Cover Letter

Dear Organizers of the NBER Workshop on Development Economics and Networks,

I am writing to apply to the NBER Workshop on Development Economics and Networks for Early-Career Researchers, to be held on December 5, 2026, in Cambridge.

I completed my PhD coursework at Trier University, Germany, in 2026, and I am currently developing my research agenda in international economics, foreign direct investment, trade interdependence, and the changing economic relationship between Europe and China. Over the past year, I have also presented my research at several international academic conferences, which has allowed me to further develop my research and receive feedback from researchers working on international trade, investment, and global production networks.

Among these experiences, one of the most valuable was my participation in the International Trade and Finance Association conference in Poznań (Poland) in June 2026. I presented my research in a session chaired by Dr. Oscar Lemmers (o.lemmers@cbs.nl), Senior Researcher at Statistics Netherlands (CBS) and Vice-chair of the OECD Expert Group on Accounting Frameworks for Measuring Economic Globalization. The discussion in that session was particularly relevant to my research interests in trade interdependence, foreign direct investment, and the measurement of international production linkages.

If my application is shortlisted, I would therefore be very pleased to ask Dr. Lemmers to serve as my faculty recommender, as his expertise and familiarity with my research would make him a particularly appropriate person to provide a recommendation.

For the workshop, I would like to present my current research on the relationship between trade dependence, indirect production dependence, and the location of foreign direct investment in Europe. The project builds on my earlier work, *Trade and Investment Connectivity in Europe and the Chinese Influence* (Dorakh, 2026), and develops the analysis further by distinguishing direct bilateral trade dependence from dependence that arises through intermediate inputs embedded in domestic production. The automobile industry provides the most prominent empirical example of this mechanism, given the increasing integration of European automotive production with Chinese inputs and investment.

I am particularly interested in the NBER workshop because it brings together early-career researchers working on frontier empirical questions related to development economics and networks. I would value the opportunity to receive feedback on the measurement of indirect production dependence, the empirical identification of its relationship with FDI, and the broader implications of production networks for international investment decisions.

Please find attached my research abstract and CV. If my application is shortlisted, I will provide the requested faculty recommender information.

Thank you for considering my application. I would be very pleased to participate in the workshop, present my research, and contribute to the discussion with other early-career researchers.

Sincerely,

Alena Dorakh

Alena Dorakh



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EDUCATION

Ph.D. in International Economics — Trier University, Germany — 12 Feb 2026
Thesis: Trade and Investment Connectivity in Europe and the Chinese Influence. Grade: magna cum laude

M.Sc. in Economics — Trier University, Germany — 2019

M.A. in International Economics — University of Warsaw, Poland — 2018

M.A. in Management — HSE University, Moscow — 2014

B.Sc. (Honors) in Accounting, Audit & Analysis — Belarusian State Economic University, Belarus — 2000

RESEARCH EXPERIENCE

Research Assistant (Rhineland-Palatinate Research Initiative Framework) — Research Project: ”FDI and Trade in Europe”, Trier University, Germany — Aug – Oct 2025

Research Visitor — Business Analytics Research Center, Chang Gung University, Taiwan — Aug – Sep 2023

International Intern — National Science and Technology Council, Taiwan — Sep – Dec 2023

Student Assistant — Research Project: “China: Structure of the Mineral Industry”, Trier University, Germany — 2020 – 2021

Student Assistant — International Trade Course, Chair of International Economic Policy, Trier University, Germany — 2019 – 2020

Research Intern — Management Department, University of Bologna, Italy — 2010 – 2011

Assistant Professor, Lecturer (Finance & Banking Faculty) — Belarusian State Economic University, Belarus — 2005 – 2013

RESEARCH & PUBLICATIONS

Peer-reviewed publications:

Author	*Title*	*Journal*	*Year*
Dorakh A.	FDI, trade interdependence, and functional integration: The role of EU membership and Asian investment.	National Accounting Review, 8(1), 116–149. https://www.aimspress.com/article/doi/10.3934/NAR.2026006	2026
Dorakh A.	Trade and Export-Platform Effects in European FDI.	Sci Set Journal of Economics Research, 4(6), pp. 01–09. https://doi.org/10.63620/MKSSJER.2025.1100	2025
Dorakh A.	FDI and trade reshaping semiconductor supply chains: Southeast Asia’s growth, Viet Nam’s influence and European interest	Proceedings of the 3rd International Conference on Sustainable Development in The New Context: Country and Firm-level Perspectives. Foreign Trade University, pp. 317–338.	2025
Dorakh A.	Interdependence and specialization in the global semiconductor industry	Journal of Infrastructure, Policy and Development, 8(6). https://doi.org/10.24294/jipd.v8i6.2436	2024

Dorakh A.	Industrial Digital Interdependence and FDI Restrictiveness as Determinants of FDI for Eastern European Economies	Intranational Politics [Međunarodni problemi], 74(1189). https://doi.org/10.18485/iipe_mp.2023.74.1189.5	2023
Dorakh A.	Trade and FDI Connectivity in Europe	Eastern Journal of European Studies, 13(2). https://doi.org/10.47743/ejes-2022-0202	2022
Dorakh A.	FDI Determinants in Europe and Chinese Influence	Serbian Journal of Management, 16(2). http://dx.doi.org/10.5937/sjm16-22279	2021
Dorakh A.	Gravity Model Analysis of FDI across EU Member States	Journal of Economic Integration, 35(3). https://doi.org/10.11130/jei.2020.35.3.426	2020
Dorakh A.	FDI Determinants in the European Union: Empirical Application	Scientific Annals of Economics and Business, 67(2). http://dx.doi.org/10.47743/saeb-2020-0012	2020

Conference presentations:

36th Annual Conference of the International Trade and Finance Association (ITFA), Poland	Jun 2026
Ethics of Business, Trade & Global Governance Conference, USA	Feb 2026
ICGE 2025 Conference, Viet Nam	Dec 2025
35th International Trade and Finance Association Conference, USA	May 2025
International Conference on Sustainable Development, Viet Nam	Apr 2024
DIGITIMES Supply Chain Summit, Taiwan	Nov 2023
Taiwan as Pioneer Workshop, University of Tübingen, Germany	Oct 2023

RELEVANT TRAINING

Operations Research: Models & Applications — National Taiwan University	2025 – present
Semiconductor Supply Chain Management — Chang Gung University, Taiwan	2023
Trade Policy Analysis with the Structural Gravity Model — Drexel University, USA	2022

HONORS & AWARDS

Research Grant, Funding Award for Early Career Research — Initiative of Rhineland-Palatinate, Germany	2025
Fellow, International Trade and Finance Association (in recognition of outstanding research), USA	2025
DAAD Scholarship — PhD Final Stage, Germany	2025
TAP (Taiwan as a Pioneer) Travel Grant, Germany / Taiwan	2023
DAAD Scholarship — Master's Final Stage, Germany	2019
Erasmus+ Mobility Grant (KA103) — European Union	2018
V4EaP Master & Post-Master Scholarship — International Visegrad Fund, Slovakia	2016

PROFESSIONAL AFFILIATIONS & RECOGNITION

Domain Expert (Economics, Trade & Finance), JT AI Labs, France	2026 – present
Member, International Trade and Finance Association (ITFA), USA	2025 – present
Member, Agricultural & Applied Economics Association (AAEA), USA	2025 – present

SOCIAL ENGAGEMENT

Volunteer: companion for elderly citizens — “Orthodoxe Kirche”, Saarbrücken	2019 – present
Volunteer: Dementia Care — VerRus D e.V., Trier	2020 – present

IT SKILLS

Software	Stata, R, Python, EViews, Gurobi

Alena Dorakh
Statement of Research Interests and Motivation

My research focuses on international economic interdependence, foreign direct investment (FDI), trade, and the changing organization of production between Europe and China. I am particularly interested in how firms respond when international economic relationships become more interconnected but also more uncertain because of trade restrictions, geopolitical tensions, and changes in market access. My current research asks a basic question in international economics: why do firms choose FDI rather than continue serving a market through exports? Traditional theories emphasize market size, trade costs, and the choice between horizontal and vertical investment. I add another dimension by examining how foreign inputs are embedded in domestic production.

I distinguish between direct trade dependence and indirect production dependence. Direct dependence captures bilateral trade between countries, while indirect dependence arises when foreign intermediate inputs are embedded in domestic production, including production that is subsequently exported to third markets. This distinction is increasingly important because aggregate bilateral trade statistics may not capture the extent to which domestic production depends on foreign inputs.

My current paper , *Trade Dependence, Indirect Production Dependence, and the Location of FDI in Europe*, builds on my earlier research, *Trade and Investment Connectivity in Europe and the Chinese Influence* (Dorakh, 2026). My previous work finds that stronger trade interdependence is associated with higher FDI and that this relationship differs across European host economies. The new project asks whether indirect production dependence can explain FDI location beyond direct trade dependence.

The automobile industry is the most prominent empirical example of this mechanism. European automotive production is deeply integrated across countries and increasingly connected to Chinese suppliers and producers. Chinese intermediate inputs can therefore become embedded in European production even when final vehicles are produced in Europe. At the same time, Chinese automobile firms are expanding production capacity within Europe. This provides a particularly clear setting in which to examine the interaction between trade, production dependence, and FDI. The automobile industry is used as the main sectoral application, while the underlying mechanism is intended to extend beyond this sector.

I am particularly interested in the NBER Workshop on Development Economics and Networks because its focus on empirical network research provides an opportunity to develop the measurement of production linkages beyond conventional bilateral trade relationships.

I would especially value feedback on how to measure indirect production dependence, identify its relationship with FDI, and distinguish the effects of market size, trade integration, and production linkages.

More broadly, my research agenda seeks to understand how firms and countries adjust their international production and investment relationships as economic integration increasingly coexists with geopolitical and policy uncertainty. I believe that combining trade dependence with production linkages can provide a more complete understanding of contemporary economic interdependence and the changing geography of foreign investment.

Trade Dependence, Indirect Production Dependence, and the Location of FDI in Europe

Extended Abstract

1. Motivation

Why do firms choose foreign direct investment rather than continue serving a market through exports? This paper argues that the answer depends not only on market size and bilateral trade, but increasingly on how foreign inputs are embedded in domestic production. When trade becomes more costly or uncertain because of tariffs, trade restrictions, or other barriers to market access, firms may have stronger incentives to locate production closer to the destination market.

This incentive is particularly relevant to the changing economic relationship between China and Europe. Europe's relationship with China is moving from one based mainly on trade toward one increasingly shaped by production and investment. Chinese firms are expanding their presence in Europe while European economies are becoming more concerned about dependence on Chinese markets, inputs, and technologies. Yet aggregate trade statistics do not reveal how deeply Chinese inputs are embedded in European production or whether this dependence affects where Chinese firms invest.

The starting point is Dorakh (2026), "Trade and Investment Connectivity in Europe and the Chinese Influence," which shows that stronger bilateral trade interdependence is associated with higher FDI and that this relationship differs across European host economies.

This paper takes the next step by asking whether direct trade dependence is sufficient to explain FDI location, or whether indirect dependence through foreign inputs embedded in domestic production provides an additional explanation.

2. Contribution

The paper connects the classic literature on the choice between exporting and foreign production with recent research on dependence embedded in global production chains. Markusen (1984, 2002) and Brainard (1997) explain the export-versus-FDI decision through market size, trade costs, and the benefits of locating production close to foreign consumers. Helpman (1984) emphasizes internationally fragmented production as a source of vertical FDI, while Melitz (2003) highlights the role of market-access costs in firms' internationalization decisions.

More recent research shows that international dependence cannot always be observed through direct trade. Johnson (2018) emphasizes the importance of input-output linkages for identifying international production relationships. Lovely and Wan (2026) show that Chinese value added can remain embedded in foreign supply chains even

when direct trade patterns change, highlighting the importance of looking beyond observed bilateral trade.

This paper combines these insights with Dorakh (2026). The central distinction is:

- Direct Dependence versus Indirect Dependence

Direct dependence captures the bilateral China–Europe trade relationship. Indirect dependence captures the extent to which European production relies on Chinese intermediate inputs.

The paper asks whether this second form of dependence helps explain where Chinese firms choose to invest, particularly when trade friction makes direct exporting less attractive.

The central mechanism is:

Chinese Inputs → European Production → Indirect Dependence → FDI Location

The paper does not assume that input dependence mechanically causes FDI. Instead, it proposes that the incentive becomes stronger when firms face higher costs or uncertainty from serving Europe through direct exports.

3. Three Channels of FDI Location

The analysis distinguishes three investment motives: market seeking, production dependence, and export-platform access.

1. The traditional **market-seeking mechanism** is:

Large Market → Local Demand → FDI

Direct Trade Dependence

The first empirical measure comes from Dorakh (2026). The bilateral Trade Dependence is defined as:

$$Trade\ Interdependence\ (Trade_I_{ij,t}) = \frac{(Imports_{ij,t} + Export_{ij,t})}{Total\ Trade\ of\ i\ with\ the\ world_t} \times 100$$

The measure captures the importance of the bilateral China–host relationship relative to the host country's total international trade. The previous results show a positive and statistically significant relationship between trade interdependence and FDI.

