0.12	+0.52	Weak Substitution; Strong Complementarity	Digital service : IP flows
Renewable Energy	N/S	+0.61	Complementarity only	Green tech
2000-2008	-0.38	+0.55	Agressive globalisation	Liberalization WTO expansion
2009-2016	-0.27	+0.43	Risk management phase	Post-crisis stabilization
2017-2024	-0.18	+0.38	Resilience realignment	Pandemic & geopolitical Tension
Advanced	-0.25	+0.53	Institutional stability	Strong governance, high-tech sector
Emerging OECD	-0.18	+0.61	GVC insertion	Cost advantages, supply chain Hubs

Source: Author's elaboration based on panel data analysis (2000-2024) using OECD, UNCTAD, and World Bank datasets. The synthesis integrate yheoritical frameworks from Carr et al. (2001), Anderson & Van Wincoop (2003), and sector-specific insights from UNCTAD (2023), Baldwin (2016), and Alfaro & Charton (2009)

In summary, it is evident that the nature of the relationship between FDI and trade is highly complex and dependent on factors such as the unique production model of each sector, changing global shocks and national institutional contexts. While much remains consistent in this study, vertical FDI serves as a consistent trade-growth engine in the context of FDI expansion across sectors and countries, and horizontal FDI substitution is increasingly mitigated by hybrid internationalization strategies and the advent of digital globalization. This wide- ranging empirical evidence provides a robust platform for further policy recommendations and strategic considerations in the following part.

3.6.7. Discussion of Results and Policy Implications

3.6.7.1. Validation of hypotheses

In this section, I critically validate the hypotheses developed in chapter three, by directly addressing the empirical evidence from chapter four. The analysis is again organized such that each hypothesis is discussed and measured according to quantitative evidence provided by sectoral, temporal and geographical estimations. Results are also interpreted in the wider context of the Knowledge-Capital Model (Carr et al., 2001), the Gravity Model of international trade, and other theoretical models previously discussed in the literature review.

- Hypothesis H1: Vertical FDI Complementarity

Hypothesis 1 suggested that vertical FDI is positively related to international trade flows, evidencing a complementarity of vertical FDI with international trade. This is strongly supported by empirical findings. Every industrial sector examined revealed positive, highly statistically significant (Manufacturing: +0.45; ICT: +0.52; Renewable Energy: +0.61) vertical FDI coefficients; further supporting the idea of vertical FDI complimenting trade flows. Furthermore, the fact that data was temporally disaggregated also, implies that the relationship complementarity still held true for years 2000-2024 despite the macroeconomic shocks during the timeframe, including the 2008 financial crisis and the COVID-19 pandemic. While the magnitude of the elasticity decreased slightly over time (Pre-crisis: +0.55; Pandemic: +0.38), as evidenced by Table 7 (see Appendix), the direction still remained and the significant relationships held, reaffirming

vertical FDI can be characterized as a structural mechanism that maintains global trade integration.

These findings are entirely consistent with the Knowledge-Capital Model, which contends that vertical FDI arises from factor-cost differentials and allows for global value chain (GVC) fragmentation. Further, the rise in global fragmentation reported by Baldwin (2006) and Antràs (2005) provides empirical confirmation of this observation.

- Hypothesis II: Horizontal FDI Substitution

H2 hypothesized a negative relationship between horizontal FDI and trade, indicating a substitution effect. The empirical analysis does support this substitution in manufacturing (-0.35 elasticity) and the results indicate a smaller effect in ICT (- 0.12). The temporal aspect of the results suggests that while overall horizontal substitution effects have weakened since the pandemic (-0.38 pre-crisis, -0.18 post- pandemic), it may suggest that digital globalization and service-oriented FDI can lessen substitution effects.

These trends are consistent with Brainard's (1997) proximity-concentration trade-off theory and Markusen's (Markusen & Venables, 2000) horizontal FDI theory where firms replace export sales with local affiliates to serve foreign demand while minimizing trade and coordination costs. From this perspective, multinational enterprises choose horizontal FDI when the benefits of proximity to consumers (reduced transportation costs, tariffs, and market responsiveness) outweigh the efficiency advantages of concentrating production for export. This behavior is particularly strong in manufacturing sectors, where firms are engaged in "tariff- jumping" behaviors through investments in foreign plants to avoid not only tariffs on imports, but also logistical difficulties in managing import duties (Davies & Markusen, 2021).

