Working Paper 264

JUNE 2025

Drivers of FDI in the EU:

Regulatory distance and revealed technological advantage

Chiara Castelli, Ronald B. Davies, Mahdi Ghodsi and Javier Flórez Mendoza

The Vienna Institute for International Economic Studies
Wiener Institut für Internationale Wirtschaftsvergleiche

Drivers of FDI in the EU:

Regulatory distance and revealed technological advantage

CHIARA CASTELLI
RONALD B. DAVIES
MAHDI GHODSI
JAVIER FLÓREZ MENDOZA

Chiara Castelli and Javier Flórez Mendoza are Economists at The Vienna Institute for International Economic Studies (wiiw). Mahdi Ghodsi is Economist at wiiw and Adjunct professor at the Vienna University of Economics and Business (WU). Ronald B. Davies is Professor of Economics at the University College Dublin, School of Economics, Belfield, Ireland and Skatteforsk – Centre for Tax Research, Norwegian University of Life Sciences, Ås, Norway

Research for this paper was financed by the Anniversary Fund of the Oesterreichische Nationalbank (Project No. 18800). Support provided by the Oesterreichische Nationalbank for this research is gratefully acknowledged.

We appreciate the valuable comments received from Branimir Jovanović, Alejandro Cuñat, Gabriel Felbermayr, Harald Oberhofer, Michael Pfaffermayr, Michael Peneder and Robert Stehrer at the FIW Workshop in 2023 as well as from participants at the European Trade Study Group (ETSG) 2024 Conference in Athens, Greece.

Abstract

This study examines the interplay between trade policy, in particular non-tariff measures (NTMs), and revealed technological comparative advantage (RTA) at the NUTS 2 level as drivers of foreign direct investment (FDI) over time. Combining data from the Orbis database (Bureau Van Dijk), the NTMs database (WTO I-TIP) and the European Patent Office (EPO PATStat), we construct a comprehensive panel database of European firms owned by foreign-owned EU and non-EU firms. This database includes financial information for both parent companies and their subsidiaries as well as detailed country- and sector-specific trade barriers from the perspective of both the home and host economies. Furthermore, this database allows us to compute tailored RTA variables reflecting firm-specific technological interests proxied by firms' patent production across technology classes. Using a Poisson pseudo-maximum likelihood (PPML) estimator, our analysis reveals a heterogeneous impact of NTMs and RTAs on FDI investment in the EU regions. Specifically, while increasing the regulatory distance (RD) of technical barriers to trade (TBTs) and sanitary-and-phytosanitary-standard (SPS) measures hampers FDI investment from extra-EU companies, the results on tariffs support the regulatory jumping motive. Furthermore, local technological capabilities significantly support FDI, especially when RTAs reflect the technological interests of the foreign-owned subsidiary, while the effect is reversed when accounting for the innovation portfolio of the parent company.

Keywords: FDI, tariff and non-tariff measures, revealed technological advantage

JEL classification: F23, O24, O34, R58

CONTENTS

Abstract....5

1. Introduction.... 9

2. Literature review....12

3. Data sources and methodology....15

3.1. Data sources....15
3.2. Methodology....15
3.3. Stylised facts: investments and RTA....17

4. Estimation results....20

4.1. Main results....20
4.2. Impact of different RTAs....24

5. Summary and concluding remarks....26

References.... 27

Appendix....32

TABLES AND FIGURES

Table 1 / PPML estimation of subsidary's total assets with respect to trade policies in the FDI host sector ... 21
Table 2 / PPML estimation of subsidary's total assets with respect to trade policies in the FDI home sector ... 23
Table 3 / PPML estimation of subsidary's total assets using different RTA variables computed with respect to subsidiary and GUO technological interest, respectively ... 25

Table A1.1 / Robustness check of Table 1, column (1) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) as well as 'no liab' sample (i.e. no liability information of subsidiary and GUO) ... 33
Table A1.2 / Robustness check of Table 1, column (2) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) and 'no liab' sample (i.e. no liability information of subsidiary and GUO) ... 34
Table A2.1 / Interaction between trade policies in host sector and horizontal integration (i.e. GUO and subsidiary in the same NACE 2-digit sector) ... 35
Table A3.1 / Robustness check of Table 2, column (1) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) and 'no liab' sample (i.e. no liability information of subsidiary and GUO) ... 36
Table A3.2 / Robustness check of Table 2, column (2) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) and 'no liab' sample (i.e. no liability information of subsidiary and GUO) ... 37
Table A4.1 / Interaction between trade policies in the home sector and the number of patents owned by the subsidiary ... 38
Table A5.1 / Interaction between RTA computed with respect to the technological interest of the GUO, interacted by the distance between FDI origin and destination countries. Model specification on host sector ... 39

Figure A1.1 / Total assets of foreign-owned firms by NUTS 2 Rev 2.0 (2016) and NACE two-digit sectors: Group 1 ... 40
Figure A1.2 / Total assets of foreign-owned firms by NUTS 2 Rev 2.0 (2016) and NACE two-digit sectors: Group 2 ... 41
Figure A1.3 / Total assets of foreign-owned firms by NUTS 2 Rev. 2.0 (2016) and NACE two-digit sectors: Group 3 ... 42
Figure A1.4 / RTA (inventors) by CPC3 and NUTS 2 Rev. 2.0 (2016): Group 1 ... 43
Figure A1.5 / RTA (inventors) by CPC3 and NUTS 2 Rev. 2.0 (2016): Group 2 ... 44
Figure A1.6 / RTA (inventors) by CPC3 and NUTS 2 Rev. 2.0 (2016): Group 3 ... 45

1. Introduction

Understanding the determinants of foreign direct investment (FDI) is crucial for fostering economic integration and technological development, especially within the European Union (EU), where regional disparities in innovation and regulatory regimes persist. Multinational enterprises (MNEs) base their investment decisions not only on market access and cost efficiency, but increasingly also on the strategic alignment between host regions' technological capacities and their own innovation portfolios. At the same time, regulatory heterogeneity – particularly in the form of non-tariff measures (NTMs), such as technical barriers to trade (TBTs) as well as sanitary and phytosanitary standards (SPSs) – can impose additional compliance burdens on foreign investors. These regulatory frictions may deter investment or reshape its geography, especially when regulatory frameworks between the home and host countries diverge significantly. This paper explores how the combination of regulatory distance (RD) and technological complementarity between parent MNEs and EU regions affects the location and intensity of FDI. By leveraging firm-level data on financial performance, ownership structure and innovation activity, we empirically assess how regulatory costs and revealed technological advantages (RTAs) interact in shaping the asset distribution of foreign subsidiaries across EU regions.

FDI has emerged as a potential driver of economic growth in both developed and developing countries, primarily due to its ability to transfer know-how and diffuse advanced technologies from MNEs to other host regions (Balasubramanyam et al. 1996; Gao 2005; Mottaleb 2007; Iamsiraroj 2016). Nevertheless, the growth impact of FDI can vary significantly across different sectors (Alfaro 2003). The primary mechanisms through which FDI fosters long-term growth in host economies are technological upgrading and knowledge spill-overs (De Mello 1999). According to the Organisation for Economic Co-operation and Development (OECD 2021), FDI can substantially advance the United Nations' Sustainable Development Goals (SDGs) by actively promoting innovation and productivity, enhancing job quality and skills, fostering gender equality in the labour market, and reducing CO_2 emissions to contribute to meeting global climate objectives. This potential for transformation is attributed to the extensive knowledge and expertise that MNEs have accumulated in their specialised sectors. Additionally, the ownership networks of MNEs contribute to the sourcing of intermediate inputs by integrating into global value chains (GVCs), diversifying managerial techniques across various markets, and ensuring better access to financial resources in multiple countries (Javorcik 2020). In developed economies, FDI is crucial for stimulating growth (Alfaro et al. 2010). Precisely because of their productive nature, MNEs base their investment decisions on factors that enhance their productivity and technological capabilities. They may select regions where they can improve cost efficiency and technological advantage, especially in environments with fewer regulatory constraints.

Prominent research studies have developed theories and models to explain the factors driving FDI. Dunning (1977, 1981) emphasises ownership advantages and industrial organisations, while Markusen (1984, 1997) and Ethier (1986) focus on agglomeration economics and market size. Further research by Helpman (1984, 1985, 2006) and Markusen and Venables (1998, 2000) highlights the importance of various country characteristics. In addition, Carr et al. (2001) and Melitz et al. (2004) discuss cost factors, wage differentials and transport costs. Other significant determinants include wealth and asset protection, risk factors, industrial and labour disputes, and policy variables, as explored by Yang et al. (2000), Resmini (2000), Braconier and Ekholm (2002), Faeth (2009), and Kumari and Sharma (2017).

Furthermore, accessing resource-abundant countries to utilise factors of production at lower costs is another major driver of FDI. Technology, as another important factor of production, can also be sourced and its diffusion utilised in locations where such technologies are abundant. To compete in global markets and generate profits, MNEs acquire newer technologies to enhance production efficiency. However, the heterogeneity of technologies and knowledge across borders and sectors drives MNEs to seek new varieties of first-hand knowledge and information through local spill-overs by positioning their subsidiaries in locations specialised in certain technologies. This is mainly because they can only gain market share in the global economy if their technologies outperform those of their competitors, enabling them to suppress costs and consequently increase markups. This allows MNEs to access and apply localised dimensions of knowledge (Pearce 1999; Nachum and Zaheer 2005) as well as to expand their production technologies into new fields.

However, various markets are regulated by numerous regulations within heterogeneous regulatory frameworks. The RD between countries could act as an additional sunk cost for an MNE investing in a new market. The home headquarters of an MNE must always comply with regulations in its home country. However, new regulatory frameworks and regulations with different objectives in other countries increase the RD between the two. Compliance with such new regulations could be costly. These costs could take the form of fixed sunk costs for acquiring new technologies and production facilities needed to produce the final product in line with regulations. Alternatively, they could manifest as ad valorem or variable costs, such as adding additional components or ingredients to final goods. Therefore, compliance with regulations could be closely related to the technological positioning of the MNE.

Thus, this paper contributes to the literature on the determinants of FDI by focusing on two co-founding drivers: regulatory costs and technological positioning. More specifically, the role of RD in NTMs (i.e. SPS measures and TBTs) as well as the influence of RTAs are tested as drivers of FDI. By exploring these dimensions, this study sheds light on how RD in NTMs between the host country of a foreign-owned subsidiary and the home country of the foreign MNE parent may impact the investment decisions of foreign-owned MNEs, particularly focusing on heterogeneity across different sectors and regions using a novel firm-level database. In fact, we are interested in finding out whether RD in NTMs, as well as the technological matching of the MNE with that of the European regions in terms of innovation and patenting activities, would affect the FDI in foreign-owned subsidiaries.