Indirect Production Dependence

The new contribution is to move beyond bilateral trade and measure how strongly European production depends on Chinese intermediate inputs:

$$IODep_{ist} = \frac{Chinese\ intermediate\ inputs\ used\ by\ sector\ s}{Gross\ output\ of\ sector\ s}$$

This measure asks a different question from bilateral trade: How much does European production depend on Chinese inputs, even when the final product is produced in Europe?

The expected mechanism is:

Chinese Inputs → European Output → Investment Incentive

Export-platform FDI

The third channel is export-platform investment. The measure developed in Dorakh (2026) is:

$$Z_{ijt} = \sum_{k \neq j} \frac{Exports_{ikt}}{Distance_{ik}^{\delta}}$$

A higher Z indicates greater potential for using the host country as a platform to serve other markets. The previous results show particularly strong export-platform effects for developing European economies, while CEE economies display stronger supply-chain characteristics.

4. Empirical Strategy

The empirical analysis proceeds from the established trade–FDI relationship to the new production-dependence mechanism.

Model 1 asks whether direct trade dependence predicts FDI:

FDI = Trade Dependence + Market Size + Distance + EU Status + Fixed Effects

This reproduces and extends the baseline framework of Dorakh (2026).

Model 2 adds indirect production dependence:

FDI = Trade Dependence + Indirect Output Dependence + Controls + Fixed Effects

The key question is whether indirect output dependence explains FDI beyond direct trade dependence.

Finally, the paper tests whether trade friction strengthens this relationship *(Model 3):*

FDI = Trade Dependence + Indirect Output Dependence + Trade Friction + Indirect Output Dependence × Trade Friction + Controls + Fixed Effects

The key coefficient is the interaction between indirect output dependence and trade friction. A positive coefficient would support the hypothesis that when European production is more dependent on Chinese inputs, increasing barriers to direct market access create stronger incentives for Chinese firms to invest in Europe.

The economic intuition is therefore:

Export from China → Trade Friction → Produce in Europe

5. European Application

The empirical analysis covers European host economies and distinguishes between different roles within the European production and market-access system.

The paper focuses on three broad investment strategies:

- Market Seeking
- Production Dependence
- Export Platform

The automotive sector, and particularly electric vehicles (EVs), provides a sectoral application of the new mechanism. EV production is highly dependent on internationally sourced batteries, electronics, components, and other intermediate inputs. This makes it possible to examine whether Chinese input dependence embedded in European automotive production is associated with Chinese investment in Europe.

The EV application is therefore used to test the broader mechanism rather than define the paper itself:

Chinese EV Inputs → European Automotive Output → Indirect Dependence → Chinese FDI

6. Expected Contribution

The paper's central contribution is to shift the analysis of China–Europe economic dependence from how much countries trade directly to how much domestic production depends indirectly on foreign inputs.

Building on Dorakh (2026), the paper retains direct trade dependence as an established determinant of FDI. Building on the recent work of Lovely and Wan (2026), it incorporates the idea that Chinese dependence can remain embedded in production even when direct trade patterns change. The new step is to ask whether this indirect production dependence itself helps explain FDI location.

The resulting framework is:

Direct Trade Dependence + Indirect Production Dependence + Export-Platform Access → FDI Location

The broader implication is that the investment response to trade restrictions may depend not only on the size of bilateral trade, but on where foreign inputs are embedded in domestic production. When production has become dependent on Chinese inputs, rising trade friction may encourage firms to move from exporting to investing, making production dependence an increasingly important determinant of where FDI goes.

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Research article

FDI, trade interdependence, and functional integration: The role of EU membership and Asian investment

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Abstract: The study analyzed how foreign direct investment (FDI) and trade in Europe are evolving, shaped by the interaction between traditional factors, such as EU membership, and emerging drivers, including trade interdependence, export-platform strategies, and Asian investment patterns. A gravity-based empirical framework augmented with newly developed indicators was employed, comprising the Bilateral Trade Interdependence Index, the export-platform indicator, Belt and Road Initiative (BRI) participation, and measures of functional integration, covering over 95% of European countries and their global partners from 2010 to 2023. The findings show that trade dependency with non-EU partners experienced the fastest growth, rising by 55% between 2011 and 2023. The empirical results confirm that stronger bilateral trade interdependence significantly predicts higher FDI inflows. The BRI analysis and functional classification highlight a shift from early infrastructure-focused Chinese investment to a new wave of strategic-sector-oriented FDI in Europe. Since 2018, export-platform strategies have expanded from Europe's core economies to Central and Eastern Europe, creating emerging production hubs, and then shifted toward the Western Balkans and Turkey, possibly reflecting evolving EU regulations and supply chain realignments.

Keywords: export; tariffs; European Integration; gravity model; export-platform FDI; market-access FDI; tariff-jumping; production hubs; the Belt and Road Initiative; EV; semiconductors

JEL Codes: F13, F14, F15, C80

1. Introduction

FDI and trade play a principal role in fast-growing economies, as they are major channels for technological diffusion, capital accumulation, and economic development. Countries that liberalize their trade policies tend to attract more FDI, since foreign investors seek access to broader markets and opportunities to integrate host economies into international production and trade networks that jointly drive industrialization and modernization (Markusen, 1995; Helpman et al., 2004; Rauf et al., 2023; Yeboah et al., 2025). This complementarity is closely associated with the expansion of global supply chains, through which multinational enterprises fragment production across borders, linking trade flows with foreign investment (Grossman & Helpman, 1991; Gereffi et al., 2005). The COVID-19 pandemic and rising geopolitical tensions revealed vulnerabilities in highly specialized and geographically concentrated supply chains, highlighting the depth of international economic interdependence (Baldwin & Freeman, 2022).

In response, policymakers have increasingly reconsidered the balance between openness and protection in trade and FDI: Europe adopted the EU-wide FDI screening framework in 2019 and has seen a renewed use of trade instruments, including tariffs imposed on Chinese electric vehicles in 2024 as part of anti-subsidy measures and the development of minimum price mechanisms in 2026 (European Commission, 2024, 2026). These developments confirm that trade policy has become a key mechanism through which the geography of FDI is actively reshaped, particularly with respect to investment originating from China, as regulatory frameworks seek simultaneously to attract beneficial capital and to mitigate perceived strategic risks (Chaisse & Dimitropoulos, 2023). Chinese FDI has increasingly reallocated from core EU member states to smaller and emerging European economies (UNCTAD, 2025), reflecting changing patterns of functional integration within regional supply chains.

Although EU countries historically accounted for a large share of global FDI inflows, by 2023, the share of core EU countries had fallen to around 1%, the lowest among all world regions. This decline challenges traditional assumptions that market size and EU membership only determine FDI. Instead, supply chain–intensive manufacturing FDI is increasingly flowing to non-core EU countries, emerging EU hubs in Central and Eastern Europe, the Balkans, and other locations such as Turkey, reflecting broader trade and investment developments that are reshaping FDI patterns (UNCTAD, 2025). This shift suggests that multinational firms respond not only to institutional membership or market size but to a country's position within regional trade networks. To capture this transformation, this paper introduces a functional classification of host economies, based on trade interdependence and FDI patterns rather than formal EU status alone. To quantify these effects, we develop a Bilateral Trade Interdependence Index that goes beyond aggregate trade volumes to capture mutual dependency and functional economic integration, even among non-EU countries. In addition, we construct an export-platform indicator to measure the extent to which host countries serve as bases for foreign investors' export-oriented activities.

While deeper trade ties are reinforcing the leadership role of core EU countries within the region, new EU member states and candidates are shifting from passive FDI recipients to active connectors, increasingly serving as production hubs (Table 1).

Table 1. Strategic motivations behind country group roles in Europe.

Group/country	Key reasons
EU core countries	Reinforce internal integration. Enable adaptation to shifting intra-EU flows. Support leadership and global competitiveness.
New EU members	Opportunity to move from passive recipients to active economic connectors. Countries that initially attract market-access driven FDI increasingly act as export-platforms and regional integration hubs.
Candidate countries (Turkey, Western Balkans, Moldova)	Strategic trade partners with strong EU ties, less-regulated countries have the potential to become production and regional supply chain hubs, integrating into broader EU networks.
Asian partners (China, South Korea, Japan, Singapore)	Diversify supply chains to strengthen resilience and maintain global competitiveness.

Source: Author's own analysis.

Eastern and Southern Europe have enhanced their appeal as emerging hubs, bolstered by recent trade shifts and supply chain realignments (UNCTAD, 2025). A ranking of trade interdependence between country pairs from 2010 to 2023 reveals that the fastest-growing interdependence occurs outside traditional EU core pairs, with countries such as Hungary, Romania, Serbia, and Turkey emerging as particularly attractive FDI destinations, especially for Asian multinationals. This pattern demonstrates that functional economic integration in Europe increasingly extends beyond formal institutional boundaries. Thus, we introduce a novel classification of sample countries and define distinct FDI periods to capture phase-specific dynamics in FDI.

In addition, Belt and Road Initiative (BRI) participation is analyzed as a potential driver of FDI, while more recent Chinese investment increasingly targets strategic sectors, contributing to the establishment of emerging production hubs. This shift indicates that BRI-related infrastructure investment has been partly replaced by a new wave of manufacturing-oriented FDI, a distinction further explored in our comparative analysis.

To better understand the motivations behind FDI location choices, we distinguish between two primary drivers: market-access FDI and export-platform FDI. The Trade Interdependence Index reflects the strength of direct economic ties between an origin and a host country and is used as a proxy for market-seeking investment. In contrast, the export-platform indicator captures a host country's capacity to serve as a base for re-exports to third markets. This dual framework also enables us to assess whether trade and FDI act as complements or substitutes. As a result, this study contributes to the literature by showing that, instead of pursuing traditional tariff-jumping strategies, firms have increasingly redirected FDI to third countries as an export platform to access protected markets indirectly.

Based on this approach, we address the following research questions: Do trade linkages explain FDI inflows in Europe? Is there functional economic integration beyond formal EU membership? Are FDI flows primarily driven by market access or by export-platform strategies, particularly for investments originating from Asia? How do Chinese FDI patterns, both BRI-related and in strategic sectors, affect bilateral FDI flows in Europe?

To address these questions, we employ a gravity model of FDI for 42 European host and 40 global origin countries from 2010 to 2023, augmenting traditional determinants with indices

developed for this study, including the Bilateral Trade Interdependence Index, the export-platform indicator, BRI participation, and measures of functional integration, to account for emerging drivers of FDI.

This study proceeds as follows: Section 2 reviews the literature and develops the conceptual framework. Section 3 presents the data and descriptive analysis. Section 4 outlines the empirical strategy and presents the results. Section 5 concludes with the main findings and suggestions for future research. Section 6 provides policy recommendations.

2 Literature review

Although a large body of literature has explored the interplay between trade and FDI, the nature of their relationship remains ambiguous and context-dependent (Maurseth et al., 2025). Some studies highlight complementarities, while others find substitution effects depending on industry, geography, and time period (Pontes, 2004). Martinez-San Roman et al. (2012) suggested that EU trade integration and FDI reinforce each other, thus being complements rather than substitutes in the EU context.

Bergstrand and Paniagua (2024) offer a particularly valuable contribution by employing a novel methodological approach to isolate the effects of individual provisions (e.g., tariff reductions) within deep trade agreements on both trade and FDI flows. Using the World Bank's DTA database, their findings reveal that certain liberalizing provisions may boost trade while discouraging FDI, and vice versa. This underscores that the relationship between trade and FDI is not fixed but can be shaped as either substitutive or complementary by the specific institutional design of trade agreements, highlighting the need to analyze trade and FDI flows jointly rather than in isolation.

Recent research has shifted toward understanding the role of trade policy uncertainty, especially tariffs. While most studies on tariffs and FDI focus on "tariff-jumping" FDI (Kahn et al., 2024; Castelli et al., 2025), where firms establish local operations to bypass import duties, our approach centers on a broader and more strategic relocation of FDI to third countries in response to trade frictions between origin and host economies. This distinction is crucial: rather than viewing tariffs solely as a barrier that firms circumvent by investing directly in the target market, we explore how firms use third countries as an export platform to access protected or geopolitically sensitive markets indirectly.

Several scholars have explored the impact of EU integration on FDI relations within Europe (e.g., Egger & Pfaffermayr, 2004; Bruno et al., 2020; Grieveson et al., 2021; Meinhart, 2024). Camarero et al. (2024) offered a valuable and timely contribution by analyzing how European monetary integration has shaped FDI patterns. While they capture the "euro effect" based on currency and monetary integration, we use trade-based metrics to evaluate the impact of EU integration on FDI.

Aiyar et al. (2024) demonstrated that geopolitical alignment significantly influences the direction of FDI flows, particularly during periods of heightened global tension. Their findings highlight the importance of political interdependence in shaping investment decisions. Our paper complements this perspective by introducing a Bilateral Trade Interdependence Index, which captures the economic dimension of interdependence. While Aiyar et al. (2024) focus on geopolitical ties, we offer a functional economic lens, allowing us to examine how sustained trade relationships foster investment patterns independently of formal political alliances. This allows us to identify

strategic integration effects not only among EU member states but also across non-EU countries and emerging alignments, such as Norway and Turkey.