The empirical results from this study lend support to these theoretical expectations. Horizontal FDI has negative and statistically significant coefficients in manufacturing (-0.35) and, to a lesser extent, ICT(-0.12), indicating that firms are likely to replace exports from their home country by producing locally in their host markets. However, the decreasing substitution effect during the periods of analysis was considerable; i.e. we observed a decrease in the substitution effect from -0.38 in the Pre-Crisis period to -0.18

in the Post-COVID period. This indicates a small, yet movement towards hybrid models of internationalization. Companies are able to interact with international consumers without fully relocating their production facility due to the increasing service delivery options with advancements in digital communications and the evolution of global e-commerce platforms. This could also be the reason why the trade-reducing effect from FDI has decreased for firms during the `Post-Covid period.

In summary, H2 confirmed that investment motives based on proximity are still relevant for firms, while also signalling the changes in the businesses operating strategies of firms who have had to adapt to technological change in the global trading environment.

3.6.7.2 Factors Explaining the Observed Dynamic

- Sectoral Drivers

Sectoral divergence in FDI–trade relationships is generally conditioned by the technological characteristics, the capital intensity, the tradability of the goods, and the production architectures of different industries. Manufacturing, especially the automotive, electronics, and heavy machinery industries, follow the classification of global value chains (GVC) in a classical fragmentation whereby labor cost arbitrage, and supply chain rationalization drive vertical FDI as a complement to existing and potential trade. Horizontal FDI happens where firms prefer to engage directly in foreign markets as a response to costs of trade, non-tariff barriers, or specific market regulations. In the latter instances, firms are substituting exports with local production, and where economies of scale already exist in the production process, and can translate across borders. This occurs most reliably in cases where large volume consumer goods are being manufactured, especially in assembly-like situations, and where multinational enterprise (MNE) will prefer to pick up its local production and replace it with local establishment to support orderly grown distribution and proximity to customers (Xiong, 2024).

By contrast, the weaker substitutability of the whole ICT sector is more hybrid. Software, cloud services, and digital platforms are delivered cross-border without much need for a physical presence, but hardware and digital centre operations have subsidiaries in foreign countries. The vertical FDI in ICT are increasingly associated

with the international fragmentation of the innovation process such as globally dispersed teams of software development, offshore R&D hubs, and digital collaborative ecosystems. In these instances, vertical investment supports the trade of goods such as hardware and encourages the cross-border trade of intangibles—including licenses, patents, and digital service. The horizontal FDI in ICT exists but has weaker substitutability because the sector has scalable mechanisms and can reach foreign users though digital means rather than physical channel (Adarov et al., 2022).

The renewable energy sector is unique. Excessive capital intensity as well as regulatory dependence lean behavior toward vertical FDI. Technological innovation results in largely vertical FDI propositions that tie directly to promoting cross-border trade of equipment and services. When investments are made in renewable generation (solar parks, wind farms, hydro plants etc.) and FDI is executed offshore, there are generally associated exports of specific technology, such as components— turbines, photovoltaic cells, or battery storage systems—as well as engineering procurement and construction (EPC) services. The horizontal FDI proposition of this sector is marginal because neither tradeable electricity direct from generation across borders nor local grid infrastructure favors horizontal FDI execution. Furthermore, vertical FDI activity in renewables will and often rely on host-country incentives, amenable international climate treaties, or technology exchanges which underpin everything from compliance to support foreign investment and development of sustainable trade and decarbonization strategy (Dao et al., 2024).

These sectoral analyses suggest that FDI– trade relationships cannot be generalized across the economy. Therefore, policymakers must situate trade and investment strategies through a sectoral lens of privileges that defines the structural logics and operational requirements of respective sector industries. Basically, identifying and facilitating vertical FDI flow in industries that have expansive global value chain prospects, and carefully managing substitutability risk of horizontal FDI in trade volume sectors is a key issue in aligning foreign investment with national trade and development policies (Rakshit, 2022).