Focusing on these firm-specific dynamics implies the construction of a comprehensive dataset that includes detailed financial, patent and ownership information from the Orbis Bureau Van Dijk database. This data is further enriched by integrating sector-specific tariffs and RD in NTMs. Additionally, sub-national patent data from the European Patent Office (EPO PATStat) provides insight into regional technological capabilities at the NUTS 2 level. Our dataset spans from 2000 to 2018, offering an unbalanced panel of European firms owned by both EU and non-EU entities. Our empirical methodology relies on the estimation of the total assets of subsidiaries using a Poisson pseudo-maximum likelihood (PPML) estimator, which is robust against heteroscedasticity and zero values in the dependent variables, following the literature (Correia, Guimarães and Zylkin 2020; Santos Silva and Tenreyro 2006; Head and Ries 2008; Head and Mayer 2014; Larch et al. 2019). This approach allows us to assess the effects of RD between the home and host countries of FDI in a dyadic relationship that varies over time.

We control for multilateral resistance effects of trade policies using multidimensional fixed effects, following the gravity literature (Yotov et al. 2016). Additionally, we incorporate a comprehensive set of fixed effects to account for unobserved heterogeneity at various levels, including firm-specific, sectoral and regional factors, to ensure robust and reliable results. The analysis distinguishes between two models: one focusing on the subsidiary's sector of activity and the other on the parent company's sector of activity. Other key variables include employment size, labour productivity, liabilities and innovation capabilities, as measured through patent activity. These firm-specific factors are complemented by sector-level trade policies (WTO I-TIP), including tariffs and RD in NTMs, which are calculated at a granular level using harmonised system (HS) product classifications at the six-digit level.

To measure the impact of RD in TBTs and SPS measures, we construct an index that captures the extent of divergence between trading partners based on the objectives of NTMs cited in the TBT and SPS notifications to the World Trade Organization (WTO). The divergence index reflects the difference in regulatory objectives between the importing and exporting countries, with higher values indicating greater RD. Furthermore, we calculate the revealed technological advantage (RTA) for each four-digit technology class matching the subsidiary's patenting activity, but at the four-digit Cooperative Patent Classification (CPC) technological classes and regional NUTS 2 level in which the subsidiary is located.[1] This RTA index helps us to understand the technological positioning of firms in relation to their regional environment, which is crucial for analysing the impact of regulatory policies on firm performance.

Our findings indicate that increasing RD through TBTs and SPS measures may hamper FDI investment from extra-EU companies, reinforcing the findings of previous studies (Cieślik and Ghodsi 2024). In addition, technological capabilities and the technological interests of the foreign-owned subsidiary matching the RTAs of the host region significantly support FDI. Interestingly, this positive effect is the opposite when considering the innovation portfolio of the parent company. Thus, this phenomenon shows that while subsidiaries benefit from local technological strengths, parent companies may be reluctant to invest in regions where their core technologies are already established, potentially due to concerns about competition or market saturation.

The remainder of the paper is organised as follows. The next section provides a brief review of the literature. Section 3 describes the data and methodology, Section 4 presents the estimation results, and Section 5 provides a summary and concluding remarks.

[1] As the sample of this study covers the 2010-2018 period, we used the 2016 version of the NUTS 2 classification for regional designations.

2. Literature review

The literature on the theoretical and empirical determinants of FDI has expanded over decades. Both macro- and microeconomic factors have been studied in the literature. Using the Orbis database and machine-learning techniques, Arel-Bundock (2017) finds that political factors are not significantly related to MNEs' decisions to invest abroad; rather, traditional gravity variables play a more critical role. Likewise, Bénassy-Quéré et al. (2007) emphasise that the quality of institutions – including bureaucracy, corruption, and transparency of information – as well as the banking sector and legal framework of the host economy are crucial determinants of inward FDI, independent of GDP per capita. Moreover, while the institutional quality of the home economy does not significantly impact FDI, the convergence of the institutions in the host country to those of the home country can foster bilateral FDI. Nevertheless, the stability of both political and economic environments significantly influences FDI inflows into a country (Schneider and Frey 1985).

The role of gravity variables in influencing FDI flows cannot be overstated. Factors including cultural distance, language proximity, colonial ties, trade agreements and additional determinants (e.g. relative labour endowments and economic sentiment indicators) significantly affect bilateral FDI flows (Bevan and Estrin 2004; Blonigen and Piger 2014; Ghodsi 2020; Cieślik and Ghodsi 2021, 2024). The ratification and implementation of bilateral investment treaties further enhance bilateral FDI outflows (Egger and Pfaffermayr 2004). Furthermore, inflation rates, interest rates, and the availability of skilled labour are key determinants of FDI (Çeviş and Çamurdan 2007; Hoang et al. 2021). Other determinants, such as regulatory reforms aimed at reducing FDI restrictiveness, can significantly boost FDI stocks (Mistura and Roulet 2019). Similarly, introducing the euro has been shown to raise inward FDI flows within the euro area, with intra-area flows being more strongly affected than those outside the euro area (Petroulas 2007). While some studies do not find any significant impact of corporate tax variations on FDI in the EU (Hunady and Orviska 2014), others address the possibility of a positive relationship between foreign ownership and tax burdens (Huizinga and Nicodème 2006). Moreover, factors such as labour costs, firing costs, public debt, GDP per capita and openness play significant roles in determining FDI (Janicki and Wunnava 2004).

Several studies have examined the role of technological capabilities in attracting FDI. In fact, MNEs invest in regions and sectors that can allow them to absorb a substantial technological spill-over. Branstetter (2006) and Belderbos et al. (2013) provide empirical evidence that MNEs seek regions with strong technological ecosystems aligned with their own innovation interests. Castellani and Zanfei (2006) argue that such matching facilitates productivity gains and knowledge spill-overs, while Fosfuri et al. (2001) emphasise the role of skilled labour mobility in diffusing technological benefits from FDI. These studies underscore the importance of locating subsidiaries in regions that offer complementarities in terms of innovation. Additionally, Noorbakhsh et al. (2001) find that countries with a strong human capital base attract more FDI, especially in technology-intensive sectors. Similarly, Haskel et al. (2007) and Coe et al. (2009) show that domestic firms benefit from foreign technological presence, but the extent of spill-overs depends on absorptive capacity and institutional quality.

Trade and investment costs imposed by regulatory differences also influence MNEs' decisions. Fontagné et al. (2015) and De Sousa et al. (2012) show that product standards and regulatory divergence affect not only trade but also investment flows, as firms seek to avoid compliance costs. Disdier et al. (2008) find that SPS measures can serve as barriers to trade in agri-food sectors, while Piermartini and Budetta (2009) and Cadot et al. (2015) note that divergent NTMs increase fixed and variable costs of entry. Chen and Moore (2010) further demonstrate that firm heterogeneity amplifies the role of regulatory frictions in FDI decisions. Chen and Novy (2012) contribute to the understanding of indirect trade and investment frictions, suggesting that RD should be viewed as a composite cost factor.

Alongside the impact of technological advancements on FDI flows, tax competitiveness and government investment also play a prominent role. Hubert and Pain (2002) used data on FDI from German MNEs to identify tax competitiveness, government fixed investment expenditures in regions with lower needs for EU structural funds, and agglomeration externalities as major drivers of FDI inflows in the European Economic Area (EEA). Similarly, Kurtovic et al. (2016) demonstrated that FDI from Austria reshaped the industrial organization in Bosnia and Herzegovina, resulting in labour market changes and an increase in wages. Hence, higher wages offered by MNEs may raise average wages and enhance certain skills among employees in the host economy (Becker et al. 2020). In addition, Lin (2010) finds that network linkages, market expansion and China's incentive policies positively affected the decision of MNEs to engage in FDI, particularly in the Taiwanese information technology (IT) sector. In this respect, export-oriented firms also show a greater propensity to engage in FDI, highlighting the importance of market dynamics and policy incentives in shaping investment decisions.

Many studies have examined the role of FDI in the EU, shedding light on several determinants influencing investment flows. A study by Bellak and Mayer (2010) shows that Austria's favourable economic environment and corporate tax policies have positioned it to attract more inward FDI following the recent global financial crisis. Additionally, Pfaffermayr and Bellak (2002) found that MNEs operating in Austria are significantly larger than domestic firms. These MNEs demonstrate higher productivity, greater investment-to-sales and investment-to-employment ratios, larger exports to both EU and non-EU countries, a greater market share within the EU, and higher annual growth in employment and sales. Although domestic Austrian firms exhibit slightly higher labour productivity growth than those owned by foreign MNEs, indicating a catch-up effect and spill-over benefits from MNEs, the key takeaway is that being part of a foreign MNE's network significantly boosts the profitability and productivity of Austrian firms. This network membership provides access to specialised human capital, information exchange, technology transfer and other benefits (e.g. transfer pricing), aligning well with the previous literature (Desai et al. 2008; Alfaro and Chen 2012). In line with these findings, Bellak (2004) notes that Austrian firms owned by MNEs perform more robustly compared to those simply owned by foreign entities. Gugler (1998) underscores that ownership concentration is a hallmark of 'bank-based' financial systems. Braconier and Ekholm (2002) carefully examine Swedish MNEs and their affiliates and find that German affiliates tend to be more R&D- and skill-intensive as well as to have higher labour productivity than affiliates in other regions. Consequently, German affiliates are less integrated with their Swedish parent companies because they trade less with them and instead supply more products to the domestic German market. This behaviour indicates that Swedish MNEs are engaging in market-seeking FDI in Germany.

Brenton et al. (1999) explore the integration of countries of Central, East and Southeast Europe (CESEE) into the EU, finding that income growth is the primary driver of FDI from the EU to these regions. However, it is noteworthy that FDI does not substitute exports from the home EU countries. Ghodsi (2020) examines the impact of TBTs on FDI stocks in the CESEE countries. The findings suggest that restrictive TBTs in CESEE that raise specific trade concerns (STCs) at the WTO act as a tariff-jumping incentive, encouraging more FDI in these regions. In contrast, regular TBTs imposed by home countries can reduce FDI stocks by increasing trade costs and hindering potential vertical integration. Breuss et al. (2001) find that public expenditure in EU member states encourages FDI outflows to other countries.

Similarly, Katsaitis and Doulos (2009) reveal that European Structural Funds positively impact FDI inflows into EU member states with higher institutional quality, while they may negatively impact states with lower institutional quality due to resource misallocation. Bruno et al. (2016) report a strong negative impact on FDI inflows of leaving the EU. Cieślik and Ghodsi (2021) find that euro-area membership may reduce pledged investments by MNEs because the single currency removes trade frictions, making trade a substitute for FDI. Furthermore, the results suggest that better economic conditions in an EU host country and worse conditions in an EU home country, measured by economic sentiment indicators (ESIs), increase the number and capital amount of intra-EU investment projects pledged by MNEs. Furthermore, a more recent study by Cieślik and Ghodsi (2024) on global foreign-owned subsidiaries active in manufacturing sectors reveals that RD in TBTs between the host and home countries of FDI is negatively associated with the turnover and total assets of these firms.