The gravity model has long served as a leading framework for explaining FDI flows by considering factors such as market size, distance, and institutional ties. This approach aligns with numerous studies that quantify the effects of various determinants on FDI (e.g., Blonigen and Piger, 2014; Kox and Rojas-Romagosa, 2020; Ramanayake, 2025) and incorporates recent advances in trade gravity literature (Larch and Yotov, 2025).

Based on the methodological recommendations of Larch et al. (2025), our analysis employs the Poisson pseudo maximum likelihood (PPML) estimator to address heteroskedasticity in bilateral FDI data and to incorporate zero FDI flows. To mitigate potential endogeneity and omitted variable bias, in addition to our constructed Bilateral Trade Interdependence Index and export-platform indicator, we include a rich set of fixed effects: origin-time and host-time fixed effects, ensuring a more robust identification of the relationship between trade and FDI.

While the concept of export-platform FDI is not new, empirical applications have often centered on non-European contexts. Ekholm et al. (2007) provided a theoretical framework for export-platform FDI, where multinational firms invest in a host country not to serve its domestic market but to re-export to third countries. Ito (2013) built on this by offering foundational empirical evidence, showing that a significant portion of U.S. outward FDI is directed toward export-platform strategies, especially within North American regional production networks. However, comparable empirical evidence remains limited for Europe, where the role of countries—both within and outside the EU—as re-export platforms has been underexplored. Our study extends this line of inquiry by developing a novel export-platform indicator tailored to the European context. This indicator specifically accounts for European distances, trade costs, and regional integration patterns, capturing the extent to which host countries serve as emerging production hubs for accessing third markets. For other regions, such as Asia, both distance measures and associated parameters would need to be adjusted to reflect different geographic and economic conditions.

Tamberi (2024) exploited the 2016 Brexit referendum as a natural experiment to investigate how trade policy uncertainty influences FDI. Using data on greenfield manufacturing FDI projects in the UK, the study showed that anticipated barriers to EU market access led to a decline in FDI. This evidence highlights the importance of export-platform considerations in FDI decisions. While Tamberi focuses on the UK's post-Brexit context, our study builds on this perspective by introducing a systematic framework to measure export-platform potential and trade interdependence across a wider set of European countries, including both EU members and their external partners.

Moreover, to address potential endogeneity, a persistent challenge in trade-FDI studies (Blonigen & Piger, 2014), we construct a rank-based instrument using the relative position of the host country's export-platform indicator.

Chinese FDI in Europe is often associated with the Belt and Road Initiative (BRI), launched in 2013. While early studies primarily emphasized infrastructure investment (Chen & Lin, 2018; Yu et al., 2019), more recent research highlighted a gradual diversification of Chinese FDI toward strategic sectors (Casarini, 2024; Nedopil, 2025). However, the effects of the BRI are heterogeneous: participation in the initiative has been found to be negatively correlated with Chinese investment in advanced economies (Yu et al., 2019), and evidence suggests that its impact on FDI typically materializes only after a lag of five to seven years (Todo et al., 2025). This study incorporates both

perspectives by analyzing BRI participation as a potential driver of FDI through infrastructure and strategic-sector investment, thereby capturing how these flows increasingly target emerging European hubs as the scope of the BRI.

Moreover, while Boeckelmann et al. (2024) analyzed FDI fragmentation through the lens of geopolitical blocs—grouping countries into Western (U.S.-aligned), Eastern (China-aligned), and Neutral blocs—our approach instead focuses on the functional roles countries play in global production networks.

In response to gaps in the literature, this study contributes by integrating both traditional and emerging determinants of FDI into a unified analytical framework. It advances existing research by:

1. developing novel indicators, the Bilateral Trade Interdependence Index and the export-platform indicator, to capture functional economic integration and export-oriented investment strategies;
2. distinguishing between BRI participation and Chinese strategic investment;
3. empirically examining how these factors have reshaped the geography of FDI across 42 European host and 40 global origin countries from 2010 to 2023; and
4. addressing potential endogeneity through a rank-based instrument while reclassifying European countries according to their functional roles, identifying emerging investment hubs beyond EU membership.

3. Descriptive statistics and methodology

3.1. Regional and global FDI statistics overview

Europe's FDI inflows shifted from large negative levels in 2021–2022 to slightly positive in 2023, largely influenced by conduit economies such as Ireland, Luxembourg, the Netherlands, Switzerland, and the United Kingdom, through which a significant portion of FDI passes without remaining in the country. Since the negative flows in these countries were smaller in 2023, this created a net positive effect on overall European FDI, while excluding these economies, inflows to the rest of Europe declined by 14% (UNCTAD, 2024). Moreover, although European countries historically accounted for 35% of global FDI, their inflows have declined dramatically over the past three years (Figure 1).

As seen from Figure 1, over the period 2010–2023, Europe has seen a marked decline in its share of global FDI inflows. In 2010, Europe was one of the top recipients, attracting 32.7% of total FDI, similar to America. In 2010, Asia and Europe had almost equal FDI inflows, with 32.6% for Asia and 32.7% for Europe, indicating balanced interest in both regions. By 2016, Europe held a more prominent position with 36.8%, surpassing America and Asia. However, in 2023, Europe's overall FDI inflow dropped dramatically to just 0.98%, the lowest among all regions (UNCTAD, 2024). This decline illustrates that the historical advantages of being in Europe (or the EU core) are no longer sufficient to attract FDI, highlighting the relevance of new FDI determinants.

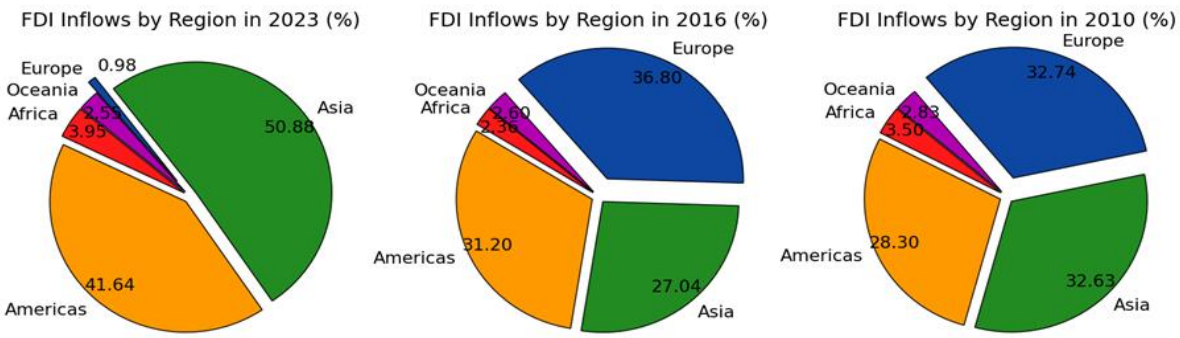


Figure 1. Foreign direct investment by region (2010–2023), % of global total. Source: Author's own analysis based on the UNCTAD dataset. Note: Europe's FDI share is compared with the Americas, including North and Latin America (UNCTAD, 2024).

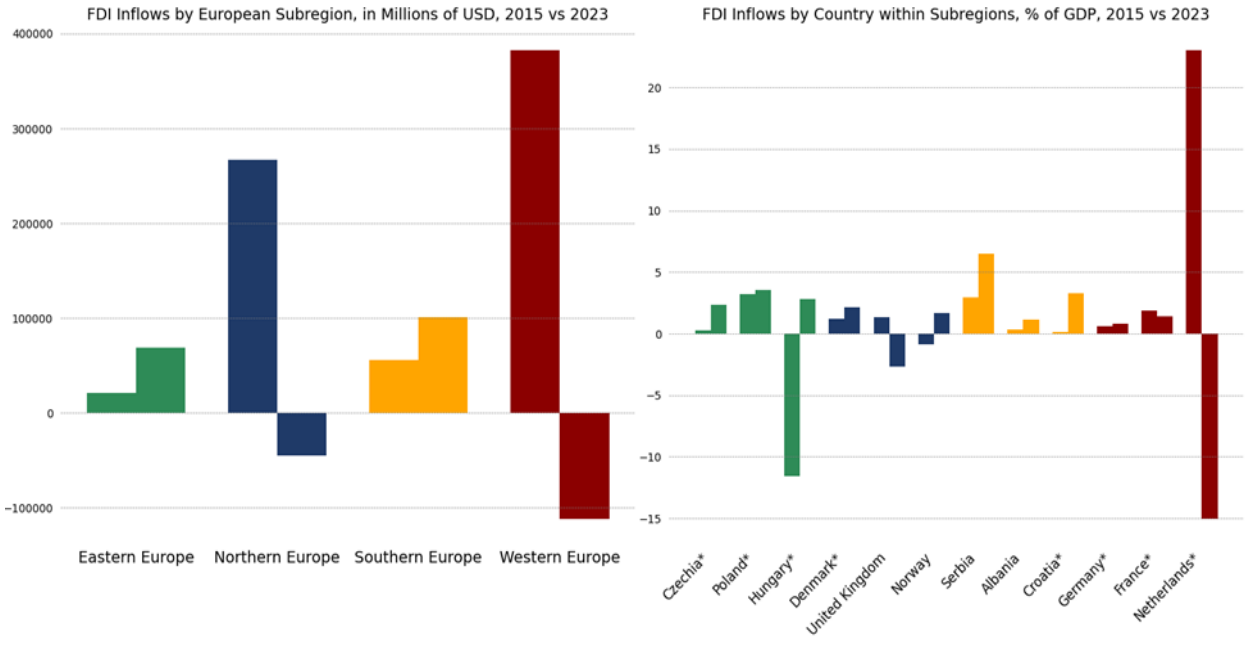


Figure 2. European FDI by subregions in 2015 and 2023. Source: Author's own analysis based on UNCTAD dataset.

Despite this regional decline, specific areas within Europe experienced notable growth. In Eastern Europe (Figure 2), FDI inflows more than doubled, highlighting the region's rising attractiveness to investors. In contrast, Western Europe saw a significant decline in FDI inflows from 2015 to 2023, signaling a shift from traditional EU investment hubs toward Eastern and Southern Europe, which are emerging as new centers of FDI activity.

For a more detailed analysis, we disaggregate the four European subregions (Eastern, Northern, Southern, and Western Europe) and select three representative countries in each group based on economic significance (Figure 2).

Figure 2 illustrates that FDI as a percentage of GDP rose markedly between 2015 and 2023 in Hungary, Serbia, Croatia, and Albania, with Serbia reaching the highest share in the region, exceeding 5% of GDP, whereas it declined in the UK and France.

Geopolitical tensions are driving a strategic push to establish reliable local supply capacities. Countries and economic blocs, including the EU, USA, and China, are scrambling to "de-risk" their economies by reducing dependence on foreign suppliers for critical goods such as semiconductors, rare earths, and EV batteries. This shift is fueling a reorientation of FDI, particularly toward the localization of EV and semiconductor supply chains within Europe.

Although investors from EU core countries remain the primary source of FDI inflows into Europe, their share has been gradually declining. Notably, 2019 marked the first year in which European investors accounted for less than 70% of total FDI inflows in the region. In contrast, Asian investors, particularly from China, have recently increased their share of FDI in Europe, although they still account for a smaller portion compared to European investors. While Chinese FDI in Europe initially increased under the Belt and Road Initiative (BRI) after 2013 and reached its peak in 2016, it is now primarily directed toward strategic sectors such as electric vehicles (EVs), batteries, advanced manufacturing, and export-platform investments, rather than infrastructure projects.

Launched in 2013, the BRI remains a global framework aimed at enhancing regional connectivity, trade, and investment across Asia, Europe, and Africa. By 2023, over 150 countries had signed Memorandums of Understanding (MOUs) under the BRI, with cumulative BRI-related investments exceeding USD 1 trillion (Nedopil, 2025). The initiative includes most low- and middle-income countries worldwide, as well as several developed economies in Eastern Europe. Among Western European nations, Italy was the only country that joined the BRI, signing the agreement in 2019 before formally withdrawing in 2023 (Belt and Road Portal, 2026).

Moving forward, Asian supply chains are increasingly localizing in Eastern Europe, the Balkans, and Turkey, as investors seek competitiveness amid shifting trade flows.

These countries offer cost advantages and, in some cases, preferential access to the EU Single Market through customs unions or candidate status. Firms such as BYD and CATL may establish production facilities to serve domestic markets and access the wider EU market tariff-free, suggesting that certain European regions could become strategic production hubs for Asian multinationals. Consequently, while EU membership has often served as the primary grouping factor in FDI studies, such classifications may fail to capture emerging production centers, underscoring the importance of including both EU members and neighboring states with EU market access.