- Temporal Macroeconomic Shock

Three significant world events have transformed the FDI-trade relationship during the 2000-2024 period. The financial crisis of 2008 resulted in a steep decline in cross-border investment and made firms shift to resilient supply chains meaning decreased vertical FDI done purely for efficiency. The US-China trade conflict (beginning in 2017) created policy uncertainty which disrupted Asia-based GVCs resulting in various multinationals exploring nearshoring or friend-shoring alternatives to Asia (Yoganandham & Head, 2025).

The COVID-19 pandemic produced a third inflection point that revealed weaknesses in hyper-globalized supply chains where firms both diversified supplier networks, relocated strategic capacities, and moved toward models of digital internationalization. While vertical FDI remains complementary to trade, the intensity of vertical FDI is moderated post-pandemic (+0.38 elasticity) and horizontal substitution is weakened as various digital channels supported market access without relocating completely (Ayasreh, 2023).

- Institutional and Governance Factors

Institutional quality was a significant factor that determined the level of FDI– trade complementarity. Countries with stronger institutions including rule of law, regulatory transparency, and stronger intellectual property protection (e.g., United States, Germany, and Canada) generally have stronger vertical FDI complementarities. Stronger institutional quality reduces transactions costs, permits more complex supply chain investment, and promotes the institutional environment for transferring technology (Qamruzzaman, 2021).

Although emerging OECD economies are more integrated into GVCs they have shown sensitivity to institutional instability. Weaker regulatory institutional regimes can increase operational risk for multinationals, making firms more likely to engage in contractual trade rather than equity-based investments. This explains to a certain extent why some emerging economies have strong vertical FDI inflows while exhibiting softer complementarity elasticities compared to advanced economy's elasticity estimates (Okara, 2023).

- Technological Change and Digitalization

Technological change above all has gradually altered the FDI–trade nexus by digitalizing the delivery of products and services through e-commerce, and the trading of intangible assets. Through digital globalization, firms can reach foreign consumers and as such, horizontal FDI becomes less important in terms of market entry strategies, because firms have created online delivery, app ecosystems, and cloud-based platforms (Biber, 2024; Skare & Riberio Soriano, 2021).

At the same time, digitalization fosters the evolution of vertical FDI through ways such as software development process fragmentation, investment in data centre infrastructure around the world, and cross-border engagement in R&D. As AI, fintech, and biotechnologies diffuse globally with the underlying need for intellectual property to protect compute power globally across borders, bilateral investment and FDI overall towards advanced-rich OECD economies, and FDI in general has increased . This technological shift aims to explain the dwindling nature of horizontal FDI substitution over time in ICT industries, and the sustained pace of vertical complementarity (Biber, 2024).

- Global Value Chain Realignment

The ongoing reconfiguration of GVCs illustrates increased pressures towards regionalization, friend-shoring, and strategic autonomy. Specifically, trade tensions, climate regulations, and geopolitical uncertainty are prompting firms to source inputs within shorter supply chains, strategically reposition nodes of trade over spatial proximity to home markets, and diversify their exposure to geographic sourcing options. Thus, while vertical FDI remains an important complement to trade, the quantity of GVCs and the international fragmentations of production has flattened since its peak in the early 2010s (Hermida et al., 2022).

Three examples in particular highlight these dynamics: the North American reshoring of semiconductor production, the European policy to produce batteries domestically, and Asia's attempts to reduce dependence on single China-centred assembly points. These examples also help to provide an explanation for the post- pandemic decline

in vertical FDI elasticities by indicating firms' increased concern for redundancy and resilience, in addition to efficiency (Contractor, 2022).

The detailed empirical patterns previously discussed that occurred due to a combination of characteristics conditional on the sector, macro-economic, or institutional changes, technological changes, and attempts to re-align production describe individual dynamics in previous Chapter . These explanations provide an invaluable channel upon which to provide recommendations for policy that can further enhance the complementarities of trade–FDI, while simultaneously reducing the likelihood of disruptions from future shocks, discussed in-depth in next part.

3.6.8. Recommendations and Perspectives

The quantitative evidence and analytic interpretations provided in the previous chapters offer a rich canvas to craft actionable policy options that enhance the positive interaction of foreign direct investment (FDI) with international trade and increase the long term competitiveness and resilience of OECD economies. Policymakers are required to be flexible and multi-dimensional when weighing efficiency, security and sustainability, and respond to current debates around changing global value chains (GVCs), digitalisation, and geopolitical uncertainties.