This paper contributes to the literature by building on these strands, particularly by examining how RD in NTMs (TBTs and SPS measures) and regional technological advantage (measured by CPC-based RTA) jointly influence FDI at the firm and regional levels within the EU. By integrating both the subsidiary's and the parent's technological portfolios, this paper offers a novel perspective on how MNEs strategically locate investments to access technologies that complement rather than duplicate their core competencies. This paper contributes to the literature by extending the work of Cieślik and Ghodsi (2024) in that it focuses on foreign-owned subsidiaries in the EU that operate across all sectors of the economy. This extension is motivated by the desire to include both the subsidiary's and the parent company's sectors to analyse the effects of RD on the total assets of subsidiaries. Consequently, there could be subsidiaries in the services sector whose parent companies are in the manufacturing sector, with RD calculated for the parent company's sector. Additionally, this paper explores the technological positioning of parent companies and their subsidiaries, particularly in terms of patenting, and examines their relationship with the RTA of the NUTS 2 region in which the subsidiary is located. Furthermore, while Cieślik and Ghodsi (2024) measured RD at the subsidiary-sector level and analysed its effects, this paper takes an additional step by identifying the parent company's sector to assess the impact of RD in NTMs within the parent company's sector on the total assets of the foreign-owned subsidiary.

3. Data sources and methodology

3.1. DATA SOURCES

We construct a comprehensive database of multinational affiliates in Europe, including those owned by EU and non-EU parents. Starting with information on firms' financials, patent activity and ownership from Orbis Bureau Van Dijk, we match it with country-sector-specific tariffs and RD in NTMs as well as with sub-national NUTS 2 patent production information from the European Patent Office (EPO PATStat). The final period of analysis goes from 2000 to 2018, with unbalanced panel information. Tariffs are compiled using the World Integrated Trade Solution (WITS) of the World Bank. Tariffs in each sector and country are the simple average ad valorem equivalents of all tariffs adjusted for tariff-quota rates that are imposed by a country on all six-digit products, including zero trade flows. The priority of choice for tariffs is first the use of bilateral effectively applied rates. When these rates are missing in the data, the bilateral preferential rates are used. And when these types are missing, the unilateral most-favoured nation (MFN) rates are used for a product line. The NTM data to measure the RD is collected from the WTO's Integrated Trade Intelligence Portal (I-TIP). The methodology used to measure the RD in TBTs and SPS measures is described in the next subsection.

3.2. METHODOLOGY

Our empirical strategy relies on the estimation of a subsidiary's total assets using a Poisson pseudo-maximum likelihood (PPML) estimator.[2] Estimating the simultaneous effects of sector-specific trade regulations – both in the parent firm's sector at home and the subsidiary's sector in the host economy – relies on the identification of two models. In fact, the sectors of activity of the subsidiary and the parent MNE do not always align, and trade policy may affect each sector differently.Specifically, when focusing on the host sector of activity s (i.e. the sector of the subsidiary),[3] we can derive our first model as follows:

$$Y_{fsrig\rho jt} = \exp[\,\alpha + Firm_{fsrt}\beta_1{}' + GUO_{g\rho jt}\,\beta_2{}' + TradePol_{sit}\beta_3{}' + TradePol_{sjt}\beta_4{}' + \\ + RTA_{frit} + \gamma_f + \gamma_g + \gamma_{rit} + \gamma_{\rho t} + \gamma_{ist} + \gamma_{jst} + \gamma_{ijs}\,] \times v_{fsrig\rho jt} \quad (1)$$

where the dependent variable *Y* refers to the total assets of firm *f* active in sector *s* and located in the NUTS 2 region *r* of the EU country *i*, with this firm belonging to the corporate group owned by a foreign global ultimate owner (GUO) *g*, which is active in sector ρ of country *j*. On the right hand side of Eq. (1), our set of regressands includes the vector of the subsidiary's characteristics $Firm_{fsrt}$, such as employment size (emp_{fct}), labour productivity (lp_{fct}), current and non-current liabilities (i.e. $curliab_{fct}$ and $nocurliab_{fct}$, respectively) and innovation capability, measured as annual count of published granted patents (p_{fct}). The same characteristics are also considered at the corporate-group level by

2 More specifically, we implemented the command 'ppmlhdfe' developed by Correia, Guimarães and Zylkin (2020). The PPML estimator with high-dimensional fixed effects allows us to achieve faster convergence and robustness.

3 I. e. following the two-digit level of Statistical Classification of Economic Activities (NACE) Revision 2.

means of unconsolidated data for the parent's own activities in vector $GUO_{g\rho jt}$.[4] Vectors $TradePol_{sit}$ and $TradePol_{sjt}$ include RD in NTMs as well as the bilateral tariff simple average imposed by country *i* (*j*) to the imports of the six-digit products from country *j* (*i*) in sector s at time *t*.[5] Tariffs are bilateral and calculated at the six-digit level of the harmonised system (HS, 1996) as the simple average of all tariffs lines (including zero trade flows) that exist within each NACE two-digit sector.

Specifically, RD within each bilateral two-digit NACE sector is assessed through the detailed objectives cited as keywords in NTM notifications targeting products at the six-digit HS level in the concordance tables, which link the six-digit HS products to two-digit NACE sector levels. Following the approach of Cadot et al. (2015), a variable for RD is measured for each type of NTM. To measure the distance in regulatory NTMs at the NACE two-digit sector s, which includes all six-digit HS products hs, a binary variable $I_{kht}^{\tau o}$ is defined. This variable indicates whether importing country k has a regulatory NTM of type τ (i.e. $\tau \in \{TBT\ ,SPS\}$) on product h in year t, which is in force with an objective o cited in the WTO notifications. The RD between two trading partners k and l in that regulatory measure τo is then defined as $RD_{klht}^{\tau o} = |I_{kht}^{\tau o} - I_{lht}^{\tau o}|$. Aggregating RD over all classes for a traded sector s between importing country k and exporting country l in year t then yields the RD D_{klst}^{τ}, which is calculated as:

$$D_{klst}^{\tau} = \sum_{o=1}^{HO_{h,\tau}} \frac{RD_{ijht}^{\tau o}}{HO_{h,\tau}}, \qquad \tau \in \{TBT\ ,SPS\} \tag{2}$$

where $O_{h,\tau}$ represents the total number of NTM objective classes of type τ imposed globally on product h, and *H* denotes the total number of six-digit HS products in sector s. This index approaches unity when the two trading partners impose TBTs or SPS measures covering different NTM classes, indicating full divergence, and approaches zero when the TBTs and SPS measures fall within the same classes for both partners. Thus, regulatory NTMs' distance increases with this index. All trade flows, including those with zero trade values, in all six-digit tariff lines are considered to avoid bias towards available tariff lines, which presumably incur lower trade costs.

In addition, we compute variable RTA_{frit} as the RTA that region *r* in country *i* has with respect to each firm-specific technological interest. This is done using the following equation:

$$RTA_{frit} = \frac{1}{N_c} \sum_{c=1}^{N_c} w_{fc}\, RTA_{rict} \tag{3}$$

where we introduce subscript *c* to define the four-digit technology class of the CPC. This implies that, for each firm *f*, we first identify the technological classes *c* in which it is active over the period by looking at its production history of granted patents. Then, once we have identified the technological interest of the company, we can compute for each year the RTAs at the same (four-digit) CPC level in the region where it is located and match the two pieces of information though weight w_{fc}. This is defined as a dummy that switches on whenever technological class *c* is produced in firm *f*, so that our final index RTA_{frit} can be seen as a simple average of the RTAs across all technological classes N_c in which *f* is

4 In order to include a larger number of observations, we present as the main results the specification with a limited set of financial information on the subsidiary and no financial information on the GUO. Nevertheless, we provide the full model specification in the Appendix (Tables A1.1 and A1.2) as a robustness check, which confirms the results presented in Section 3.

5 More specifically, we include both TBTs and SPS measures as NTMs.

active. Alternatively, we can further refine our weighting system to account for the importance of each technology class by taking the technology share of total patenting output of firm *f*, previously defined in Eq.(1) as p_{fct}, so that RTA_{frit} can be seen as the weighted average of RTAs across all technology classes N_c in which *f* is active, weighted by their relative importance. In addition, we repeat the calculations of our innovation-weighted RTA indices with respect to the technological interest of the parent company.

Finally, following the FDI literature (Anderson and van Wincoop 2003; Head and Mayer 2014; Baier and Bergstrand 2009), we include a set of fixed effects accounting for the unobserved individual characteristics at both the subsidiary and GUO level (i.e. γ_f and γ_g, respectively) as well as bilateral host-sector γ_{ijs} (i.e. the sector of subsidiary), the home-sector time $\gamma_{\rho t}$, the host-sector time in both FDI origin and destination countries, namely γ_{jst} and γ_{ist} (i.e. the country of the GUO and of the subsidiary, respectively), and regional-time γ_{rit}.[6] It is also important to note that all continuous variables included on the right-hand side of Eq. (1) are arcsine (hyperbolic sine) transformed, with the exception of the RTA variables, which are kept in levels.[7]

Similarly, when focusing on the home sector ρ (i.e. the sector of the GUO), we can derive our second model as:

$$
\begin{aligned}
Y_{fsrig\rho jt} = \exp[\,\alpha + \, & Firm_{fsrt}\beta_1' + GUO_{g\rho jt}\,\beta_2' + TradePol_{\rho it}\beta_3' + TradePol_{\rho jt}\beta_4' + \\
& + RTA_{frit} + \gamma_f + \gamma_g + \gamma_{rit} + \gamma_{st} + \gamma_{i\rho t} + \gamma_{j\rho t} + \gamma_{ij\rho}\,] \times v_{fsrig\rho jt}
\end{aligned} \tag{4}
$$

where we can notice a strong similarity with Eq. (1), although now both vectors $TradePol_{\rho it}$ and $TradePol_{\rho jt}$, as well as the set of fixed effects, refer to the GUO sector ρ.[8]

3.3. STYLISED FACTS: INVESTMENTS AND RTA

In this section, we use heatmaps to provide a descriptive overview of FDI measured by the total assets of foreign-owned subsidiaries across NACE two-digit sectors and NUTS 2 regions. The regions are arranged alphabetically and presented in three figures (A1.1-A1.3). Furthermore, we display the RTA, which is based on the location of inventors across NUTS 2 regions and classified according to three-digit CPC classes. These are also split across regions and shown in three figures (A1.4-A1.6).

Figures A1.1-A1.3 show the total assets held by foreign-owned subsidiaries averaged across years that are measured in millions of US dollars in logarithmic (log) form, where rows represent the NACE two-digit sectors and the columns the regions at the NUTS 2 level. The colours are centred around zero: yellow to green shades indicate positive and higher log values (i.e. FDI exceeding USD 1 million), while

6 Additional inclusion of specifications with interaction terms between trade policy variables and firm-level characteristics were also taken into account in the analysis, as will be explained in more depth in Section 3.