3.2. Defining the bilateral trade interdependence and export-platform indicators

The relationship between international trade and FDI is complex and interconnected. Trade can both substitute for and complement FDI. Market-seeking firms may substitute exports by establishing local subsidiaries, while growing trade in strategic sectors increasingly encourages firms to establish production facilities in Europe to serve both host and third-country markets. This export-platform dynamic reflects deeper functional integration, where trade ties become a key driver of investment decisions.

Trade interdependence can also stimulate FDI by reducing information and transaction barriers while strengthening business networks. Countries with rising trade connectivity are more likely to attract inward FDI, as greater integration into global supply chains enhances their investment appeal.

To empirically capture the degree of trade integration between two countries, this study introduces the Trade Interdependence Index ($Trade_I_{ij,t}$). The Trade Interdependence Index measures the importance of bilateral trade between host country *i* and origin country *j* relative to the total trade of the host country with the world in a given year (*t*). The index is calculated using the following Equation (1):

$$Trade\ Interdependence\ (Trade_I_{ij,t}) = \frac{(Imports_{ij,t} + Export_{ij,t})}{Total\ Trade\ of\ i\ with\ the\ world_t} \times 100 \qquad (1)$$

where:

- $Imports_{ij,t}$ = Imports of host country *i* from origin country *j* at time *t*.
- $Export_{ij,t}$ = Exports of host country *i* to origin country *j* at time *t*.

$Total\ Trade_{it}$ refers to the total trade of host country *i* in a specific year *t*. It is calculated as the sum of all imports and exports of country *i* with its trade partners during that year, i.e., $Total\ Trade_{it} = \sum_k (Imports_{ik,t} + Exports_{ik,t})$, where *k* runs over all trade partners. Hereafter, for simplicity, we denote the Trade Interdependence Index as $Trade_I$ throughout the text. We keep the index in percentage terms rather than logs, since log transformation would create negative values and complicate interpretation, while percentage terms allow direct and comparable interpretation across countries and years.

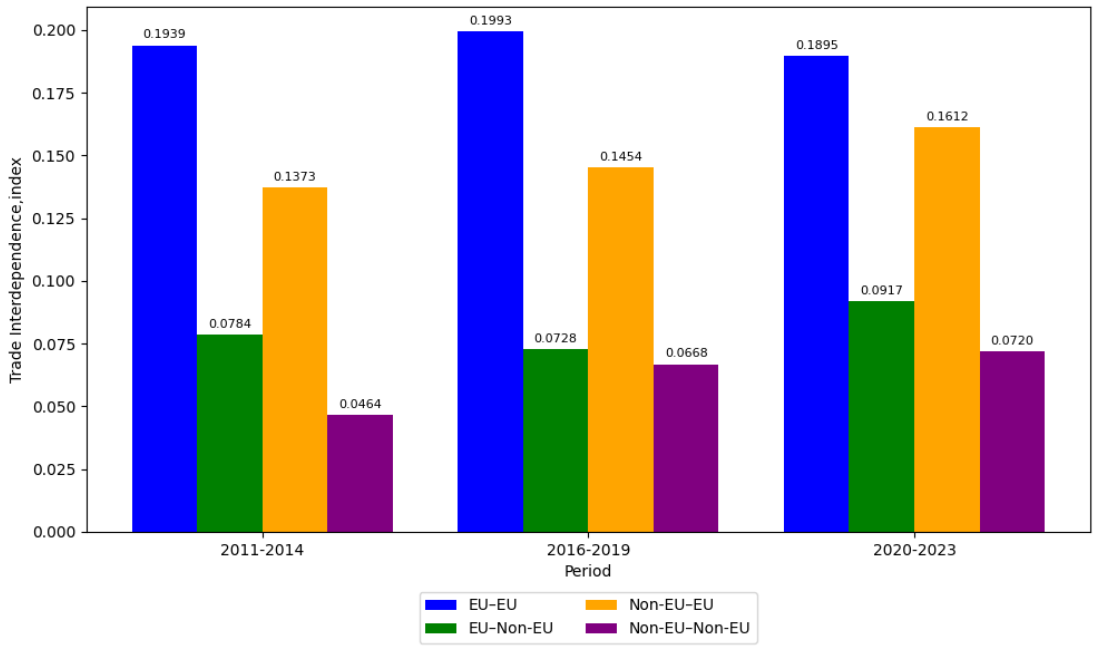


Figure 3. Trade Interdependence Index by period and country pair type. Source: Prepared by the author using data from the United Nations Commodity Trade Statistics Database.

A higher $Trade_I$ value indicates a greater trade dependence on the partner country *j*, potentially implying a closer economic relationship that may encourage FDI flows. Using total trade with the world as the denominator ensures that the index consistently reflects the relative importance of partner *j*. In contrast, using only the sum over FDI origin countries could produce

values that depend on the subset of countries included in the sample, and the denominator could fluctuate depending on which origins have FDI data in a given year, making comparisons over time unreliable. By using total trade, the index always represents the share of total trade coming from *j*, regardless of how many FDI origins are in the dataset, allowing for consistent comparison both across countries and across years. Figure 3 shows trade interdependence trends across country pair types over three periods.

As seen from Figure 3, Non-EU–Non-EU pairs exhibit the fastest growth rate in trade interdependence, increasing by approximately 55% from 0.0464 in 2011–2014 to 0.0720 in 2020–2023. This rapid expansion highlights the growing economic integration and increasing trade flows among non-EU countries, including emerging hubs such as Turkey, Serbia, and other Balkan states, as well as rising Asian origins. Similarly, EU–Non-EU pairs, where non-EU countries such as China, Korea, and the US are origins trading with EU hosts, show a notable rise in trade interdependence (from 0.0784 to 0.0917, 17%). This suggests that EU countries are becoming increasingly important destinations for non-EU exporters, possibly reflecting growing production integration, supply chain links, and investment flows from Asia and the US into the EU. Non-EU–EU pairs follow a similar trajectory (17.4%). This growth highlights how EU exporters and investors are deepening their integration with nearby non-EU economies, reinforcing Europe's broader regional interconnectedness.

In contrast, EU–EU pairs experience a slight decline of about 2.3%, indicating that trade interdependence among EU member states may be stabilizing. Overall, these patterns suggest that the fastest-growing trade interdependence is occurring outside the traditional core of EU-to-EU trade relationships, driven particularly by non-EU countries both within Europe and beyond. This has important implications for understanding the evolving architecture of European trade and FDI, emphasizing the increasing significance of emerging hubs and external partners in shaping regional integration.

To gain a deeper understanding of these evolving trade relationships, we adopted a rank-based analytical approach to assess the relative intensity of trade interdependence between country pairs. Specifically, we calculated rankings (1 to 5) of trade interdependence for each country pair, categorized into the same four regional pair types used in earlier analysis: EU–EU, EU–Non-EU, Non-EU–EU, and Non-EU–Non-EU. This analysis spans three distinct periods (P), 2011–2014 (P1), 2016–2019 (P2), and 2020–2023 (P3), enabling us to identify the most dominant trade links within and beyond Europe, while revealing how patterns of regional integration have evolved. Given the volume and complexity of the data (60 rankings in total), detailed results are presented in Appendix A (Figure A.1), with key findings summarized in Table 2.

As shown in Table 2 and Figure A.1 (Appendix A), EU–EU pairs dominated trade interdependence rankings, reflecting strong intra-EU integration. Within the EU, trade links have shifted from traditional core countries toward new member states, reflecting stronger integration of Central and Eastern Europe. Traditional links such as Luxembourg-Belgium and Austria–Germany were prominent in earlier periods, while Czechia–Germany, Poland–Germany, and North Macedonia–Germany have emerged as key trade connections in later periods, highlighting the increasing role of new EU members in European supply chains. Importantly, their growing role is not limited to intra-EU trade; these countries also feature prominently in EU–Non-EU trade relationships, particularly with major global partners such as China and the USA.

Table 2. Summary matrix of trade interdependence trends and key country pairs.

Group	EU	Non-EU
EU	Shift from EU core to new EU members, reflecting stronger integration of Central and Eastern Europe. Examples: • Luxembourg–Belgium (0.203, P.1) • Austria–Germany (0.325, P.2) • Poland–Germany (0.239, P.3)	China and the USA remain top partners across all periods, reflecting extra-EU linkages. Examples: • Ireland–US (0.180, P.1) • France–China (0.072, P.2) • Hungary–China (0.045, P.3)
Non-EU	Candidate and neighboring countries increasingly act as production and supply chain hubs within the EU Examples: • Bosnia and Herzegovina–Croatia (0.146, P.1) • Turkey–Germany (0.095, P.2) • North Macedonia–Germany (0.234, P.3)	Fastest-growing trade interdependence; regional and Asian linkages intensify, highlighting Asia's influence. Examples: • Bosnia and Herzegovina–Serbia (0.093, P.1) • Montenegro–China (0.087, P.2) • Turkey–China (0.074, P.3)

Note: Andorra and Albania show high trade interdependence with Spain and Italy, respectively, but each is dependent on this single partner, making them exceptions. Source: Author's own analysis

Indeed, outside the EU, China and the USA remain consistently important partners for EU countries, with trade links such as Ireland–US, France–China, and Hungary–China maintaining high interdependence across all periods. Non-EU countries interacting with EU members, including Bosnia and Herzegovina–Croatia and Turkey–Germany, are increasingly integrated into EU supply chains, reflecting their role as emerging nodes in regional production networks.

While EU countries generally maintain higher overall indices, trade interdependence among non-EU countries is growing fastest, driven by regional and Asian linkages, with examples such as Montenegro–China and Turkey–China, underscoring Asia's rising influence in the broader European trade landscape.

When ranked by aggregate trade interdependence, EU-origin countries dominate—particularly in EU–EU and EU–Non-EU groups—while Asian-origin countries have long remained overshadowed but are now emerging more prominently in Europe. In over half of the European host countries, Asian origins rank among the top 10 trade partners, engaging not only with integrated European Core countries (Germany, France, Netherlands, Norway) but also with new EU members (Poland, Hungary, Romania), candidate countries (Turkey, Serbia), and neighboring non-EU states (Ukraine, Moldova). Notably, China, Japan, Indonesia, Singapore, Taiwan, South Korea, and Vietnam have steadily increased their trade interdependence with Europe year by year.

Trade interdependence primarily reflects direct economic ties between two countries (e.g., origin *j* and host *i*)—such as through total trade flows or demand potential—and may explain trade and FDI motivated by access to the host market. However, in many cases, market access alone is no longer a sufficient motive for investment or trade. Instead, firms may target strategic locations for their potential as production hubs, leveraging supply chain efficiencies and regional trade agreements. In such cases, FDI and trade flows are often driven by broader regional or global

strategies, where the host country serves primarily as a platform to export to third countries rather than as the final destination. This is particularly relevant for Asian-origin countries, which, as our analysis suggests, invest in and trade with European host countries not only for local market access but also to re-export to third-country markets across Europe.

As a result, trade interdependence may not fully capture these indirect motives and can underestimate a country's strategic value as an export platform.

To address this, we introduce the export-platform indicator (Z_{ijt}, Equation 2), a third-country instrument designed to capture the host country's (*i*) capacity to serve as a re-export base. Specifically, the export-platform indicator is constructed as the value of exports from host country *i* to all third countries *k,* except the origin country *j* (i.e., $k \neq j$). Z_{ijt} is calculated for each host-origin-year (*i-j-t*) combination and captures the extent to which *i*'s exports to third countries reflect its potential to serve as an export platform for investors from *j*, with trade flows weighted by distance.

The indicator is formally defined as:

$$Z_{ijt} = \sum_{k \neq j} \frac{Exports_{ikt}}{Distance_{ik}^{\delta}} \tag{2}$$

where:

- Z_{ijt} is the export-platform indicator of host *i* with respect to origin country *j* in year *t.*
- $\sum_{k \neq j} Exports_{ik}$ is the value of exports from host *i* to third country *k;* the origin country *j* is excluded to avoid directly capturing bilateral trade between *i* and *j*.
- $Distance_{ik}$ is the geographic distance between *i* and *k.*
- t refers to the year (2010 to 2023).
- δ is the *distance* decay parameter (typically between 0.7 and 2) that captures how distance reduces trade. We set $\delta = 1$, so the index emphasizes countries that export strongly to nearby third markets, consistent with the concept of regional export-platform. Choosing $\delta = 2$ would overweight nearby partners, even if distant partners account for substantial trade.

High Z_{ijt} values suggest that FDI may be motivated by re-export opportunities (export-platform FDI), the sourcing of intermediate goods, or a mix of these factors together with market-access motives. While vertical FDI is typically identified through trade in intermediate goods (which our aggregate trade data do not allow us to isolate), our results primarily speak to the export-platform dimension of FDI. In our empirical analysis, a positive coefficient on Z_{ijt} suggests that greater export-platform capacity of host *i* (toward third countries) is associated with increased FDI from origin *j*.