3.6.8.1. Align Trade Policy with FDI Promotion

The evidence shows that vertical FDI is a strong complement to trade. Therefore, not only should trade policies consider the reduction of tariffs, but they should aggressively implement strategies to attract FDI that enhances GVC integration, including BITs, PTAs, and investment facilitation measures that conform to WTO standards that simultaneously reduce barriers to trade and investment (Li, 2021).

Advanced economies should also coordinate trade and investment policies that will advance export-platform FDI, which allows firms to locate the production stages in OECD regions, but allow for trade across borders. For example, regional trade agreements, such as the USMCA, EU Single Market, and CPTPP are examples of agreements where FDI and trade reinforcing each other through coordinated liberalization

(Tamberi, 2024).

3.6.8.2. Incentivize Vertical FDI in Strategic Sectors

Policymakers should aim to promote vertical FDI flows that improve the degree of domestic participation in the global production networks. Targeted incentive policies for suitable sectors include renewable energy; ICT hardware; pharmaceuticals; and advanced manufacturing. This will encourage inward investment and export capacity, simultaneously. Strategic vertical FDI can be facilitated across both the burden of taxation as well as rates of R&D subvention; through enhanced technology partnerships; and along areas such as expedited approval processes and other standards (Narula & Dunning, 2010). All of which can help facilitate the host influence participation in global supply chains and produce spillover effects in terms of skills enhancement, upgrading; technology spillovers; and export diversification (Hoekman & Sanfilippo, 2023).

3.6.8.3. Reinforce Institutional and Regulatory Quality

The empirical analysis reveals that good institutional quality plays an important role in strengthening FDI–trade complementarity. Strong rule of law, predictable regulatory regimes, transparency in investment screening, and strong intellectual property protection all reduce the uncertainty of the operational environment and deepen commitments by multinationals to invest in their supply chain.

Governments can improve the quality of their institutions to strengthen FDI– trade complementarity. They ought to strengthen anti-corruption comprehensive frameworks, streamline cross-border legal standards, and/or develop independent regulatory bodies to ensure stable business environments. Frameworks, like the OECD Codes of Liberalisation and Investment Policy Reviews, represent institutional points of reference, which offer an opportunity to support the work of governments in sustaining FDI–trade complementarity (Wang et al., 2023).

3.6.8.4. Build Resilient and Flexible Global Value Chains

Global crises like the financial crash of 2008, the trade wars, and now the COVID-

19 pandemic, have highlighted fragilities in hyper-globalized supply chains. Policymakers should promote resilience-oriented GVC restructuring that considers efficiency meaning we want some redundancy and diversification in our logistics systems (Peter, 2025).

Incentives for regional diversification, nearshoring, dual sourcing and strategic stockpiling of critical inputs (semiconductors, pharmaceuticals, energy infrastructure) can help to insulate trade–FDI complementaries from future disruptions. Initiatives can promote private-public coordination type platforms that can frame resilient investment decisions for firms but also protect open lines of trade (Auboin et al., 2021).

Policymakers from across the OECD face an important challenge: modernizing investment promotion and trade liberalization policies including, recognition of FDI (foreign direct investment) as both substitutes and complements for international trade. By promoting vertical FDI, improving institutional environments, and facilitating GVC's (global value chains) resilient design, governments can create a sustainable trade and investment environment with mutually reinforcing flows which allow for long-term growth, technological upgrading, and geopolitical stability.

3.6.9. Perspectives for Multinational Firms

The empirical trends examined in this paper have important implications for international business (IB) in the context of cross-border financing through foreign direct investment and international trade. As MNEs navigate a challenging and increasingly complex global environment that is influenced by the effects of digital transformations, institutional heterogeneity, macroeconomic shocks, and supply chain realignment, these firms will need to make strategic FDI decisions under the uncertainty that accompanies them. This section provides actionable insights to MNEs, which are informed by the sectoral, temporal, and geographic factors explored above.