7 The reason for using the arcsine (hyperbolic sine) transformation of continuous variables is primarily because of the presence of zero values as well as because they make it easier to express results as asymptotic semi-elasticities, as done by the logarithmic transformation in linear regression (Bellemare and Wichman 2020).

8 As is done when focusing on the subsidiary sector, the main results presented in Section 3 with respect to Eq. (3) only consider information on the economic activity and country of origin of the GUO to include a larger sample size. The reader is once again invited to refer to the full model specification in the Appendix (Tables A3.1 and A3.2).

orange to red shades denote negative log values, corresponding to foreign-owned total assets below USD 1 million. Figures A1.4-A1.6 follow the same layout, but they represent the RTA of three-digit CPC classes in each NUTS 2 region based on inventors' locations. The colours in heatmaps A1.4-A1.6 reflect the logarithmic degree of RTA within each three-digit technology class across the EU. An RTA greater than one suggests that the region is specialised in that technology class relative to other regions. Thus, yellow to green shades indicate RTAs above one (i.e. technological specialisation), while orange to red shades reflect RTAs below one (i.e. technological disadvantage).

If we look at the rows of Figure A1.1, we see that some sectors – including finance (64), real estate (68), and professional activities of head offices (70) – contain the darkest green cells, indicating the highest amount of total assets owned by foreign-owned firms across regions. These sectors are also heavily invested in other regions, as demonstrated in Figure A1.2 and Figure A1.3. Furthermore, when we look at the columns of Figure A1.1, we observe that several regions – including AT13 (Wien), BE10 (Brussels), DE71 (Darmstadt), DE21 (Oberbayern) and DE30 (Berlin) – exhibit dark green, especially in finance (NACE 64), wholesale (46) and motor vehicles (29). These cells present large total amounts of assets invested by foreign-owned firms. In contrast, some Belgian regions – such as BE31 (Prov. Walloon Brabant) and BE34 (Prov. Luxembourg) – and peripheral Bulgarian regions remain pale yellow, orange, red or even without foreign investment across many sectors, highlighting the limited FDI in these regions.

However, the largest foreign investment – an average annual of USD 155.955 billion – is in finance in CY00 (Cyprus), which is a known tax haven for MNEs. The second-largest foreign investment is, again, in finance (one in Brussels worth USD 156.494 billion), and the third-largest is in head office activities in Darmstadt, the region that is home to Frankfurt, worth USD 65.047 billion in total assets owned by foreign-owned firms. Although foreign MNEs have heavily invested in some services, there are numerous empty cells (i.e. indicating lower or negligible investment) in various services sectors and regions. In contrast, MNEs have heavily invested in many manufacturing sectors, especially those with medium to high tech intensity (NACE 20 to NACE 29), across regions. Tech manufacturing – in machinery (28) and fabricated metals (25) – show very large investments across regions.

Figure A1.2 illustrates the second group of regions in our sample. Regions like DK01 (Capital Region, Hovedstaden), DK04 (Midtjylland), ES30 (Comunidad de Madrid), ES51 (Cataluña), FR10 (Île-de-France), FRK2 (Rhône-Alpes), HR04 (Kontinentalna Hrvatska) and HU11 (Budapest) seem to have an outstanding amount of FDI across most sectors. Many Greek regions and a few French regions have prominent white gaps in the dataset. The largest amount of average annual total assets invested by foreign-owned are in finance in Île-de-France (worth USD 313.866 billion), then in Comunidad de Madrid (worth USD 186.138 billion), and then in Hovedstaden (worth USD 93.041 billion).

Furthermore, Figure A1.3 shows the total assets of foreign-owned firms across sectors in the last set of regions. Regions such as Dublin in Ireland (IE04), Lombardia in Italy (ITC4), Luxembourg (LU00), Malta (MT00), Noord-Holland in the Netherlands (NL32), Warszawski stołeczny in Poland (PL91), Área Metropolitana de Lisboa in Portugal (PT17), Bucureşti-Ilfov in Romania (RO32), Stockholm in Sweden (SE1), and Bratislavský kraj in Slovakia (SK01) stand out by having large amounts of foreign investment. By contrast, a striking number of orange, red and empty cells are observed in many Polish and Romanian regions. Substantial heterogeneity is evident across different regions and industries, both within and between the three groups. Once again, the finance sector receives the largest amount of total assets, with Luxembourg (LU00) leading with USD 5,365.201 billion, followed by Noord-Holland (NL32) with USD 2,337.156 billion, Zuid-Holland (NL33) with USD 950.171 billion, and Eastern and Midland in Ireland (IE06) with USD 474.943 billion.

Figures A1.4-A1.6 display the distribution of log RTA across European regions for each three-digit technology class. Since the RTA values are initially constructed at the four-digit level of CPC classes for each NUTS 3 region over time and then averaged to produce one figure per three-digit technology class at the NUTS 2 level, the resulting graphs may be affected by aggregation bias. For example, if within a three-digit class there are many four-digit technologies in which a location has a comparative disadvantage in one technology but an advantage in another, the average can conceal this variation. Thus, even though by definition a region must have an RTA in some technology and a disadvantage in another, this may not show up as such in the heatmap. Despite this limitation, the role of technology in our sample is evident: in advanced EU regions, inventors are active across many technology classes, while several technology classes are not even the subject of innovation in many peripheral regions.

4. Estimation results

In this section, we present the results of the econometric analysis. In the first sub-section, we analyse the results of all variables estimated from Eq. (1), presented in Table 1, and those estimated from Eq. (4), presented in Table 2. The second sub-section discusses the estimation results of various measurements of the RTA variable in Eq. (3), presented in Table 3.

4.1. MAIN RESULTS

We start our analysis using the results on trade policies that include tariffs and RD in TBTs and SPS measures. Table 1 presents the estimation results considering the subsidiary's primary sector as the sector of analysis for trade policy measures. Table 2 presents the estimation results considering the parent's primary sector as the sector of trade policy measures. An initial noteworthy result relates to NTMs. In determining total assets of the subsidiary, these trade policies seem to matter more for the subsidiary's sector than for the parent's sector. In fact, in Table 1, RD in TBTs receives negative and significant coefficients. In contrast, as Table 2 shows, the primary sector of the parent does not play a role (in a statistically significant manner) in how RD measures affect investment behaviour at the subsidiary level.

In the case of host-sector regulation, when there is a greater divergence in TBTs between the FDI destination country and the FDI origin country, there is a stronger discouraging effect on investment, mainly driven from the sample of analysis where the country of origin is outside the EU, as shown in Table 1. In fact, for extra-EU FDI, the coefficient for RD in TBTs in the sector of the subsidiary is negative and statistically significant at the 1% level. This indicates that when RD in TBTs increases by one percentage point (pp), the total assets of a subsidiary decreases roughly by 1.86%. This, in turn, indicates that when the home and host countries proliferate TBTs with objectives that are not regulated by the other partner, the FDI in the EU decreases. This finding suggests that firms are highly sensitive to regulatory barriers, which can distort their ability to operate efficiently and compete in foreign markets.

Moving on to the other policy variables, the negative impact of RD in SPS measures is not statistically significant in any of the models, except when we interact the SPS variable with a binary variable indicating the relationship when the two-digit primary sector of activity of the subsidiary is the same as that of the parent (see columns 3 and 4). Since vertical integration of FDI can also take place frequently within a two-digit sector, we cannot interpret it as a horizontal FDI.[9] However, this shows that when regulations with diverging objectives targeted by SPS measures affect both the parent's and the subsidiary's respective sectors, their disturbing impact on the bilateral investment becomes statistically significant. In fact, the coefficient for SPS measures indicates that an increase of one pp in the RD in SPS measures targeting the sectors of activity of both the parent and the subsidiary would decrease the total assets of the subsidiary by 0.70%. This indicates a substantial detrimental effect on FDI from non-EU countries at a 5% significance level.

[9] In our whole sample, horizontally integrated NACE 2-digit subsidiaries account for almost 11% of the observations.

Table 1 / PPML estimation of subsidary's total assets with respect to trade policies in the FDI host sector

	No interaction		Interaction	
	(1)	(2)	(3)	(4)
	Whole sample	Extra-EU GUOs	Whole sample	Extra-EU GUOs
Trade policies host sector				
Reg Div TBT	-0.0000	-1.8558***	0.0161	-1.8421***
	(0.6477)	(0.4675)	(0.6462)	(0.4683)
Reg Div SPS	-0.2667	0.8950	-0.0395	1.1728
	(0.7394)	(0.7556)	(0.7416)	(0.7731)
Horiz. Integration x Reg Div SPS			-0.5664*	-0.7020**
			(0.3123)	(0.3243)
Tariff host country	0.0716	0.1698***	0.0633	0.1633***
	(0.0564)	(0.0496)	(0.0565)	(0.0495)
Tariff home country	0.0157	0.0182	0.0150	0.0178
	(0.0312)	(0.0354)	(0.0313)	(0.0354)
Subsidiary-level variables				
Employment	0.1359***	0.1365***	0.1359***	0.1365***
	(0.0128)	(0.0180)	(0.0128)	(0.0180)
Labour productivity	0.0393***	0.0510***	0.0393***	0.0510***
	(0.0079)	(0.0122)	(0.0079)	(0.0122)
No. owned patents	-0.0040	0.0052	-0.0041	0.0051
	(0.0056)	(0.0106)	(0.0056)	(0.0106)
Subsidiary-level based RTA				
RTA (inventors) weighted	0.0026***	0.0015*	0.0026***	0.0015*
	(0.0010)	(0.0009)	(0.0010)	(0.0009)
Constant	20.1359***	19.7705***	20.1383***	19.7756***
	(0.1434)	(0.2271)	(0.1434)	(0.2273)
No. observations	1345501	602225	1345501	602225
AIC	6.6181e+12	3.6799e+12	6.6178e+12	3.6796e+12
BIC	6.6181e+12	3.6799e+12	6.6178e+12	3.6796e+12
No. groups	114385	51935	114385	51935
Time invariant FE: Firm, GUO, home-host country pair in host sector	Yes	Yes	Yes	Yes
Time variant FE: region NUTS 2, host-country/host-sector, home-country/host-sector	Yes	Yes	Yes	Yes
Time variant home-sector FE	No	No	No	No

Note: All regressors except the RTA variable have undergone arcsine transformation. Robustness checks using different sample sizes and model specifications for columns 1 and 2 are available in Tables A1.1 and A1.2 of the Appendix, while additional estimation of columns 3 and 4 using other trade policies is available in Table A2.1 of the Appendix. Clustered standard error in parenthesis. * $p < .10$, ** $p < .05$, *** $p < .01$

When it comes to tariffs, the primary findings support the hypothesis of tariff jumping when tariffs are imposed by the host country. Specifically, the coefficient for host-country tariffs is positive and statistically significant at the 1% level for extra-EU FDI (according to Table 1) when tariffs are imposed on the sector of the subsidiary, and for all types of FDI (according to Table 2) when tariffs are imposed on the sector of the parent company. This suggests that higher tariffs imposed by the destination country encourage FDI, as firms prefer to invest and produce in the EU rather than exporting to the EU at higher tariff costs. Since (in Table 2) tariffs imposed on the sector of the parent company residing in the EU are positively correlated with its investment in another EU member state with the same level of bilateral tariffs on the same sector, one can argue that higher protectionism in terms of tariffs incentivises European GUOs to invest more within the EU. Furthermore, the tariff-jumping impact is particularly stronger for innovative firms, as indicated by the significance of the interaction term with the number of patents owned by the subsidiary (in columns 3 and 4 of Table 2). The interaction term shows that tariffs in the host country combined with the number of patents owned by the subsidiary positively affect FDI decisions. This suggests that when the subsidiary is innovating novel technologies that are worth receiving grants from patent offices, the tariff-jumping motive is even stronger. Such a subsidiary can produce with its novel technologies in the host EU member state more independently of its parent, which can export its goods to this subsidiary as intermediate inputs of production at a higher cost induced by larger tariffs. The coefficients of tariffs imposed by the home country in Tables 1 and 2 appear to be statistically insignificant. This suggests that tariffs imposed by the home country of FDI do not play a statistically significant role in cross-border investment in the EU. In other words, considering the GVCs, the exports of goods from the subsidiary to the parent company are not affected by the tariffs imposed by the home country of the parent company.