Export-platform FDI in Europe is primarily directed toward accessing nearby markets, particularly within the EU. Nevertheless, there are important cases where affiliates located in Europe also serve more distant destinations. For instance, automotive production in Central and Eastern Europe and pharmaceutical manufacturing in Ireland are partly exported outside Europe, including to North America, Asia, and the Middle East. For this reason, our indicator is constructed to include all third-country destinations, while the distance weighting ensures that nearby markets dominate its value. This approach allows us to remain consistent with the regional focus of most export-platform strategies, while also accommodating the global dimension.

While Z_{ijt} is an aggregate, country-level proxy rather than a firm-level measure, our contribution is to focus specifically on exports to third countries, excluding the origin country, and

to apply distance weighting, which captures the host country's potential to serve as a hub for multiple markets.

We use the logarithm of Z_{ijt} to improve the symmetry of its distribution and reduce the influence of extreme values. While Santos Silva & Tenreyro (2006) discuss the benefits of log-transforming trade flows in gravity-type models, we apply the same reasoning to our export platform indicator Z_{ijt}, which is constructed from aggregate trade flows to third countries. Appendix A, Figure A.2 presents two histograms comparing the distribution of Z_{ijt} and *lnZ*. The histograms show that the log-transformed export-platform indicator (*lnZ*) is less skewed, more symmetric, and less dominated by extreme values than the original Z_{ijt}, supporting the use of the logarithm in the analysis.

4. Empirical analysis and stages of the study

4.1. Data and empirical strategy

Our dataset comprises yearly observations from 42 European host countries and 40 global origin countries over the period 2010–2023. In addition to all 27 EU member states, we include the United Kingdom (UK), EU candidate countries—Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia, Turkey, and Ukraine—as well as the potential EU candidate Kosovo. To better capture functional economic integration, we also include non-EU European economies with strong ties to the Eurozone, such as Norway, Switzerland, and Iceland, along with Andorra and Belarus, due to their distinct non-Eurozone status. This approach allows us to analyze trade–FDI patterns beyond formal EU membership.

FDI flow data are drawn from the UNCTAD (2025) and supplemented by the CEPII Gravity Database (Conte et al., 2022). GDP figures are obtained from the World Bank World Development Indicators (World Bank, 2025), while trade data are sourced from UN Comtrade (UN Comtrade Database, 2025). Due to the absence of consistent annual observations for Kosovo and Belarus, we utilize data sourced from local agencies. Data identifying BRI signatory countries and their respective investment volumes were sourced from the Belt and Road Portal (2026).

In the dataset, some observations of bilateral FDI flows between major European financial hubs (e.g., Luxembourg, Ireland, and the Netherlands) and their partners showed abnormally large negative values. These extreme cases likely reflect intra-firm financial restructuring, balance sheet consolidations, or transactions through special purpose entities, which are common in tax-optimized jurisdictions. Since these flows are orders of magnitude larger than typical bilateral FDI and reflect accounting practices rather than productive investment, they were excluded from the dataset. This interpretation is consistent with IMF, OECD, and UNCTAD practices. It is a tiny fraction of the sample (<1%), and the affected countries remain in the dataset with their regular investment flows, ensuring that their role as key FDI hubs is preserved while avoiding distortions from statistical anomalies.

Additionally, in our dataset, approximately 27% of observations are negative or zero. Negative FDI flows reflect real economic phenomena such as disinvestment through equity capital, reinvested earnings, or intra-company loans, and thus cannot be ignored entirely. However, for the main analysis, we employ the Poisson pseudo-maximum likelihood (PPML) estimator, which requires nonnegative dependent variables. Following established practice (Bruno et al., 2017; Kox and Rojas-Romagosa, 2020), we set negative FDI flows to zero while keeping genuine zero flows unchanged. To address potential concerns about truncation, we also conduct robustness checks

using the ordinary least squares (OLS) estimator with FDI in levels, which naturally accommodates both negative and zero flows.

Table A.1 in Appendix A reports descriptive statistics for the main variables used in the analysis, including bilateral FDI flows, trade interdependence, gravity controls, and EU dummies. Appendix Table A.2 presents the corresponding Pearson correlation matrix. The results show no evidence of problematic multicollinearity. Together, these tables provide an overview of data distribution and associations among key variables.

The empirical analysis is grounded in an extended gravity model of FDI, which incorporates both standard economic determinants and two novel indicators: the Trade Interdependence Index (*Trade_I*) and the export-platform indicator (Z_{ijt}):

- The Trade Interdependence Index (*Trade_I*) captures the strength of bilateral trade relationships and serves as a proxy for market-access FDI. It reflects how economically connected a host country is to a specific origin country.
- The export-platform indicator (Z_{ijt}), developed specifically for this study, measures the degree to which a host country is used as a base for re-exporting to third markets. It captures strategic FDI patterns beyond direct market access.

By combining these indicators, the analysis distinguishes between different FDI motivations and identifies structural patterns that go beyond traditional EU membership or geographic proximity.

While trade interdependence captures the relative importance of trade with host *i*, it may still be endogenous in the FDI regression if unobserved factors simultaneously affect trade and FDI. To address this potential endogeneity, we construct a rank-based instrument. Instead of using the level of exports or the export-platform indicator (Z_{ijt}), the instrument is based on the relative rank of the host's Z_{ijt} (Equation 2). For each host in a given year, (Z_{ijt}) values across partners are ranked in descending order, and the normalized rank is as shown in Equation (3).

$$Z_rank_norm_{ijt} = \frac{N_{it} - rank\ (Z_{ijt})}{N_{it} - 1} \tag{3}$$

where N_{it} denotes the number of partner countries associated with host *i* in year *t*. This approach captures the relative importance of each partner for that host, while excluding the specific origin (*j*), providing a valid instrument for the FDI regression. The normalized rank equals 0 for the partner with the highest (Z_{ijt}) and 1 for the partner with the lowest.

We implement a two-stage estimation using high-dimensional fixed effects (HDFE) regressions and PPML. In the first stage, trade interdependence (*Trade_I*) is regressed on the rank-based instrument ($Z_rank_norm_{ijt}$) and controls, absorbing host-year and origin-year fixed effects to account for unobserved heterogeneity. Fitted values and residuals are used to test instrument relevance. In the second stage, PPML estimates FDI using the exogenous component of trade interdependence.

Although we test for endogeneity of *Trade_I* in all models, we present the instrumental variable results for one representative specification in Appendix A (Tables A.3–A.4) to illustrate that endogeneity does not affect our main findings.

The residual from the first-stage regression (*cf_resid*) was not statistically significant in the second stage (Table A.4), suggesting that endogeneity is likely limited. The coefficient on trade interdependence (*Trade_I*) remains positive and significant, indicating that our results are robust to potential endogeneity.

A negative coefficient for $Z_rank_norm_{ijt}$ makes sense because higher ranks correspond to lower normalized rank values (i.e., more trade with that partner results in a lower $Z_rank_norm_{ijt}$), leading to higher *Trade_I*. Having established that our instrument adequately captures the exogenous variation, we then proceed to use *Trade_I* as the main explanatory variable.

The empirical strategy is implemented in two main stages:

- Stage 1: Assessing the effects of trade interdependence, EU membership, and BRI participation on FDI flows.
- Stage 2: Incorporating the export-platform dimension and heterogeneity in FDI drivers, including Chinese investment.

4.2. Trade interdependence, EU membership, and BRI effects on FDI

The first stage of the analysis involves estimating an augmented gravity model that, in addition to economic size and distance, incorporates additional factors such as trade interdependence, EU membership, and BRI participation as explanatory variables for bilateral FDI flows Equation (4).

$$FDI_{ijt} = exp\big[\beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln\big(GDP_{jt}\big) - \beta_3 \ln\big(dist_{ij}\big) + \beta_4\, EU_host_{it} + \beta_5 EU_origin_{jt} + \beta_6 Trade_I_{ijt} + \beta_7 comlang_off_{ij} + \beta_8 comrelig_{ij} + \beta_9 BRI_host_{it}\big] \times \epsilon_{ijt} \quad (4)$$

where:

- FDI_{ijt} represents bilateral FDI flows from origin *j* to host country *i* in year *t*.
- GDP_{it}, GDP_{jt} denote the time-varying real GDP of host country *i* and origin country *j*, respectively, in year *t*.
- $dist_{ij}$ is the geographical distance between countries *i* and *j*.
- EU_host_{it} and EU_origin_{jt} are dummies indicating EU membership of host and origin countries in year *t*.
- $Trade_I_{ijt}$ captures bilateral trade interdependence between *i* and *j* in year *t*.
- $comlang_off_{ij}$ is a dummy for shared official language.
- $comrelig_{ij}$ is a dummy for common religion.
- BRI_host_{it} is a dummy indicating BRI membership of host countries in year *t*.
- ϵ_{ijt} is the error term.

Additional bilateral and interaction variables used in subsequent models are presented in Appendix A (Table A.5).

Among the large number of estimations, and based on the recent recommendations (Larch et al., 2025; Herman, 2023), the model incorporates host-time ($\alpha_{i,t}$) and origin-time ($\delta_{j,t}$) fixed effects, which absorb all time-varying country characteristics (such as GDP). Country-pair fixed effects (γ_{ij}), which capture time-invariant bilateral characteristics (such as distance, common language, or religion), were also tested but not included in the final specification. Consequently, these characteristics are included explicitly as variables in the estimation rather than being absorbed by fixed effects.

All estimations are performed using Stata. For the main analysis, we employ the PPML estimator, while OLS estimates are used as robustness checks. The PPML is specifically designed to

handle the resulting highly right-skewed distribution of FDI. For robustness, standard errors are clustered by dyadic country pairs to account for serial correlation.

At this stage, we test whether stronger trade ties are associated with higher FDI inflows and whether FDI is driven more by market access or by participation in regional frameworks that enhance connectivity and production integration. We also compare the effects of functional integration, formal EU membership, and BRI participation. Results are shown in Table 3.

Table 3. Gravity model estimation results.

Model[1]	(1)[2]	(2)	(3)	(4)	(5)[3]
Dependent variable	FDI	FDI	FDI	FDI	FDI
Trade_I	74.1127*	0.0506***	−0.0504*	0.0798***	0.0479***
	(39.9614)	(0.0093)	(0.0285)	(0.0124)	(0.0101)
ln_dist	−667.7508***	−0.2685**	−0.3589***	−0.2698***	−0.2705***
	(128.0091)	(0.1097)	(0.1008)	(0.1001)	(0.1012)
$\ln_GDP_{it}$	306.0710***	0.5420**			
	(43.2824)	(0.2615)			
$\ln_GDP_{jt}$	343.4810***	0.0661			
	(71.6665)	(0.3440)			
EU_host	144.6234	0.1418			
	(124.4407)	(0.1807)			
EU_origin	−428.7108***	−0.5939**			
	(158.0309)	(0.2697)			
BRI_host	−700.6104***	−0.3386***			
	(98.1758)	(0.1251)			
EU_pair			0.3492**	0.4090**	0.4991**
			(0.1656)	(0.1921)	(0.2131)
BRI_pair			0.4915	1.1810**	0.4493
			(0.3722)	(0.5701)	(0.3546)
$Trade_I \times \ln_GDP_{it} \times ln_dist$			0.0013***		
			(0.0003)		
comlang_off			−0.2083*	−0.1740	−0.1746
			(0.1207)	(0.1265)	(0.1314)
comrelig			0.8270***	0.8402***	0.8530***
			(0.1737)	(0.1806)	(0.1828)
BRI_pair × Trade_I				−0.1236	
				(0.1006)	
EU_pair × Trade_I				−0.0311**	
				(0.0139)	
EU–Non-EU × Trade_I					0.0376**
					(0.0178)
Non-EU–EU × Trade_I					0.0161
					(0.0164)
Non-EU–Non-EU × Trade_I					0.0012
					(0.0356)

Continued on next page

Model[1]	(1)[2]	(2)	(3)	(4)	(5)[3]
Dependent variable	FDI	FDI	FDI	FDI	FDI
_cons	−2066.2536**	2.2086	10.2942***	9.6634***	9.6097***
	(868.0295)	(6.5732)	(0.7446)	(0.7502)	(0.7543)
N	14615	14615	14387	14387	14387
r2_p		0.7491	0.8293	0.8275	0.8276

Note: [1]Model (1) in Table 3 estimates the baseline gravity specification using OLS with high-dimensional fixed effects (*reghdfe*), while Models (2)–(5) employ the PPML estimator (*ppmlhdfe*) to account for the multiplicative nature of the gravity framework and the presence of zero FDI flows. Models (2)–(5) include origin–time and host–time fixed effects to control for country-specific time trends; however, pair fixed effects are not included, since only Croatia changed its EU membership status during 2010–2023, and their inclusion could lead to overfitting due to limited within-pair variation. Standard errors in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01.

[2] Large coefficient estimates and standard errors in Model (1) arise because the OLS regression is estimated with FDI in levels, which yields higher than log-linear or PPML; the significance of the coefficients remains robust.

[3] Interaction terms (EU–Non-EU × Trade_I, Non-EU–EU × Trade_I, Non-EU–Non-EU × Trade_I) capture differences in the effect of trade interdependence by country-pair EU status, as defined in Section 3.2.

Source: Author's elaboration.