3.6.9.1. Adaptating FDI Strategies in a Hybrid Globalization Environment

MNEs are increasingly required to combine their physical foreign investment with digital internationalization to maximize their global market exposure. The diminished

FDI substitution effect in the horizontal sense, especially in ICT, is a somewhat stark illustration that platform-based service delivery is enabling firms to facilitate international expansion without replicating full-blown physical subsidiaries (Luo, 2022).

Manufacturing firms must navigate a dual track in using physical investments for their crucial assembly stages but make use of digital technologies to enable visibility in the supply chain, remote monitoring, and customer integration. Firms focused on services and ICT can take advantage of trade in intellectual property across borders, emerging debt analytics, and cloud platforms that can complement their physical investment presence (Bamakan et al., 2022).

3.6.9.2. Sector-Specific Strategie Guidelines

- Manufacturing

Multinational enterprises (MNEs) ought to focus their vertical FDI structures on integrating host-country suppliers into global production networks while concentrating core high-value activities (research and development, design, branding) in home economies. In areas where labor cost advantages are fluid (e.g. Central Europe and Southeast Asia), organizations can remain cost-competitive while preserving cross-border trade connections (Li et al., 2024).

- ICT

ICT businesses face this challenge of global data centre investment while navigating differing intellectual property protections and inter-country data flow regulations. Hybrid models consisting of both physical investment (server farms, regional hubs) and digital service exportation can maximize scalability while adhering to multiple different, nation specific, data governance frameworks (Kothandapani, 2024).

- Renewable Energy

Using joint venture options and public-private partnerships is a model MNEs pursuing renewable energy can utilize to navigate the complexity of host-country

regulation as permitting is often a lengthy process. MNEs pursuing vertical FDI is the right solution but a careful assessment of possible collaborations that includes local private and/or public stakeholders can help MNEs ensure compliance with regulations, acceptance within local markets, and gain access to sustainable energy projects (Pinilla-De La Cruz et al., 2022).

3.6.9.3. Managing Institutional and Regulatory Risk

The geographical evidence demonstrates that variations in institutional quality imply differing levels of risk. MNEs investing in emerging OECD markets will have to do some due diligence regarding contract enforcement, dispute settlement options, or investment screening.

Political risk insurance, bilateral investment treaty coverage, and working with local legal professionals can help firms manage uncertainty regarding governance; and firms will need to develop compliance capacities to operate within rapidly evolving foreign investment screening legislation in advanced economies, particularly as they apply to "strategic sectors" designated as critical to "national security" (Voon & Merriman, 2022).

3.6.9.4. Navigating regionalization and Global Value Chain Realignment

MNEs ought to prepare for additional regional consolidation of supply chains driven by trade wars, regulatory changes and strategic autonomy agendas. North America, Europe and East Asia are all examples of regions of cluster where close to end-markets and geopolitical stability outweigh efficiency.

Multiple flexible manufacturing systems, redundant suppliers and nearshoring can improve resilience. Firms are able to reduce efficiency by geographically diversifying production, while still protecting borderless trade flows during intense systemic shock (Moradlou et al., 2021).

Multinational enterprises deal with a level of complexity in global FDI–trade, with which they have never had to deal before. However, by using hybrid investments,

optimizing sectoral strategies, managing institutional risk proactively, and regionalizing their supply chains, MNEs will be better placed to navigate the changing nature of globalization while retaining a level of growth. The strategic adaptations offer a reflection of the core empirical findings of this research and provide a means of sustaining competitive positions in the future wave of globalization and global economic integration.

3.7. Study Limitation and Direction for Future Research

3.7.1. Data Limitations

Although this research provides a thorough empirical and theoretical exploration of the relationship between foreign direct investment (FDI) and international trade in the OECD context, the study design, data availability, and methods do not come without limitations. Understanding these limitations will both protect academic integrity and provide an avenue for future researchers to expand upon and elaborate on the findings presented herein

The analysis is based mainly on macroeconomic datasets released to the public by the OECD, UNCTAD, the World Bank, and national statistical agencies. Although the majority of datasets of this nature are, on average, of decent quality, there are some limitations. First, the comprehensive sectoral disaggregation of FDI flows remains difficult, especially the distinction between horizontal studies and vertical FDI in official statistics. Thus, we utilized necessary proxy variables and indirect estimation approaches to quantify the distinctions, e.g., industry classifications and export-orientation variables being used as indicators of investment motives.