The other firm characteristics included in the analysis (i.e. employment size and labour productivity) show positive and statistically significant coefficients on investment,[10] confirming the findings of the existing literature (Adetunji and Owolabi 2016; Yadav et al. 2022; Yousaf 2022). Finally, the number of patents owned by the subsidiary does not receive statistically significant coefficients in Table 1 when we control for the sector of the subsidiary. However, it does become statistically significant in Table 2 when we control for the sector of the parent. One also needs to note that the sample size differs considerably in these two tables. Moreover, our regional RTA innovation-weighted measure shows positive and significant coefficients throughout Tables 1 and 2, emphasising the importance of matching location-specific innovation capabilities to the specific technological interest of the subsidiary, which holds strategic relevance for corporate groups, as will be further explored in the next sub-section.

[10] As well as current and non-current liabilities, as reported in the Appendix (Tables A1.1-A3.2).

Table 2 / PPML estimation of subsidary's total assets with respect to trade policies in the FDI home sector

	No interaction		Interaction	
	(1)	(2)	(3)	(4)
	Whole sample	Extra-EU GUOs	Whole sample	Extra-EU GUOs
Trade policies home sector				
Reg Div TBT	-0.3837	-1.5305	-0.4255	-1.6413
	(0.9902)	(1.4305)	(1.0002)	(1.4171)
Reg Div SPS	-0.0992	1.1367	-0.0091	1.2230
	(0.9905)	(1.7117)	(0.9983)	(1.6958)
Tariff host country	0.1332***	0.2022***	0.1276**	0.2035***
	(0.0517)	(0.0458)	(0.0521)	(0.0455)
Tariff home country	0.0689	0.0287	0.0632	0.0244
	(0.0487)	(0.0509)	(0.0496)	(0.0520)
Subsidiary-level variables				
Employment	0.1379***	0.1334***	0.1379***	0.1337***
	(0.0134)	(0.0186)	(0.0134)	(0.0186)
Labour productivity	0.0369***	0.0454***	0.0370***	0.0454***
	(0.0106)	(0.0156)	(0.0106)	(0.0156)
No. owned patents	0.0014	0.0215*	0.1379***	0.1337***
	(0.0087)	(0.0124)	(0.0134)	(0.0186)
No. owned patents x Tariff host country			0.0251***	0.0247***
			(0.0090)	(0.0090)
Subsidiary-level based RTA				
RTA (inventors) weighted	0.0051***	0.0017	0.0052***	0.0015
	(0.0016)	(0.0026)	(0.0016)	(0.0026)
Constant	20.2992***	19.8886***	20.3038***	19.8961***
	(0.2070)	(0.3062)	(0.2067)	(0.3060)
No. observations	678859	276996	678859	276996
AIC	5.3029e+12	2.5760e+12	5.2989e+12	2.5739e+12
BIC	5.3029e+12	2.5760e+12	5.2989e+12	2.5739e+12
No. groups	27123	9847	27123	9847
Time invariant FE: Firm, GUO, host-home country pair in home sector	Yes	Yes	Yes	Yes
Time variant FE: region NUTS 2, host-country/home-sector, home-country/home-sector	Yes	Yes	Yes	Yes
Time variant host-sector FE	Yes	Yes	Yes	Yes

Note: All regressors except the RTA variable have undergone arcsine transformation. Robustness checks using different sample sizes and model specifications for columns 1 and 2 are available in Tables A3.1 and A3.2 of the Appendix, while additional estimation of columns 3 and 4 using other tarde policies is available in Table A4.1 of the Appendix. Clustered standard error in parenthesis. * p < .10, ** p < .05 , *** p< .01

4.2. IMPACT OF DIFFERENT RTAS

To uncover the potential heterogeneities behind two types of regional RTA – inventor-versus-applicant co-authorship system – and to account for the potentially different role played by the technological interest of the subsidiary and the parent company, we compute our RTA measures according to both innovation portfolios. The main findings are presented in Table 3.[11]

Examining the first four rows of Table 3, we observe an interesting result among the different RTA measures computed with respect to the technological interest of the subsidiary, as described in Eq. (3) of Section 2. Specifically, the largest and most significant coefficient is found when regional RTA is computed with respect to the location of the inventors and weighted by the relative importance of the technological classes in the subsidiary's patent production. For instance, the coefficient for this regional RTA measure is statistically significant at the 1% level, which indicates that a one-unit increase in the regional RTA of technology classes in which the subsidiary patents results in a 0.0026 pp increase in the total assets of the subsidiary. This is a robust and positive impact on FDI.

Moving on to the bottom four rows of Table 3, we examine the same indices computed with respect to the technological portfolio of the parent company. Interestingly, all regional RTA measures calculated on the basis of co-authorship by inventors or by applicants (i.e. ownership) exhibit negative signs. Specifically, the coefficient for the regional RTA measure based on the location of inventors in that region of the EU is negative and statistically significant at the 5% level. Similarly, the coefficient remains negative for the regional RTA measure based on owners of patents residing in that region. This effect is particularly true for ownership-based regional RTAs and for extra-EU investors. These findings suggest, as a first indication, that headquarters are rather reluctant to outsource in-house innovation to regions where competitors (i.e. other patent owners) are active in the same technologies. In addition, the stronger effect registered for extra-EU groups indicates the potential presence of a distance decay effect of knowledge spill-overs, which diminishes as the distance between subsidiaries and parent companies increases.

To further support this hypothesis, we additionally estimate the same specification while including an interaction term between regional RTAs and the distance between source and destination countries, using information from the CEPII database. The results, presented in Table A5.1 in the Appendix, confirm the additive negative effect of distance, especially for groups with headquarters outside the EU. In fact, when the regional RTA variable is interacted with the geographical distance between the home and host country of FDI, the main effect of RTA becomes statistically significant and positive across all models. However, the interaction term is negative and statistically significant. This means that when the parent company is more distant from the location of its subsidiary, the regional RTA calculated using the technologies of the parent company has a substantial negative impact on the total assets of the subsidiary located in that region. This result sheds light on the fact that foreign investors strategically locate their FDIs in regions with strong innovation capabilities in technologies that the parent company does not necessarily produce but is nevertheless interested in developing within its production network

[11] Specifically, we will note that these results are computed following Eq. (1), meaning they include trade policies with respect to the host sector. Results considering the GUO sector, as in Eq. (3), are available upon request.

Table 3 / PPML estimation of subsidary's total assets using different RTA variables computed with respect to subsidiary and GUO technological interest, respectively

Model specifications with respect to trade policies in the host sector

	(1) **Whole sample**	(2) **Extra-EU GUOs**	(3) **Whole sample**	(4) **Extra-EU GUOs**	(5) **Whole sample**	(6) **Extra-EU GUOs**	(7) **Whole sample**	(8) **Extra-EU GUOs**	(9) **Whole sample**	(10) **Extra-EU GUOs**	(11) **Whole sample**	(12) **Extra-EU GUOs**	(13) **Whole sample**	(14) **Extra-EU GUOs**	(15) **Whole sample**	(16) **Extra-EU GUOs**
Subsidiary-level based RTA RTA (inventors)	0.0011* (0.0007)	0.0007 (0.0007)														
RTA (inventors) weighted			0.0026*** (0.0010)	0.0015* (0.0009)												
RTA (owners)					0.0011* (0.0006)	0.0005 (0.0005)										
RTA (inventors) weighted							0.0004 (0.0004)	0.0003 (0.0005)								
GUO-level based RTA RTA (inventors)									-0.0040 (0.0038)	-0.0145* (0.0084)						
RTA (inventors) weighted											-0.0033 (0.0043)	-0.0157 (0.0105)				
RTA (owners)													-0.0038 (0.0036)	-0.0195** (0.0095)		
RTA (owner) weighted															-0.0060* (0.0036)	-0.0205** (0.0087)
No. observations	1345501	602225	1345501	602225	1345501	602225	1345501	602225	1345501	602225	1345501	602225	1345501	602225	1345501	602225
No. groups	114385	51935	114385	51935	114385	51935	114385	51935	114385	51935	114385	51935	114385	51935	114385	51935
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time invariant FE: Firm, GUO, host-home country pair in host sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant FE: region NUTS 2, host-country/host-sector, home-country/host-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant home-sector FE	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Note: All regressands except the RTA variable have undergone arcsine transformation. The corresponding specifications with focus on the home sector's trade policies are available upon request. Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

5. Summary and concluding remarks

This paper analyses the role of regulatory distance (RD) and technological positioning of activities of multinational enterprises (MNEs) across the NUTS 2 regions of the European Union (EU) over the 2000-2018 period. Our analysis shows that RD in technical barriers to trade (TBTs) discourages investment in subsidiaries owned by extra-EU parent companies. Besides, while larger tariffs imposed by the EU encourage tariff-jumping motives behind foreign direct investment (FDI) in the EU by extra-EU parent MNEs, the effect of RD in sanitary-and-phytosanitary-standard (SPS) measures seems to mainly hamper the total assets of subsidiaries that are active in the same NACE two-digit sectors as their parent companies.

While NTMs are not necessarily hampering trade, as shown in many papers in the literature (Bao and Qiu 2012; Ghodsi 2023), RD and the imposition of rules with diverse objectives in home- and host-country FDI counteparts would increase the compliance costs, bureaucratic hurdles and transactional costs (Piermartini and Budetta 2009; Cadot et al. 2015; Cadot and Ing 2015; Knebel and Peters 2019; Nabeshima and Obashi 2021; Inui et al. 2021). These results show that such RD increases the costs of investment, too.