The coefficients of *Trade_I* are consistent across all estimators in Table 3, confirming the main hypothesis that stronger bilateral trade interdependence is positively associated with higher FDI inflows. Namely, a one-percentage-point increase in trade interdependence is associated with an approximately 0.05-unit (5%) higher expected FDI inflow (Models 2–5), all else being equal. The absolute effect in million USD varies depending on the baseline FDI level, so small investors experience only modest changes while larger flows may change more substantially. The pattern suggests that firms invest in countries with existing trade links, reflecting both market-seeking motives and export-platform strategies, where affiliates may serve multiple markets. The results provide quantitative evidence that FDI and trade are complementary.

Moreover, as seen from Model 3, the effect of trade interdependence on FDI depends simultaneously on the host country's GDP and geographic distance ($Trade_I \times ln_GDP_{it} \times ln_dist$). In practical terms, this implies that European economies with substantial trade links can attract relatively higher FDI inflows from distant foreign investors, such as China, highlighting the role of trade integration in FDI patterns. In this context, investors may prioritize economic scale over linguistic proximity *(comlang_off)* when making cross-border investment decisions.

The coefficients of the gravity variables are consistent with theoretical expectations. The negative and significant effect of distance *(ln_dist)* indicates that geographical proximity facilitates FDI flows, while the positive coefficients on host and origin GDPs suggest that larger and more developed economies both attract higher levels of FDI. Shared religion (*comrelig)* exhibits a positive and significant association with FDI, suggesting that cultural proximity fosters cross-border investment.

EU integration plays a substantial role in shaping FDI patterns. Although EU membership of the host country (*EU_host*) is not significant, and EU membership of origin *(EU_origin)* has a negative effect (Models 1–2), bilateral EU membership (*EU_pair*) significantly enhances FDI flows, with EU pairs receiving approximately 49.1% more FDI than non-EU pairs. This finding is consistent with

prior research: Bruno et al. (2020) estimated that bilateral EU membership boosts FDI by about 50%, while Grieveson et al. (2021) reported a 35% increase, highlighting the strong role of EU integration.

The coefficient on the interaction term *EU_pair*× *Trade_I* is −0.0311 (Model 4), indicating that the positive effect of trade interdependence on FDI inflows is weakened for EU pairs. In other words, while trade generally promotes FDI, this effect is smaller when both countries are EU members, suggesting that EU integration may partially substitute for the role of trade in attracting FDI. At the same time, trade interdependence matters most when at least one country is in the EU, especially for *EU–Non-EU* pairs (0.0376, $p < 0.05$), whereas *Non-EU–EU* and *Non-EU–Non-EU* pairs exhibit only a weak or insignificant trade effect (Model 5).

Although the coefficient of the BRI participation variable (*BRI_pair*) is positive, it is statistically insignificant in Models 3 and 5. This may reflect that BRI projects in Europe are primarily loan-financed infrastructure initiatives rather than direct FDI inflows, that European markets are already integrated and capital-abundant, or that a time lag delays observable effects. Geopolitical and regulatory concerns, particularly within the EU, may also dampen investment responses. In addition, heterogeneity across European countries could mask the BRI's impact rather than indicating a uniformly null effect. Consistently, being a BRI host country (*BRI_host*) is associated with a significant reduction in FDI (Models 1–2), suggesting that these infrastructure projects may substitute for private investment.

When the interaction between BRI participation and trade interdependence (*BRI_pair* × *Trade_I*) is introduced in Model 4, the coefficient on the *BRI_pair* dummy becomes positive and statistically significant, indicating that the baseline FDI effect of BRI membership is more clearly identified once trade-related channels are accounted for. However, the interaction term ($\beta = -0.1236$) is insignificant, indicating that trade intensity does not moderate the BRI's effect on FDI. This pattern may reflect the nature of BRI engagement in Europe, where many projects are infrastructure-oriented or state-driven rather than contingent on existing trade relationships. Notably, countries such as Serbia, Hungary, Montenegro, and Greece serve functional roles as emerging hubs, attracting BRI-related investment even with modest trade linkages. Conversely, core European economies (Germany, France), despite deep trade ties and EU membership, have not participated in the BRI, suggesting that FDI distribution is heterogeneous and shaped by country-specific roles in regional investment networks rather than by EU status.

By analogy, the negative but significant EU_pair × Trade_I interaction in Model 3 indicates that some EU countries attract substantial FDI despite limited trade dependence, while others maintain strong trade relations but receive relatively modest FDI inflows. For instance, Ireland receives disproportionately high levels of FDI, largely due to its favorable tax regime rather than bilateral trade dependency. In contrast, the Czech Republic—though deeply embedded in European manufacturing supply chains and maintaining strong trade relations, particularly with Germany—records more uncertain FDI inflows. This likely reflects the fact that deeper economic integration within the EU reduces the extent to which FDI decisions are directly tied to trade, whereas for EU–Non-EU pairs, trade matters more, as shown in Model 5.

The general results from Table 3 provide statistically robust evidence that the effect of trade interdependence on FDI systematically differs between EU and non-EU pairs. While EU membership facilitates both trade and FDI, it alone is not sufficient to fully explain Europe's investment landscape. The limited and heterogeneous impact of BRI participation further supports this view, suggesting that alternative integration mechanisms beyond the EU—such as the BRI—also

influence regional investment dynamics. Indeed, non-EU countries such as Turkey and Serbia attract substantial FDI and maintain active trade relationships despite not being EU members, indicating that factors beyond formal EU membership better account for current FDI patterns.

Additionally, countries that joined the EU after 2004 often experience a temporary surge in FDI during the early years of their membership, with this effect tending to diminish or stabilize as integration matures. Consequently, in non-EU country pairs, trade appears to exhibit a stronger complementarity with FDI—often driven by motives such as gaining market access or establishing export-platform—resulting in a more pronounced trade–FDI relationship outside the EU.

These findings highlight the importance of reclassifying and expanding the analytical sample beyond formal EU membership, particularly by including countries like Turkey, Serbia, and other European countries that have become significant production hubs despite not being full EU members. Many of these countries are also engaged in the BRI framework, further illustrating how non-EU integration channels contribute to shaping FDI patterns in Europe. Their integration into European value chains—driven by geographic proximity, cost competitiveness, and FDI-friendly reforms—makes them functionally similar to the new EU member states. Including these countries in the analysis helps identify patterns of functional integration that extend beyond institutional affiliation.

To operationalize this perspective, we reclassify countries based on observed trade and investment linkages and regional economic roles, rather than formal EU membership, providing a more relevant framework that better reflects the functional economic integration shaping FDI in Europe (Table A.6 in Appendix A).

Specifically, host countries are classified as Integrated Europe Core if they exhibit consistently high inward FDI flows, high trade interdependence within the European network, and stable participation in EU production chains. Emerging Strategic Hubs are defined as countries with growing FDI inflows and medium-to-high trade interdependence with EU core economies. Neutral States are characterized by low trade interdependence and concentrated trade dependence on a limited number of partners. Notably, Norway and Switzerland are included in Group 1 due to their harmonized trade regimes and their role as significant investors in Europe, while the United Kingdom is treated as a main trade partner both during its EU membership up to 2020 and thereafter.

To minimize the influence of extreme trade dependency values, we assign countries with only one dominant trade partner to a separate group (Neutral), such as Albania–Italy, Andorra–Spain, and others (Table A.6 in Appendix A). This functional classification also reflects countries' varying exposure to alternative integration frameworks, such as the BRI, which increasingly influence investment linkages beyond the EU core.

Origin countries are grouped into EU origins, Asia, and other (Table A.6 in Appendix A). Grouping origin countries by region captures shared economic characteristics, institutional frameworks, cultural ties, and trade agreements that influence FDI flows. It accounts for proximity effects, reduces omitted variable bias, and aligns with empirical evidence showing that FDI tends to cluster within regions.

Moreover, FDI flows fluctuate over time due to economic cycles, market conditions, and regulatory changes. We introduce a division of FDI into distinct phases—2010 to 2013 as the early take-off and learning phase, 2014 to 2017 as the surge and peak, and 2018 to 2023 as the downturn, regulatory pushback, and sectoral rebound—to capture phase-specific dynamics in investment flows. To capture potential time-varying effects, we also divide BRI participation into two periods:

BRI_early (2013–2018), representing the initial expansion phase, and *BRI_late* (2019–2023), reflecting the more recent phase of investment under the BRI framework (Table 4).

While country-year fixed effects account for global shocks, the inclusion of FDI periods allows us to examine how investment patterns, including Chinese FDI in Europe, differ across cycles and regions, and to compare structural changes over time. Without these periods, the gravity model assumes a stable relationship over the entire time span, which can mask important shifts in FDI behavior. To validate this classification and the defined periods, we estimate five PPML models to test whether the BRI effects, functional typology, and the three FDI periods provide a better explanation of bilateral FDI patterns compared to traditional institutional categories (Table 4).

In Table 4, while *Trade_I*, *EU_pair*, and *ln_dist* all show the expected significant effects, our primary focus here is on the impact of the BRI (Model 1). *BRI_early* has a large positive and significant coefficient, indicating that countries participating in the BRI during 2013–2018 received substantially higher FDI, highlighting the importance of early BRI engagement. By contrast, *BRI_late* is positive but not significant, suggesting that more recent participation has not yet translated into measurable FDI effects.

Table 4. Functional integration, trade interdependence, and temporal effects on FDI.

Model	(1)	(2)	(3)	(4)	(5)
Dependent variable	FDI	FDI	FDI	FDI	FDI
Trade_I	0.0546***	0.0186	0.0447***	-0.4403**	0.0684***
	(0.0091)	(0.0179)	(0.0137)	(0.1914)	(0.0114)
EU_pair	0.3776**	0.3489**	0.4407***	0.4523***	0.4314**
	(0.1577)	(0.1593)	(0.1680)	(0.1667)	(0.1681)
ln_dist	−0.2603***	−0.2573**	−0.2651**	−0.3013***	−0.2661***
	(0.1010)	(0.1036)	(0.1036)	(0.1043)	(0.1024)
BRI_early	2.3038***				
	(0.7567)				
BRI_late	0.5643				
	(0.6198)				
BRI_early × Trade_I	−0.3563**				
	(0.1568)				
BRI_late × Trade_I	−0.0279				
	(0.0975)				
Europe Core × Period 1 × Trade_I		0.0248			
		(0.0208)			
Europe Core × Period 2 × Trade_I		0.0253			
		(0.0242)			
Europe Core × Period 3 × Trade_I		0.0494**			
		(0.0199)			
Emerging Hubs× Period 1× Trade_I		0.0395**			
		(0.0193)			
Emerging Hubs× Period 2× Trade_I		0.0473**			
		(0.0221)			

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Model	(1)	(2)	(3)	(4)	(5)
Dependent variable	FDI	FDI	FDI	FDI	FDI
Emerging Hubs× Period 3× Trade_I		0.0434**			
		(0.0199)			
Neutral States × Period 1 × Trade_I		0.0255			
		(0.0207)			
Neutral States × Period 2 × Trade_I		0.0604***			
		(0.0143)			
Asia × Period 1× Trade_I			0.1268		
			(0.1026)		
Asia × Period 2× Trade_I			0.1173		
			(0.0816)		
Asia × Period 3× Trade_I			−0.0653		
			(0.0698)		
Europe × Period 1× Trade_I			−0.0046		
			(0.0178)		
Europe × Period 2× Trade_I			−0.0255		
			(0.0237)		
Europe × Period 3× Trade_I			0.0370*		
			(0.0190)		
Other × Period 1× Trade_I			0.0102		
			(0.0262)		
Other × Period 2× Trade_I			0.0945***		
			(0.0235)		
Europe Core × Asia × Trade_I				0.4981**	
				(0.2005)	
Europe Core × Europe × Trade_I				0.4848**	
				(0.1919)	
Europe Core ×Other × Trade_I				0.5019***	
				(0.1881)	
Emerging Hubs × Asia × Trade_I				0.5288***	
				(0.2005)	
Emerging Hubs ×Europe × Trade_I				0.4926***	
				(0.1912)	
Emerging Hubs ×Other × Trade_I				0.2914	
				(0.1882)	
Neutral States × Asia × Trade_I				0.6527***	
				(0.2172)	
Neutral States ×Europe × Trade_I				0.4878***	
				(0.1882)	
NonHubs × Pre3× Trade_Asia					0.8315***
					(0.2210)
NonHubs× Period 3× Trade_Asia					0.3843
					(0.2777)
Em.Hubs × Pre3× Trade_Asia					0.6135***

Continued on next page

Model	(1)	(2)	(3)	(4)	(5)
Dependent variable	FDI	FDI	FDI	FDI	FDI
					(0.2034)
Em.Hubs × Period 3 × Trade_Asia					0.1767
					(0.3511)
NonEur.Core × Pre3 × Trade_EU					−3.5985*
					(2.0058)
NonEur.Core× Period 3 × Trade_EU					0.5623
					(1.9431)
Europe Core × Pre3 × Trade_EU					−4.2160**
					(1.8562)
Europe Core × Period 3 × Trade_EU					1.6420
					(1.9992)
_cons	9.8888***	9.8839***	9.8719***	10.1717***	9.8726***
	(0.7476)	(0.7619)	(0.7607)	(0.7658)	(0.7560)
N	14387	14387	14387	14387	14387
r2_p	0.8238	0.8243	0.8266	0.8253	0.8255

Note: Standard errors in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01. Period numbers (1, 2, and 3) refer to the FDI periods described below: Period 1 = 2010–2013 (early take-off); Period 2 = 2014–2017 (surge and peak); Period 3 = 2018–2023 (downturn/rebound). "Pre3" is a shorthand for "pre-Period 3". "NonHubs" means non-emerging hubs, "Em.Hubs" means emerging hubs, and "NonEur.Core" means non-Europe Core hosts. Trade_Asia = Trade_I × Asia (origin). Trade_EU = Trade_I * EU (origin).
Source: Author's elaboration.