Second, the coverage of new OECD members (e.g., Chile, Turkey, Mexico) is sometimes limited for certain periods, especially with respect to disaggregated sectoral flows. Finally, intrafirm trade flows are also curtailed, which would have allowed for a more nuanced picture of global value chain behavior overall.

3.7.2. Sectoral and temporal Coverage Constraints

Even if three representative sectors—manufacturing, ICT, and renewable energy—

were analyzed, other sectors which could have differential FDI–trade outcomes (e.g., financial services real estate, logistics, agriculture) were excluded. Their inclusion may uncover different substitution or complementarity patterns.

In addition, a time frame of 2000–2024 is long enough to encompass multiple global economic cycles, it could overlook historical patterns of FDI–trade interactions especially before the globalization boom in the late 1990s. Future research could employ historical panel methodologies or longitudinal multi-decade case studies.

3.7.3. Methodological Considerations

This analysis, like any large-scale empirical analysis, has several limitations in regard to methods. First, the econometric estimation of FDI–trade elasticities involves endogeneity, as FDI and trade may potentially be simultaneously endogenous. While the use of panel regression and sector-specific fixed effects may go some distance in addressing this issue, there are other methods, such as structural modelling or using instrumental variables, that could also strengthen causal inference.

Second, there remain methodological challenges in accurately measuring horizontal versus vertical FDI. We have taken care to use the accepted proxies delineated in the Knowledge-Capital Model framework, but direct data on intra-firm transactions, ownership types, and contract types would have helped us sharpen our measures. Third, some general assumptions about the model such as linear functional form, and homogeneity in the sectoral classifications, may underestimate the complexity of behavior on the part of firms.

3.7.4. Future Research Perspectives

A number of promising research extensions arise from these limitations. First, extending the analysis beyond OECD countries to include developing and emerging nations would be a useful test of the generalizability of FDI–trade complementarity under different institutional contexts. The patterns that would emerge in investigations of regions such as Sub-Saharan Africa, Southeast Asia, and South America, may differ, especially with Gecko from an increasing trend in South-South investment flowed.

Second, the inclusion of ESG dimensions may be illuminating in determining how FDI–European Union (EU) decisions are made owing to sustainability considerations. The importance of green FDI, climate change risk mitigation, and responsible investment policies suggest ancillary new explanatory variables that, while not yet recognised, could be tested in FDI models.

Third, a more sophisticated modelling of the flows of digital FDI, that is: aspects smaller space-distanced intangible capital and cross-border data flows; or digital platform99/index investments, that transcends traditional FDI measures of the rapidly evolving Whether in ICT sectors, include tests-primary business models.

Finally, high-resolution high-frequency data analytics, natural experiments (for example: geopolitical events such as Brexit, US-China trade wars), or accusations of flexible use of options shape pestering economic developments, and firm-based micro panel studies, can depict a more dynamic picture of how global value chain responses occur during an episode of shocks.

This paper offers an excellent empirical base while acknowledging some definitional, data, and modelling limitations that can be improved upon in the future. As the sphere of sectors is extended, as econometric identification is improved, and as new global trends such as digitalization and ESG are briefed to inform the academic community, future work can develop the understanding within an increasingly complex global economy.

CONCLUSION

This dissertation examined the complicated relationship between FDI and international trade, with a view to analyzing geographically and temporally the possible complementarity and substitution of FDI and international trade at the sectoral level across OECD countries. In an increasingly interdependent global economy with rapidly transforming value chains, a near-constant cycle of technological transformation, and persistent geopolitical uncertainty, the interplay of FDI and trade flows, both from a theoretical and a policy perspective, remains an important pursuit. The overall aim of the research was to test whether vertical FDI tends to complement trade flows and, whether horizontal FDI tends to substitute them for the same set of countries while also addressing to what extent the interaction varies over time, by sector, and across countries.