Furthermore, regional revealed technological advantage (RTA) seems to enhance FDI for the technologies in which the subsidiaries are actively patenting rather than the parent company. In fact, the parent company prefers to locate its subsidiary and increase its investment where it seeks to benefit from regional technological spill-overs (so as to improve its technological capabilities in innovation areas of interest to it) rather than seek technological spill-overs in technologies directly produced at the headquarters. This implies that the technologies produced in the subsidiary might have higher technological quality due to spill-overs from other inventors and owners of patents (firms) in the region that are specialised in the production of those technologies, as indicated by their RTA.

These results are important for policy makers in several aspects. As RD in technical standards discourages FDI in the EU, policy makers in the EU need to find ways to reduce RDs with important trading partners, such as the extra-EU advanced economies, which are potential sources of technological spill-overs to the EU. By initiating trade negotiations with advanced economies, the EU can harmonise its technical standards (e.g. TBTs and SPS measures) to pursue similar objectives as these trading partners. This would necessitate imposing new regulations with similar objectives to those of the trading partners in addition to encouraging these trading partners to reciprocate and impose regulatory NTMs with similar objectives to those of the EU. Reducing RD and increasing regulatory convergence would substantially increase cross-border FDI, as evidenced here.

Furthermore, technological spill-overs are the main positive sources of FDI that induce policy makers to attract high-tech FDI. The results indicate that such technological spill-overs are very important for MNEs, as they aim to acquire new technologies when investing in specific regions in the EU with significant specialisation. Therefore, a good way to encourage such technological FDI in the EU – in a manner that benefits both sides – would be to implement a patent box. This can be achieved by giving tax credits to firms investing and patenting in the EU.

References

Adetunji, O. M. & Owolabi, A. A. (2016). Firm performance and its drivers: how important are the industry and firm-level factors. *International Journal of Economics and Finance*, 8(11), 60–77.

Alfaro, L. (2003). Foreign direct investment and growth: does the sector matter? Harvard Business School, 1-31, May.

Alfaro, L. & Chen, M. X. (2012). Surviving the global financial crisis: foreign ownership and establishment performance. *American Economic Journal: Economic Policy*, 4(3), 30–55.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S. & Sayek, S. (2010). Does foreign direct investment promote growth? Exploring the role of financial markets on linkages. *Journal of Development Economics*, 91(2), 242–256.

Anderson, J. E. & van Wincoop, E. (2003). Gravity with gravitas: a solution to the border puzzle. *The American Economic Review*, 93(1), 170–192.

Arel-Bundock, V. (2017). The political determinants of foreign direct investment: a firm-level analysis. *International Interactions*, 43(3), 424–452.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: is Africa different? *World Development*, 30(1), 107–119.

Asongu, S., Akpan, U. S. & Isihak, S. R. (2018). Determinants of foreign direct investment in fast-growing economies: evidence from the BRICS and MINT countries. *Financial Innovation*, 4(1), 1–17.

Baier, S. L., & Bergstrand, J. H. (2009). Bonus vetus OLS: a simple method for approximating international trade-cost effects using the gravity equation. *Journal of International Economics*, 77(1), 77–85.

Balasubramanyam, V. N., Salisu, M. & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *The Economic Journal*, 106(434), 92–105.

Bao, X. & Qiu, L. D. (2012). How do technical barriers to trade influence trade? *Review of International Economics*, 20(4), 691–706.

Becker, B., Driffield, N., Lancheros, S. & Love, J. H. (2020). FDI in hot labour markets: the implications of the war for talent. *Journal of International Business Policy*, 3(2), 107–133.

Belderbos, R., Leten, B. & Suzuki, S. (2013). How global is R&D? Firm-level determinants of home-country bias in R&D. *Journal of International Business Studies*, 44(8), 765–786.

Bellak, C. (2004). How domestic and foreign firms differ and why does it matter? *Journal of Economic Surveys*, 18(4), 483–514.

Bellak, C. & Mayer, S. (2010). Inward FDI in Austria and its policy context, 2010. Columbia FDI Profiles.

Bellemare, M. F. & Wichman, C .J. (2020). Elasticities and the inverse hyperbolic sine transformation. *Oxford Bulletin of Economics and Statistics*, 82(1), 50–61.

Bénassy-Quéré, A., Coupet, M. & Mayer, T. (2007). Institutional determinants of foreign direct investment. *World Economy*, 30(5), 764–782.

Bevan, A. A. & Estrin, S. (2004). The determinants of foreign direct investment into European transition economies. *Journal of Comparative Economics*, 32(4), 775–787.

Blonigen, B. A. & Piger, J. (2014). Determinants of foreign direct investment. *Canadian Journal of Economics/Revue canadienne d'économique*, 47(3), 775–812.

Braconier, H. & Ekholm, K. (2002). Locating foreign affiliates in Germany: the case of Swedish MNEs, in: Jungnickel, R. (ed.). *Foreign-owned Firms*. Palgrave Macmillan, London, 89–106.

Branstetter, L. (2006). Is foreign direct investment a channel of knowledge spillovers? Evidence from Japan's FDI in the United States. *Journal of International Economics*, 68(2), 325–344.

Brenton, P., Di Mauro, F. & Lücke, M. (1999). Economic integration and FDI: an empirical analysis of foreign investment in the EU and in Central and Eastern Europe. *Empirica*, 26(2), 95–121.

Breuss, F., Egger, P. & Pfaffermayr, M. (2001). The impact of Agenda 2000's structural policy reform on FDI in the EU. *Journal of Policy Modeling*, 23(7), 807–820.

Bruno, R., Campos, N., Estrin, S. & Tian, M. (2016). Gravitating towards Europe: an econometric analysis of the FDI effects of EU membership. Technical Appendix to 'The impact of Brexit on foreign investment in the UK', Centre for Economic Performance, London School of Economics and Political Science, London.

Cadot, O. & Ing, L. Y. (2015). Non-tariff measures and harmonisation: issues for the RCEP. ERIA Discussion Paper Series, 2015-61.

Cadot, O., Asprilla, A., Gourdon, J., Knebel, C. & Peters, R. (2015). Deep regional integration and non-tariff measures: a methodology for data analysis. UNCTD. Policy Issues in International Trade and Commodies, Research Study Series No. 69.

Carr, D. L., Markusen, J. R. & Maskus, K. E. (2001). Estimating the knowledge-capital model of the multinational enterprise. *The American Economic Review*, 91(3), 693–708.

Castellani, D. & Zanfei, A. (2006). *Multinational firms, innovation and productivity*. Edward Elgar Publishing, Cheltenham and Northampton, Mass.

Çeviş, İ. & Camurdan, B. (2007). The economic determinants of foreign direct investment in developing countries and transition economies. *The Pakistan Development Review*, 46(3), 285–299.

Chen, M. X., & Moore, M. O. (2010). Location decision of heterogeneous multinational firms. *Journal of International Economics*, 80(2), 188–199.

Chen, N. & Novy, D. (2012). On the measurement of trade costs: direct vs. indirect approaches to quantifying standards and technical regulations. *World Trade Review*, 11(3), 401–414.

Cieślik, A. & Ghodsi, M. (2021). Economic sentiment indicators and foreign direct investment: empirical evidence from the European Union countries. *wiiw Working Paper* No. 203. The Vienna Institute for International Economic Studies (wiiw), July.

Cieślik, A., & Ghodsi, M. (2024). The impact of regulatory distance in non-tariff measures on the cross-border investment of multinationals. *Emerging Markets Finance and Trade*, 1–40.

Coe, D. T., Helpman, E. & Hoffmaister, A. W. (2009). International R&D spillovers and institutions. *European Economic Review*, 53(7), 723–741.

Correia, S., Guimarães, P. & Zylkin, T. (2020). Fast Poisson estimation with high-dimensional fixed effects. *The Stata Journal*, 20(1), 95–115.

De Mello, L. R. (1999). Foreign direct investment-led growth: evidence from time series and panel data. *Oxford Economic Papers*, 51(1), 133–151.

Desai, M. A., Foley, C. F. & Forbes, K. J. (2008). Financial constraints and growth: multinational and local firm responses to currency depreciations. *The Review of Financial Studies*, 21(6), 2857–2888.

De Sousa, J., Mayer, T. & Zignago, S. (2012). Market access in global and regional trade. *Regional Science and Urban Economics*, 42(6), 1037–1052.

Disdier, A. C., Fontagné, L. & Mimouni, M. (2008). The impact of regulations on agricultural trade: evidence from the SPS and TBT agreements. *American Journal of Agricultural Economics*, 90(2), 336–350.

Dunning, J. H. (1977). Trade, location of economic activity and the MNE: a search for an eclectic approach, in: Ohlin, B., Hesselborn, P.-O. & Wijkman, P. M. (eds.). *The International Allocation of Economic Activity*. Palgrave Macmillan, 395–418.

Dunning, J. H. (1981). *International production and the multinational enterprise*. RLE International Business. Routledge.

Egger, P. & Pfaffermayr, M. (2004). The impact of bilateral investment treaties on foreign direct investment. *Journal of Comparative Economics*, 32(4), 788–804.

Ethier, W. J. (1986). The multinational firm. *The Quarterly Journal of Economics*, 101(4), 805–833.

Faeth, I. (2009). Determinants of foreign direct investment: a tale of nine theoretical models. *Journal of Economic Surveys*, 23(1), 165–196.

Fontagné, L., Orefice, G., Piermartini, R. & Rocha, N. (2015). Product standards and margins of trade: firm-level evidence. *Journal of International Economics*, 97(1), 29–44.

Fosfuri, A., Motta, M. & Rønde, T. (2001). Foreign direct investment and spillovers through workers' mobility. *Journal of International Economics*, 53(1), 205–222.

Gao, T. (2005). Foreign direct investment and growth under economic integration. *Journal of International Economics*, 67(1), 157–174.

Ghodsi, M. (2020). How do technical barriers to trade affect foreign direct investment? Tariff jumping versus regulation haven hypotheses. *Structural Change and Economic Dynamics*, 52, 269–278.

Ghodsi, M. (2023). Exploring the 'non-tariff measures black box': Whose regulatory NTMs on which products improve the imported quality? *International Economics*, 173, 45–67.

Gugler, K. (1998). Corporate ownership structure in Austria. *Empirica*, 25(3), 285–307.

Haskel, J. E., Pereira, S. C. & Slaughter, M. J. (2007). Does inward foreign direct investment boost the productivity of domestic firms? *The Review of Economics and Statistics*, 89(3), 482–496.

Head, K. & Mayer, T. (2014). Gravity equations: workhorse, toolkit, and cookbook, in: Gopinath, G., Helpman, E. & Rogoff, K. (eds.). *Handbook of International Economics* (Vol. 4). Elsevier, 131–195. https://doi.org/10.1016/B978-0-444-54314-1.00003-3

Head, K. & Ries, J. (2008). FDI as an outcome of the market for corporate control: theory and evidence. *Journal of International Economics*, 74(1), 2–20.