The interaction BRI_early × Trade_I is negative and significant, implying that early BRI projects partially substitute for trade-driven FDI, while the interaction BRI_late × Trade_I is insignificant, highlighting the limited impact of recent BRI engagement. Based on the BRI analysis, more recent Chinese investment appears to foster the emergence of production hubs in Europe. Thus, rather than including the BRI variable directly, future analysis will use our functional classification to distinguish Asia as a source region and China as a specific origin of FDI, highlighting the shift from early infrastructure-focused BRI investment to a new wave of manufacturing- and strategic sector–oriented investment.

In Model 2, regional and phase-specific dynamics are explicitly accounted for, consistent with our hypotheses and earlier findings. These results support distinguishing FDI into three periods to better capture temporal variation across investment phases. Aggregating all years would obscure important patterns, particularly the rising role of trade in *Emerging Hubs* and *Europe Core*. Trade interdependence increasingly drives FDI in *Emerging Hubs* across all periods (Period 1: 0.0395; Period 2: 0.0473**; Period 3: 0.0434**), while *Europe Core* shows a growing effect in the most recent period (Period 3: 0.0494**). *Neutral States* exhibit a marked increase in trade-driven FDI in Period 2 (0.0604***), highlighting the heterogeneity of trade's impact across country types. Notably, the stronger marginal effect of trade interdependence (Trade_I) for *Emerging Hubs*, despite their lower baseline FDI levels relative to *Europe Core* economies, helps mitigate endogeneity concerns, particularly those related to reverse causality. If endogeneity were primarily driven by FDI mechanically increasing trade flows, one would expect the largest responsiveness of FDI to Trade_I

in core economies with historically high FDI stocks. Instead, the estimated marginal effects are strongest among structurally intermediate economies. This pattern suggests that the results are not merely capturing simultaneity between FDI and trade but rather reflect how pre-existing trade network embedding conditions the allocation of FDI.

Model 3 highlights the origin-specific effects of trade interdependence on FDI. For *Asia*, the coefficients are positive in Periods 1 and 2 and negative in Period 3, but none are statistically significant. *Europe* responds only in the most recent period (2018–2023), while other origins, including the US, show significant effects primarily in Period 2 (2014–2017). This may reflect different FDI motives: Asian investors often pursue export-platform FDI, linked to exports to other countries, whereas Europe and Other origins may prioritize market access or vertical FDI, making the trade–FDI link more visible. Future analysis that interacts host and origin regions with trade interdependence provides a clearer and more detailed picture of these relationships.

Model 4, which interacts host and origin regions with trade interdependence, provides a clearer and more detailed picture of these relationships. Indeed, FDI is significantly stronger between *Europe Core* hosts and all origin groups (*Asia, Europe, Other*), with coefficients around 0.48–0.50, and similarly for *Emerging Hubs* hosts with *Asia and Europe* origins. *Neutral States* also exhibit strong trade-FDI complementarity, particularly with *Asia* (0.65***) and *Europe* (0.49***). These results underscore that trade interdependence has the most substantial impact when both host and origin regions are considered, capturing the heterogeneity in global FDI patterns.

The increasing role of Asian origins is further shown in Model 5, where both *Emerging Hub* and *Non-Hub hosts* display a strong and significant association between trade with Asia and FDI before 2018 (*Pre-Period 3*). However, this effect weakens and becomes insignificant in the 2018–2023 period, suggesting that Asian-origin FDI was more trade-driven in earlier phases but has since shifted toward other motives, such as technology acquisition or export-platform strategies. In this context, countries such as Hungary, Poland, and Slovakia have become major destinations for investment especially from Asia, particularly from China, in sectors like electric vehicles (EVs), batteries, and semiconductors.

For *Europe Core and Non-European Core* hosts, trade with the EU had a negative association with FDI before 2018 (−4.2160**; −3.5985*) but turned positive in the most recent period (2018–2023) (1.6420; 0.5623), although the effects are not statistically significant (Model 5). This pattern may indicate a gradual adjustment in intra-European investment structures following regulatory and geopolitical shifts after 2020, such as Brexit and the introduction of new EU investment screening mechanisms.

Overall, the findings indicate that Asia and other non-EU countries are becoming increasingly important sources of FDI into Europe, signaling a shift in integration patterns beyond traditional EU boundaries. This transformation appears to be influenced by external geopolitical and economic factors, such as the US–China trade war, which likely encouraged Asian firms to diversify production bases and expand market access within Europe. In contrast, European-origin FDI exhibits more modest changes, reflecting a relatively stable trade–FDI relationship over time. In addition, the results emphasize that trade–FDI linkages vary across both temporal and regional contexts, and that distinguishing functional groups and FDI periods is essential for uncovering these evolving dynamics.

However, the nonsignificant and occasionally negative effects of trade interdependence for Asian investors (Models 3 and 5) suggest that not all FDI is primarily trade-driven. Instead, these

patterns may reflect a shift toward strategic or export-oriented investment motives, where firms use European locations as production or distribution platforms for third markets.

Therefore, the export-platform indicator (Z_{ijt}) becomes central in the next stage of the analysis, as it is incorporated into the gravity model to capture FDI aimed at serving external rather than domestic markets. This extension allows us to explore whether certain countries attract FDI not because of their domestic markets but because of their strategic location for exporting to the EU or other nearby regions.

4.3. Export-platform strategies and heterogeneity in FDI drivers

This stage examines the role of host countries as export platforms and explores heterogeneity across origin regions, particularly contrasting Asian and Western investors. While geopolitical tensions and trade barriers (e.g., the U.S.–China trade war) are expected to influence FDI allocation, their effects are absorbed by the country-time fixed effects in the model. As a result, these tensions are controlled for but not directly estimated or reported in the regression results. This analysis helps identify both the strategic use of host countries as export platforms and the shifting geography of FDI driven by external shocks. Let:

- *i:* host country (e.g., where the FDI affiliate is located)
- j: origin country (home country of FDI)
- *k:* third country (final market for exports)
- Z_{ijt}: Export-platform indicator from country *i* with respect to country *j*

We extend the baseline gravity model (Equation 4) by introducing Equation (5), in which FDI from country *j* to country *i* also depends on trade with third countries *k*:

$$FDI_{ijt} = exp\Big[\beta_0 + \beta_1 Trade_{I_{ijt}} + \beta_2 \ln(Z_{ijt}) - \beta_3 \ln(dist_{ij}) + \beta_4 EU_{pair_{ijt}} + \beta_5 BRI_pair_{ijt} + \alpha_{i,t} + \delta_{j,t}\Big] \times \epsilon_{ijt} \quad (5)$$

Here, Z_{ijt} captures the extent to which host *i* is connected to international markets via exports to third countries $k \neq j$, while host-time ($\alpha_{i,t}$) and origin-time ($\delta_{j,t}$) fixed effects are included. In addition to the baseline variables, we include several interaction terms between the export-platform indicator (Z_{ijt}), host and origin regions, and FDI periods to capture heterogeneous effects across time and geography. This allows for distinguishing between:

- Market-access FDI, proxied by $Trade_I_{ijt}$, reflecting investments driven by direct trade relationships.
- Export-platform FDI, proxied by Z_{ijt}, capturing investments motivated by third-market export opportunities.

If the coefficient on Z_{ijt} is positive and significant, it means that FDI from origin country *j* tends to increase when host country *i* is well trade-connected to third-country markets. This supports the export-platform FDI motive: investors from *j* are not just targeting *i*'s domestic market but also using *i* as a base to reach other destinations. Conversely, if the coefficient is small or insignificant, FDI is more likely market-seeking or vertical. In this case, firms from *j* invest in *i* primarily to serve *i*'s domestic market (market-access motive) or to send outputs back to *j* (pure vertical FDI).

Expanding upon Equation (5), Table 5 presents five specifications incorporating interaction terms that integrate the export-platform indicator Z_{ijt} (lnZ) estimated using a PPML framework with origin-year and host-year fixed effects to capture country-specific time dynamics. Since Z_{ijt} (lnZ) already incorporates distance terms, $ln(dist_{ij})$ is excluded from the regressions. Including both would be conceptually redundant, even though the statistical correlations are low. For this reason, dyadic fixed effects also cannot be used when including distance or distance-adjusted variables, as dyadic fixed effects absorb all pair-level time-invariant variables, including distance and the export-platform indicator.

Moreover, *Trade_I*, *lnZ*, *EU_pair*, and *BRI_pair* variables account for both policy-driven and trade-related channels affecting FDI, while country-year fixed effects control for broader geopolitical or macroeconomic shocks. Specifically, Model 1 (Table 5) includes interaction terms between *lnZ* and *BRI* participation to assess how the role of the BRI evolves when FDI is oriented toward export-platform strategies, also taking into account recent trends. The estimation results are presented in Table 5.

Table 5. Gravity model with export-platform indicator.

Model	(1)	(2)	(3)	(4)	(5)
Dependent variable	FDI	FDI	FDI	FDI	FDI
Trade_I	0.0645***	0.0695***	0.0685***	0.0644***	0.0682***
	(0.0105)	(0.0117)	(0.0114)	(0.0102)	(0.0092)
EU_pair	0.3957***	0.3723**	0.3451**	0.3440**	0.3713**
	(0.1484)	(0.1503)	(0.1592)	(0.1547)	(0.1553)
lnZ	0.2126	0.4756	0.0857	0.4992***	−0.0479
	(0.5034)	(0.5523)	(0.5297)	(0.1604)	(0.2454)
BRI_pair	2.1708**				
	(0.9616)				
lnZ × BRI_early	−0.0837				
	(0.0532)				
lnZ × BRI_late	−0.0915*				
	(0.0498)				
Europe Core × Period 2 × lnZ		1.9804**			
		(0.9941)			
Europe Core × Period 3 × lnZ		−1.4904**			
		(0.7589)			
Emerging Hubs × Period 1 × lnZ		−1.3201**			
		(0.6457)			
Emerging Hubs × Period 2 × lnZ		−0.7878			
		(0.6466)			
Emerging Hubs × Period 3 × lnZ		−0.9794			
		(0.6324)			
Neutral States × Period 1 × lnZ		0.4319			
		(0.6536)			
Neutral States × Period 2 × lnZ		−0.1640			
		(0.6847)			

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Model	(1)	(2)	(3)	(4)	(5)
Dependent variable	FDI	FDI	FDI	FDI	FDI
Neutral States × Period 3 × lnZ		−1.1428**			
		(0.5270)			
Asia × Period 1 × lnZ			0.1970		
			(0.1372)		
Asia × Period 2 × lnZ			1.4555*		
			(0.8706)		
Asia × Period 3 × lnZ			−0.9025*		
			(0.4987)		
Europe × Period 1 × lnZ			0.0941		
			(0.1257)		
Europe × Period 2 × lnZ			1.4389*		
			(0.8628)		
Europe × Period 3 × lnZ			−0.8932*		
			(0.4927)		
Other × Period 1 × lnZ			1.3515		
			(0.8707)		
Other × Period 1 × lnZ			−0.8664*		
			(0.4882)		
Non-Asia × Non-Europe Core × lnZ				−0.4214***	
				(0.0898)	
Non-Asia × Europe Core × lnZ				−0.6175	
				(0.6044)	
Asia × Europe Core × lnZ				−0.2235	
				(0.6020)	
Non-Asia × Emerging Hubs × lnZ				−0.8588*	
				(0.4773)	
Asia × Non-Emerging Hubs × lnZ				−0.1837***	
				(0.0618)	
Asia × Emerging Hubs × lnZ				−1.0497**	
				(0.4794)	
ExportPlatformEU × Pre-Period 3 × lnZ					0.0158*
					(0.0086)
ExportPlatformEU × Period 3 × lnZ					0.0054
					(0.0075)
ExportPlatformChina× Pre-Period3×lnZ					0.0042
					(0.0182)
ExportPlatformChina × Period 3 × lnZ					0.0528***
					(0.0202)
_cons	8.7017*	0.4303	4.4769	10.9625	8.8599*
	(4.8847)	(11.8735)	(10.0424)	(9.0399)	(4.7445)
N	14387	14387	14387	14387	14387
r2_p	0.8225	0.8243	0.8237	0.8237	0.8231

Note: Standard errors in parentheses, *p < 0.10, **p < 0.05, ***p < 0.01. Period numbers (1, 2, and 3) refer to the FDI periods described below: Period 1 = 2010–2013 (early take-off); Period 2 = 2014–2017 (surge

and peak); Period 3 = 2018–2023 (downturn/rebound). "Non-Asia" refers to "Europe and Other" origins, "Non-Europe Core" refers to "Emerging Hubs and Neutral States" hosts.
ExportPlatformEU = EU (origin) × Non-EU Core. ExportPlatformChina = China (origin) × Non-EU Core.
Source: Author's elaboration.