Theoretically, the research was steeped in the Knowledge-Capital Model, Brainard's proximity-concentration trade-off (1997), and Gravity Models of international trade. The combination of these frameworks provided a suitable avenue for exploring and differentiating between horizontal and vertical FDI, and how their relative impact on trade flows, alongside both 'horizontal' and 'vertical' FDI. Horizontal FDI, for instance, is one where market-seeking motivation dominates, and in this case, horizontal FDI substitutes an additional export, while vertical FDI is motivated by being cost efficient through greater specialization along a world value chain and as a result, complements trade because trade usually means greater cross- border movement of intermediate goods and services.

With respect to the empirical analyses - by sector, time, and country - there were some discernible patterns. Manufacturing sectors were marked by strong horizontal substitution (-0.35 elasticity) alongside vertical complementarity (+0.45 elasticity). In terms of ICT sectors, horizontal substitution was slightly weaker (- 0.12) combined with strong intervention vertical complementarity (+0.52), signifying the overall trends of accelerating digital globalization. With respect to renewable energy, it was found to have pure vertical complementarity (+0.61). In terms of temporal activity, FDI–trade complementarity exhibits slight weakening after the global financial crisis, and possibly post-pandemic, yet there remains little doubt about strength of the ties between FDI and

trade. This research adds to the scholarly literature, as it provides what is likely the most granular sectoral, temporal, and geographic decomposition of the FDI–trade relationship in the OECD environment. It both reinforces and builds on the fundamental theories of international economics, as it provides strong empirical evidence to support claims of the sector-specific utilization of the Knowledge-Capital Model and increasingly emphasized digital trade and institutional quality in FDI–trade relationships, amongst other substantive details.

In practical terms, the thesis outlines plausible recommendations for governments that are focused on promoting trade through the lens of vertical FDI attraction, institutional capacity enhancement, and resilient GVC design. The essay elucidates concrete strategic recommendations for multinational firms trying to make sense of regionally concentrated investment trends, risks associated with variation in institutional quality, and managing hybrid digital-physical internationalization models in a fast-changing global economy. The recommendations are evidence-based and constructed while being mindful of sectoral dynamics, specific geographic contexts, and temporal changes across a variety of policy and business reactions.

While it provides some robustness of empirical findings, this thesis recognizes that limitations exist related to sectoral breadth, availability of data associated with modest degrees of lost opportunities, devolvement of methodology to a subordinated distinction among forms of FDI, and access to data that is free of potential biases associated with discreteness. For example, while the absence of disaggregated firm-level came from inclusion and exclusion criteria, this prevented from making an absolutist classification of FDI and precluded the thesis with measuring for intra-firm-trade dynamics. The proxy variable measure of vertical FDI and horizontal FDI is rather grounded within accepted definitional practice of academia, it paired with the layered modeling, introduces some risk for inference. Moreover, while the datasets constitute carefully maintained geographic consistency and quality supplied by the OECD, the thesis reaches limits to exponential generalizability to non-member developing economies with vastly different institutional and trading structures.

Future research therefore should take into account this level of analysis and debate

beyond the OECD context by consider incorporating a emergent or developing economies to determine whether sectoral FDI–trade dynamics would appear similar to negotiate differing institutional frameworks. A further consideration would be to include more nuanced framing of ESG-related dimensions of FDI models, which would help explain how priorities related to sustainability factor into investment–trade channels, especially in sectors that could be considered climate related. Some additional consideration could also be the need to firmer measures of digital FDI such as expounding on intangible capital, data flows, and platform investment contours to more accurately sample for globalization in a digital phase of globalization. The degree of resolution via the utilization of high-frequency, or in real time, data best reflects ongoing geopolitical, as well as macroeconomic dynamics in contagious countries.

At a time when a pandemic has disrupted supply chains and engendered more nationalist impulses while there is volatility owing to geopolitical tensions, accelerated technological shock, climate mitigations, and overall structural instability, change in FDI and trade will remain dynamic and consequential. The thesis is empirical in providing clarity of these changing dynamics while opening up meaningful pathways for both institutional actors and firms to maintain engagement with global economic interconnectedness and stability in an era of advancing complexity. With the conception of globalization constantly changing, given the dual phenomena of fragmentation and reconfiguration, the ability to fully comprehend and dualistically manage the FDI–trade is key to achieving inclusive, sustainable, and resilient economic development.

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