Helpman, E. (1984). A simple theory of international trade with multinational corporations. *Journal of Political Economy*, 92(3), 451–471.

Helpman, E. (1985). Multinational corporations and trade structure. *The Review of Economic Studies*, 52(3), 443–457.

Helpman, E. (2006). Trade, FDI, and the organization of firms. *Journal of Economic Literature*, 44(3), 589–630. DOI: 10.1257/jel.44.3.589

Hoang, H. H., Huynh, C. M., Duong, N. M. H. & Chau, N. H. (2021). Determinants of foreign direct investment in Southern Central Coast of Vietnam: a spatial econometric analysis. *Economic Change and Restructuring*, 55, 1–26.

Hubert, F. & Pain, N. (2002). Fiscal incentives, European integration and the location of foreign direct investment. *The Manchester School*, 70(3), 336–363.

Huizinga, H. & Nicodème, G. (2006). Foreign ownership and corporate income taxation: an empirical evaluation. *European Economic Review*, 50(5), 1223–1244.

Hunady, J. & Orviska, M. (2014). Determinants of foreign direct investment in EU countries: do corporate taxes really matter? *Procedia Economics and Finance*, 12, 243–250.

Iamsiraroj, S. (2016). The foreign direct investment-economic growth nexus. *International Review of Economics and Finance*, 42, 116–133.

Inui, T., Ikeuchi, K., Obashi, A. & Yang, Q. (2021). The impact of regulatory distance from global standards on a country's centrality in global value chains. *International Economics*, 166, 95–115.

Janicki, H. P. & Wunnava, P. V. (2004). Determinants of foreign direct investment: empirical evidence from EU accession candidates. *Applied Economics*, 36(5), 505–509.

Javorcik, B. (2020). Global supply chains will not be the same in the post-COVID-19 world, in: Baldwin, R. & Evenett, S. (eds.). *COVID-19 and trade policy: Why turning inward won't work*.

Katsaitis, O. & Doulos, D. (2009). The impact of EU structural funds on FDI. *Kyklos*, 62(4), 563–578.

Knebel, C. & Peters, R. (2019). Non-tariff measures and the impact of regulatory convergence in ASEAN, in: Ing, L. Y., Olivier, C. & Peters, R. (eds.). *Regional Integration and Non-Tariff Measures in ASEAN*. Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA), 65–89.

Kumari, R. & Sharma, A. K. (2017). Determinants of foreign direct investment in developing countries: a panel data study. *International Journal of Emerging Markets*, 12(4), 658–682. https://doi.org/10.1108/IJoEM-10-2014-0169

Kurtovic, S., Dacic, H. & Talovic, S. (2016). The effect of foreign direct investment from Austria on skilled and unskilled labor in Bosnia and Herzegovina. *Business and Economic Research*, 6(1), 210–223.

Larch, M., Wanner, J., Yotov, Y. V. & Zylkin, T. (2019). Currency unions and trade: A PPML re-assessment with high-dimensional fixed effects. *Oxford Bulletin of Economics and Statistics*, 81(3), 487–510.

Lin, H. C. (2010). Technology diffusion and global welfare effects: imitative R&D vs. south-bound FDI. *Structural Change and Economic Dynamics*, 21(4), 231–247.

Markusen, J. R. (1984), Multinationals, multi-plant economies, and the gains from trade. *Journal of International Economics*, 16(3-4), 205–226.

Markusen, J. R. (1997). Trade versus investment liberalization. National Bureau of Economic Research. No. w6231.

Markusen, J. R., & Venables, A. J. (1998). Multinational firms and the new trade theory. *Journal of International Economics*, 46(2), 183–203.

Markusen, J. R. & Venables, A. J. (2000). The theory of endowment, intra-industry and multi-national trade. *Journal of International Economics*, 52(2), 209–234.

Melitz, M., Helpman, E. & Yeaple, S. (2004). Export versus FDI with heterogeneous firms. *American Economic Review*, 94(1), 300–316.

Mistura, F. & Roulet, C. (2019). The determinants of foreign direct investment: Do statutory restrictions matter? OECD Working Papers on International Investment, No. 2019/01. OECD Publishing, Paris. https://doi.org/10.1787/641507ce-en

Mottaleb, K. A. (2007). Determinants of foreign direct investment and its impact on economic growth in developing countries. Available at: https://mpra.ub.uni-muenchen.de/9457/

Nachum, L. & Zaheer, S. (2005). The persistence of distance? The impact of technology on MNE motivations for foreign investment. *Strategic Management Journal*, 26(8), 747–767.

Nabeshima, K. & Obashi, A. (2021). Impact of regulatory burdens on international trade. *Journal of the Japanese and International Economies*, 59, 101120.

Noorbakhsh, F., Paloni, A. & Youssef, A. (2001). Human capital and FDI inflows to developing countries: new empirical evidence. *World Development*, 29(9), 1593–1610.

OECD (2021). FDI qualities policy toolkit: polices for improving the sustainable development impacts of investment. Consultation paper. March. www.oecd.org/daf/inv/investment-policy/FDI-Qualities-Policy-Toolkit-Consultation-Paper-2021.pdf

Pearce, R. (1999). The evolution of technology in multinational enterprises: the role of creative subsidiaries. *International Business Review*, 8(2), 125–148.

Petroulas, P. (2007). The effect of the euro on foreign direct investment. *European Economic Review*, 51(6), 1468–1491.

Pfaffermayr, M. & Bellak, C. (2002). Why foreign-owned firms are different: A conceptual framework and empirical evidence for Austria, in: Jungnickel, R. (ed.). *Foreign-owned Firms*, Palgrave Macmillan, London, 13–57.

Piermartini, R. & Budetta, M. (2009). A mapping of regional rules on technical barriers to trade, in: Estevadeordal, A., Suominen, K. & Teh, R. (eds.). *Regional Rules in the Global Trading System* Cambridge, Cambridge University Press, 250–315.

Resmini, L. (2000). The determinants of foreign direct investment in the CEECs: new evidence from sectoral patterns. *Economics of Transition*, 8(3), 665–689.

Santos Silva, J. M. C., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, 88(4), 641–658.

Schneider, F. & Frey, B. S. (1985). Economic and political determinants of foreign direct investment. *World Development*, 13(2), 161–175.

Yadav, I. S., Pahi, D. & Gangakhedkar, R. (2022). The nexus between firm size, growth and profitability: new panel data evidence from Asia-Pacific markets. *European Journal of Management and Business Economics*, 31(1), 115–140.

Yang, J. Y. Y., Groenewold, N. & Tcha, M. (2000). The determinants of foreign direct investment in Australia. *Economic Record*, 76(232), 45–54.

Yousaf, M. (2023). Labour productivity and firm performance: evidence from certified firms from the EFQM excellence model. *Total Quality Management & Business Excellence*, 34(3-4), 312–325.

Yotov, Y. V., Piermartini, R., Monteiro, J. A. & Larch, M. (2016). An advanced guide to trade policy analysis: the structural gravity model. United Nations and World Trade Organization (WTO). Geneva. https://doi.org/10.30875/abc0167e-en

Appendix

Table A1.1 / Robustness check of Table 1, column (1) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) as well as 'no liab' sample (i.e. no liability information of subsidiary and GUO)

	(1) Table 1	Sample 1 'all vars'	Sample 1 cgsg	Sample 1 no guo	Sample 2 'no liab'	Sample 2 cgsg	Sample 2 no guo	Sample3 cgsg	Sample4 no guo
Reg Div TBT	-0.0000	1.0833	0.8483	0.4988	0.8361	0.7165	0.4880	-0.0697	-0.0000
	(0.6477)	(0.7415)	(0.7466)	(0.8375)	(0.7301)	(0.7538)	(0.8331)	(0.9439)	(0.6477)
Reg Div SPS	-0.2667	2.0119	2.4909	1.9062	2.2241	2.4771	1.8367	0.3273	-0.2667
	(0.7394)	(1.6812)	(1.8384)	(1.6187)	(1.6992)	(1.7825)	(1.5770)	(1.1628)	(0.7394)
Tariff host country	0.0716	0.1159	0.1323	0.1248	0.1385	0.1399	0.1279	0.1022	0.0716
	(0.0564)	(0.0777)	(0.0877)	(0.0829)	(0.0872)	(0.0880)	(0.0833)	(0.0763)	(0.0564)
Tariff home country	0.0157	-0.0049	-0.0101	-0.0095	-0.0103	-0.0117	-0.0129	0.0034	0.0157
	(0.0312)	(0.0388)	(0.0435)	(0.0430)	(0.0414)	(0.0413)	(0.0407)	(0.0366)	(0.0312)
Subsidiary-level variables									
Employment	0.1359***	0.1135***	0.1635***	0.1590***	0.1618***	0.1635***	0.1598***	0.1349***	0.1359***
	(0.0128)	(0.0136)	(0.0158)	(0.0165)	(0.0150)	(0.0150)	(0.0158)	(0.0135)	(0.0128)
Labour productivity	0.0393***	0.0323***	0.0418***	0.0382***	0.0407***	0.0406***	0.0369***	0.0365***	0.0393***
	(0.0079)	(0.0089)	(0.0124)	(0.0114)	(0.0113)	(0.0113)	(0.0104)	(0.0079)	(0.0079)
No. owned patents	-0.0040	0.0008	0.0023	-0.0038	0.0021	0.0013	-0.0049	-0.0015	-0.0040
	(0.0056)	(0.0066)	(0.0070)	(0.0080)	(0.0072)	(0.0072)	(0.0081)	(0.0056)	(0.0056)
Current liabilities		0.0819***							
		(0.0073)							
Non-current liabilities		0.0209***							
		(0.0019)							
GUO-level variables									
Employment		0.0270***			0.0363***				
		(0.0056)			(0.0066)				
Labour productivity		0.0036			0.0030				
		(0.0045)			(0.0046)				
No. owned patents		-0.0003			-0.0006				
		(0.0046)			(0.0051)				
Current liabilities		0.0092***							
		(0.0033)							
Non-current liabilities		-0.0014							
		(0.0032)							
RTA (inventors) weighted	0.0026***	0.0030*	0.0032*	0.0034**	0.0034**	0.0032*	0.0035**	0.0042***	0.0026***
	(0.0010)	(0.0016)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0016)	(0.0013)	(0.0010)
Constant	20.1359***	17.6799***	19.7607***	19.8664***	19.6661***	20.0560***	20.1530***	20.3475***	20.1359***
	(0.1434)	(0.3194)	(0.2520)	(0.2338)	(0.2643)	(0.2305)	(0.2146)	(0.1524)	(0.1434)
No. observations	1345501	313808	313808	313808	328330	328330	328330	675843	1345501
AIC	6.6181e+12	1.9805e+12	2.2159e+12	2.3781e+12	2.3070e+12	2.3138e+12	2.4813e+12	4.9124e+12	6.6181e+12
BIC	6.6181e+12	1.9805e+12	2.2159e+12	2.3781e+12	2.3070e+12	2.3138e+12	2.4813e+12	4.9124e+12	6.6181e+12
No. groups	114385	10652	10652	10652	11570	11570	11570	27389	114385
Firm, GUO, home-host country pair in host sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
region NUTS 2, host-country/host-sector, home-country/host-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant home-sector FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