In Model 1 (Table 5), the export-platform indicator (*lnZ*) remains the main focus, but its positive yet insignificant coefficient suggests heterogeneous effects, implying that access to third-country markets may influence FDI differently depending on the host region or investment phase. Notably, the BRI pair dummy is positive and significant (2.17**), suggesting that bilateral BRI participation still supports FDI.

Comparing the *BRI* results from Table 4 (Model 1) and Table 5 (Model 1), *BRI_early* was strongly associated with higher FDI when trade interdependence acted as a proxy for market access, while *BRI_late* showed no significant effect. In contrast, when focusing on export-platform orientation (*ln Z*), the interaction with *BRI_late* is slightly negative but significant, whereas *BRI_early* remains insignificant. This suggests a shift from trade-driven investment in the early period to a growing role of export-platform motives in the later phase. In addition, the coefficients on *EU_pair* and *Trade_I* are positive and statistically significant across all models (Models 1–5) in Table 5, confirming the presence of market-access FDI and strong regional integration within Europe in terms of FDI flows.

When interacting *lnZ* with regional groups and FDI periods (Model 2), *Europe Core* shows a strong positive effect in *Period 2* (2014–2017), suggesting that core European economies benefited from export platform–oriented FDI, possibly as multinational firms consolidated production in Germany, France, and the Netherlands to serve broader regional markets. In Period 3 (2018–2023), the effect for Europe Core turns negative and marginally significant (−1.49, p = 0.050), suggesting a shift away from export-platform FDI amid supply chain restructuring, Brexit, and rising focus on Emerging Hubs. Earlier, in Period 1 (−1.32, p = 0.041), these economies had weakly developed export-platform roles, while Neutral States showed a declining export-base potential in recent years.

Although the coefficient for *Emerging Hubs* in *Period 3* (Model 2) remains negative and statistically insignificant, it may indicate a gradual structural adjustment and diversification of FDI motives. By 2023, many Emerging Hubs (e.g., Poland, Hungary, and the Czech Republic) had solidified their roles as export-oriented production bases, making new FDI inflows less sensitive to the export-platform indicator (*ln Z*). Additionally, recent FDI has become more sector-concentrated, particularly in semiconductors, EV, and green industries, and the EU's investment screening mechanisms have further concentrated such projects in a few strategic hubs (e.g., Hungary). Moreover, growing geopolitical and policy uncertainties have increased cross-country heterogeneity within this group. Together, these factors make the aggregate relationships statistically weaker.

From the origin perspective (Model 3), both *Asian* and *European* FDI peak in *Period 2* (2014–2017) but weaken or turn negative in *Period 3* (2018–2023), likely reflecting structural shifts, sectoral concentration, and geopolitical or regulatory changes. The nonsignificant or negative coefficients in *Period 3* suggest that investment motives are largely shaped by host-country characteristics and should be considered jointly. To capture these dynamics, Model 4 interacts Asian and European origins with major host groups, highlighting which host–origin pairs drive export-platform FDI.

In Model 4, the results indicate that for *Asian* investors in *non-Emerging Hubs,* the coefficient (−0.18***) suggests that Asian FDI declines in hosts with stronger third-market linkages when these hosts lie outside *Emerging Hubs.* For *Europe Core* economies (Germany, France, and the Netherlands), export-platform motives appear relatively saturated, as these economies already serve as central nodes within highly integrated value chains. Although the coefficient for *Asia* × *Emerging Hubs* (–1.05**) is negative, this does not imply a decline in export-platform FDI. Rather, it indicates that *Emerging Hubs* have already matured into established export-platform economies, where export-oriented production has become a structural feature rather than a marginal driver of new investment. For Asian investors, particularly Chinese firms, this pattern reflects a shift from early trade-driven investment toward a more institutionalized export-platform model, in which production in Central and Eastern Europe (notably Hungary, Poland, and the Czech Republic) serves the wider EU market. *Non-Asian* investors also use these hubs, though to a lesser extent, underscoring the growing functional specialization and regional centrality of Emerging Hubs within Europe's FDI network.

Among Asian investors in Europe, China represents the dominant source of FDI. As such, we distinguish Chinese investment from other Asian FDI and compare it with EU FDI to capture differences in origin-specific strategies and their impact on export platform–oriented flows. To operationalize this, we construct new variables, *ExportPlatformEU* and *ExportPlatformChina*, described in Table A.5 in Appendix A.

In Model 5, the interaction terms highlight the evolving export-platform role of EU and Chinese investors in non-Europe Core hosts. For *EU-origin* FDI, the coefficient is positive and weakly significant in the *pre-Period 3* (2010–2017) at 0.0158* but becomes smaller and insignificant in *Period 3* (2018–2023), suggesting that export-platform motives for EU investors have stabilized. By contrast, *Chinese FDI* shows a strong and significant export-platform effect in *Period 3* (0.0528***), while it is negligible in the earlier period, indicating that China increasingly uses *Emerging Hubs* and *Neutral States* as strategic export bases in recent years.

Nevertheless, the empirical results in Tables 4–5 highlight the limitations of using the export-based indicator (*ln Z*) as a proxy for export platform–oriented FDI. Negative or insignificant coefficients in several specifications suggest that *ln Z* reflects only a portion of the factors influencing actual investment flows. Other factors, such as sectoral specialization, host-country characteristics, and strategic motives, play a dominant role in shaping FDI patterns. For instance, while Chinese FDI is rising in *Emerging Hubs* (Hungary, Romania, Slovakia), Japanese FDI has declined, signaling different strategic priorities. It shows that not all Asian FDI follows the same trade- or export platform-driven logic. Meanwhile, countries with potential to become new export-platform hubs, such as Turkey or Albania, are attracting additional Asian projects due to cost advantages, geographic position, and integration with EU value chains. These results underscore that, although *ln Z* offers insights into trade-linked FDI, the empirical approach requires accounting for multiple heterogeneous determinants and their interactions.

The general results highlight the importance of distinguishing origin regions and host types, as well as investment periods, to capture the evolving trade-FDI dynamics.

Overall, the findings provide strong support for the export-platform hypothesis, showing that despite geopolitical tensions and rising trade barriers, Asian FDI, particularly from China, remains export-oriented toward regions integrated into European supply chains.

Together, the evidence from Tables 3–5 confirms that market-access and export-platform motives coexist in Europe's FDI landscape, with Chinese FDI shifting from early BRI infrastructure projects toward strategic-sector investments, primarily in Emerging Hubs. These results provide robust support for the research questions addressed in this study.

5. Conclusions

This study provides new insights into the evolving dynamics of FDI and trade-based economic integration in Europe. The analysis shows that trade linkages, functional economic integration beyond formal EU membership, and investor origin all shape FDI patterns, with Asian, particularly Chinese, investment increasingly driven by export-platform strategies. Using an augmented gravity model for 42 European host countries and their global partners (2010–2023) and incorporating the Trade Interdependence Index (*Trade_I*) and export-platform indicator (*lnZ*), the results reveal that both market-access and export-platform motives coexist, but their relative importance varies across host types, investment periods, and origin regions. In particular, Chinese FDI has shifted from early BRI infrastructure projects toward manufacturing investments in Emerging Hubs, highlighting the changing nature of external influence in European FDI flows.

Descriptive analysis shows that trade dependency with non-EU partners experienced the fastest growth, increasing by 55% between 2011 and 2023, with emerging trade corridors led by Turkey–China, Poland–South Korea, and Hungary–China. While European investors still dominate EU FDI inflows, their share has steadily declined, falling below 70% for the first time in 2019. Meanwhile, Asian investors are increasing their presence in Europe, with Asian economies now ranking among the top 10 trade partners in over half of European host countries. Future FDI is likely to concentrate in emerging production hubs such as Eastern Europe, the Balkans, and Turkey.

Accordingly, we adopt a rank-based analytical approach, classifying countries based on observed trade and FDI linkages, including BRI, and functional integration, rather than formal EU membership, into Integrated Europe Core, Emerging Strategic Hubs, and Neutral States, while origin countries are grouped as European, Asian, or Other.

The empirical results support the hypothesis that stronger bilateral trade interdependence (*Trade_I*) is positively associated with higher FDI inflows (Tables 3–5). Europe Core countries (including Norway and Switzerland) and Emerging Hubs (including Turkey and Serbia) have seen increasing FDI over time (Table 4), despite not all being EU members. Together with the declining significance of EU membership and BRI participation variables (Table 3), this supports the hypothesis that functional economic integration provides a more relevant framework than formal institutional classification for explaining FDI and trade patterns in Europe. Splitting the sample into three periods (Tables 4–5) captured more nuanced dynamics of FDI flows across different phases.

At the same time, BRI participation alone does not significantly affect FDI, likely because projects are primarily loan-financed infrastructure initiatives, markets are already integrated, and time lags delay observable effects. When interactions with trade interdependence are considered, the BRI pair dummy becomes significant, which reflects the heterogeneous nature of hosts, where emerging hubs such as Serbia, Hungary, Montenegro, and Greece attract BRI-related investment, while core EU economies like Germany and France participate less. Incorporating the export-platform indicator (*ln Z*) further suggests a shift in Chinese FDI from trade-driven motives in the early period toward a growing emphasis on export-platform strategies in the later phase (Table 5).

Despite the limitations of using the export-based indicator ($ln\,Z$) as a proxy for export platform–oriented FDI, the export-platform FDI hypothesis is supported. In Europe Core economies (Germany, France, and the Netherlands), export-platform motives appear relatively saturated, as these countries already serve as central nodes within highly integrated value chains. For Asian investors, particularly Chinese firms, this pattern reflects a shift from early trade-driven investment toward a more institutionalized export-platform model, with production in Central and Eastern Europe (notably Hungary, Poland, Slovakia, and the Czech Republic) serving the wider EU market.

At the same time, China, as the main Asian investor, has increasingly utilized the potential of Emerging Hubs and Neutral States as strategic export bases, particularly focusing on non-EU countries in recent years. By 2023, many EU Emerging Hubs (such as Poland, Hungary, and the Czech Republic) had already solidified their roles as export-oriented production bases, making new FDI inflows less sensitive to the export-platform indicator. Meanwhile, countries like Turkey, Serbia, and Albania have attracted new waves of Chinese FDI, reflecting their growing integration into European value chains. Together with the EU's investment screening mechanisms, these developments have further concentrated strategic projects in a limited number of key hubs. Moreover, rising geopolitical and policy uncertainties have amplified heterogeneity within this group.

Overall, this study contributes by integrating trade interdependence and export-platform perspectives within an augmented gravity framework to explain evolving FDI patterns in Europe. It highlights the growing role of Emerging Hubs and the shift of Chinese investment from infrastructure-driven to strategic, export-oriented FDI, offering new evidence on functional integration beyond the EU and the changing geography of global value chains.

6. Policy recommendations

The empirical findings show that manufacturing FDI is increasingly concentrated in economies with strong trade interdependence and functional integration into European supply chains. This suggests that export-platform investment responds more to network embedding than to market size or institutional membership alone.

First, EU policymakers should ensure that rules of origin and cumulation provisions in trade agreements adequately reflect fragmented production structures across integrated European supply chains. If export-platform FDI is growing in highly trade-dependent economies, overly restrictive value-added thresholds may limit their capacity to function as regional production hubs. Monitoring re-export intensity and foreign value-added shares can help evaluate whether current trade rules facilitate structural upgrading.

Second, investment screening frameworks should balance security considerations with the economic benefits of network integration. Screening policies should remain targeted to strategic sectors while avoiding excessive restrictions that could discourage efficiency-enhancing manufacturing investment in highly trade-integrated economies. In addition, screening can help differentiate between efficiency-driven export-platform FDI and defensive tariff-jumping investments, which occur when firms establish local production primarily to avoid high import tariffs rather than to exploit regional supply networks.

Third, connectivity-related initiatives, including infrastructure projects associated with development programs similar to the Belt and Road model, should be complemented by industrial

integration policies in Central and Eastern European economies. Such projects can improve trade accessibility and reduce transportation costs, but their contribution to manufacturing FDI is stronger when accompanied by measures that facilitate supply-chain participation, technological upgrading, and compliance with European production and regulatory standards.

Author contributions

The author confirms sole responsibility for the conception, design, analysis, and writing of this manuscript.

Use of AI tools declaration

The author declares that no Artificial Intelligence (AI) tools were used in the creation of this article.

Conflict of interest

The author declares no conflicts of interest in this paper.

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