Table A1.2 / Robustness check of Table 1, column (2) using ‘all variables’ sample (i.e. complete financial information of subsidiary and GUO) and ‘no liab’ sample (i.e. no liability information of subsidiary and GUO)

	(2) Table 1	Sample 1 ‘all vars’	Sample 1 cgsg	Sample 1 no guo	Sample 2 ‘no liab’	Sample 2 cgsg	Sample 2 no guo	Sample 3 cgsg	Sample 4 no guo
Reg Div TBT	-1.8558*** (0.4675)	-2.6739** (1.2015)	-2.3089* (1.3009)	-2.1283* (1.1966)	-2.3710* (1.2966)	-2.3424* (1.2923)	-2.1047* (1.1916)	-2.6265*** (0.8912)	-1.8558*** (0.4675)
Reg Div SPS	0.8950 (0.7556)	2.4412* (1.3870)	2.4441 (1.7101)	1.7289 (1.4215)	2.5582 (1.7294)	2.5380 (1.7249)	1.7309 (1.4313)	2.6782** (1.2409)	0.8950 (0.7556)
Tariff host country	0.1698*** (0.0496)	0.2189** (0.1063)	0.1837 (0.1149)	0.2378** (0.1147)	0.1805 (0.1147)	0.1770 (0.1136)	0.2295** (0.1126)	0.2850*** (0.0673)	0.1698*** (0.0496)
Tariff home country	0.0182 -1.8558*** (0.0354)	0.0090 -2.6739** (0.0413)	-0.0054 -2.3089* (0.0456)	-0.0124 -2.1283* (0.0495)	0.0022 -2.3710* (0.0441)	-0.0026 -2.3424* (0.0443)	-0.0094 -2.1047* (0.0483)	0.0109 -2.6265*** (0.0409)	0.0182 -1.8558*** (0.0354)
Subsidiary-level variables									
Employment	0.1365*** (0.0180)	0.1262*** (0.0191)	0.1817*** (0.0244)	0.1794*** (0.0258)	0.1787*** (0.0236)	0.1832*** (0.0240)	0.1812*** (0.0255)	0.1328*** (0.0194)	0.1365*** (0.0180)
Labour productivity	0.0510*** (0.0122)	0.0288*** (0.0109)	0.0382** (0.0160)	0.0350** (0.0143)	0.0384** (0.0157)	0.0383** (0.0159)	0.0353** (0.0144)	0.0489*** (0.0151)	0.0510*** (0.0122)
No. owned patents	0.0052 (0.0106)	0.0166* (0.0097)	0.0201* (0.0103)	0.0101 (0.0129)	0.0178 (0.0111)	0.0169 (0.0112)	0.0072 (0.0132)	0.0131 (0.0087)	0.0052 (0.0106)
Current liabilities		0.0857*** (0.0100)							
Non-current liabilities		0.0210*** (0.0026)							
GUO-level variables									
Employment		0.0745*** (0.0205)			0.0725*** (0.0252)				
Labour productivity		0.0105 (0.0124)			-0.0016 (0.0167)				
No. owned patents		-0.0064 (0.0055)			-0.0070 (0.0059)				
Current liabilities		0.0290 (0.0184)							
Non-current liabilities		-0.0165* (0.0092)							
RTA (inventors) weighted	0.0015* (0.0009)	0.0021 (0.0031)	0.0020 (0.0033)	0.0040 (0.0031)	0.0026 (0.0032)	0.0024 (0.0032)	0.0043 (0.0031)	0.0020 (0.0018)	0.0015* (0.0009)
Constant	19.7705*** (0.2271)	16.8769*** (0.6525)	19.7492*** (0.3432)	19.8079*** (0.3156)	19.0055*** (0.6238)	19.7423*** (0.3375)	19.7970*** (0.3121)	19.8783*** (0.2932)	19.7705*** (0.2271)
No. observations	602225	151217	151217	151217	157777	157777	157777	275639	602225
AIC	3.6799e+12	1.2570e+12	1.4067e+12	1.5166e+12	1.4219e+12	1.4290e+12	1.5378e+12	2.5403e+12	3.6799e+12
BIC	3.6799e+12	1.2570e+12	1.4067e+12	1.5166e+12	1.4219e+12	1.4290e+12	1.5378e+12	2.5403e+12	3.6799e+12
No. groups	51935	4085	4085	4085	4655	4655	4655	10009	51935
Firm, GUO, home-host country pair in host sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
region NUTS 2, host-country/host-sector, home-country/host-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant home-sector FE	No	No	No	No	No	No	No	No	No

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

Table A2.1 / Interaction between trade policies in host sector and horizontal integration (i.e. GUO and subsidiary in the same NACE 2-digit sector)

	Original model		**Exclusion of certain GUO activities**							
	(1) Whole sample	**(2) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**
Trade policies host sector										
Reg Div TBT	-0.0000 (0.6477)	-1.8558*** (0.4675)	0.0153 (0.6501)	-1.7358*** (0.4874)	0.0161 (0.6462)	-1.8421*** (0.4683)	-0.0005 (0.6474)	-1.8356*** (0.4642)	0.0006 (0.6477)	-1.8547*** (0.4674)
Reg Div SPS	-0.2667 (0.7394)	0.8950 (0.7556)	-0.2665 (0.7421)	0.9602 (0.7640)	-0.0395 (0.7416)	1.1728 (0.7731)	-0.2629 (0.7381)	0.9037 (0.7501)	-0.2775 (0.7396)	0.8944 (0.7559)
Tariff host country	0.0716 (0.0564)	0.1698*** (0.0496)	0.0707 (0.0562)	0.1653*** (0.0493)	0.0633 (0.0565)	0.1633*** (0.0495)	0.0678 (0.0566)	0.1565*** (0.0494)	0.0714 (0.0564)	0.1698*** (0.0496)
Tariff home country	0.0157 (0.0312)	0.0182 (0.0354)	0.0157 (0.0312)	0.0190 (0.0354)	0.0150 (0.0313)	0.0178 (0.0354)	0.0158 (0.0312)	0.0182 (0.0354)	0.0269 (0.0333)	0.0159 (0.0352)
Interaction with horizotal integration										
Horiz integration X Reg Div TBT			-0.1093 (0.3208)	-0.5030 (0.3260)						
Horiz integration X Reg Div SPS					-0.5664* (0.3123)	-0.7020** (0.3243)				
Horiz integration X Tariff host country							0.0117 (0.0335)	0.0330 (0.0361)		
Horiz integration X Tariff home country									-0.0220 (0.0253)	0.0049 (0.0218)
No. observations	1345501	602225	1345501	602225	1345501	602225	1345501	602225	1345501	602225
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time invariant FE: Firm, GUO, home-host country pair in host sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant FE: region NUTS 2, host-country/host-sector, home-country/host-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant home-sector FE	No	No	No	No	No	No	No	No	No	No

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01. Results are robust to the additional exclusion of groups where the GUO is active in either financial or head-office and managerial activities (i.e. NACE K64-K66 and M70). These results are available upon request.

Table A3.1 / Robustness check of Table 2, column (1) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) and 'no liab' sample (i.e. no liability information of subsidiary and GUO)

	(1) Table 2	Sample 1 'all vars'	Sample 1 cgsg	Sample 2 'no liab'	Sample 2 cgsg	Sample 3 cgsg
Reg Div TBT	-0.3837 (0.9902)	-0.5843 (0.7724)	-0.3313 (0.7955)	-0.2759 (0.7913)	-0.3085 (0.7933)	-0.3837 (0.9902)
Reg Div SPS	-0.0992 (0.9905)	0.3698 (0.7802)	0.3899 (0.8260)	0.3288 (0.8251)	0.3860 (0.8263)	-0.0992 (0.9905)
Tariff host country	0.1332*** (0.0517)	0.0996** (0.0492)	0.0732 (0.0508)	0.0734 (0.0502)	0.0694 (0.0504)	0.1332*** (0.0517)
Tariff home country	0.0689 (0.0487)	-0.0011 (0.0474)	0.0179 (0.0513)	0.0082 (0.0511)	0.0074 (0.0514)	0.0689 (0.0487)
Subsidiary-level variables						
Employment	0.1379*** (0.0134)	0.1306*** (0.0139)	0.1707*** (0.0166)	0.1674*** (0.0157)	0.1689*** (0.0158)	0.1379*** (0.0134)
Labour productivity		0.0431*** (0.0073)		0.0464*** (0.0094)		
No. owned patents	0.0369*** (0.0106)	0.0320*** (0.0094)	0.0394*** (0.0125)	0.0382*** (0.0112)	0.0380*** (0.0113)	0.0369*** (0.0106)
Current liabilities		0.0770*** (0.0083)				
Non-current liabilities		0.0213*** (0.0018)				
GUO-level variables						
Employment		0.0431*** (0.0073)		0.0464*** (0.0094)		
Labour productivity	0.0369*** (0.0106)	0.0320*** (0.0094)	0.0394*** (0.0125)	0.0382*** (0.0112)	0.0380*** (0.0113)	0.0369*** (0.0106)
No. owned patents		0.0013 (0.0056)		0.0048 (0.0067)		
Current liabilities		0.0060 (0.0052)				
Non-current liabilities		-0.0006 (0.0045)				
RTA (inventors) weighted	0.0051*** (0.0016)	0.0043** (0.0017)	0.0051*** (0.0019)	0.0053*** (0.0020)	0.0052*** (0.0020)	0.0051*** (0.0016)
Constant	20.2992*** (0.2070)	17.6677*** (0.4040)	19.8145*** (0.2542)	19.5889*** (0.3062)	20.1123*** (0.2321)	20.2992*** (0.2070)
No. observations	678859	315656	315656	330107	330107	678859
AIC	5.3029e+12	2.1037e+12	2.3446e+12	2.4541e+12	2.4605e+12	5.3029e+12
BIC	5.3029e+12	2.1037e+12	2.3446e+12	2.4541e+12	2.4605e+12	5.3029e+12
No. groups	27123	10488	10488	11400	11400	27123
Firm, GUO, host-home country pair in home sector	Yes	Yes	Yes	Yes	Yes	Yes
region NUTS 2, host-country/home-sector, home-country/home-sector	Yes	Yes	Yes	Yes	Yes	Yes
Time variant host-sector FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

Table A3.2 / Robustness check of Table 2, column (2) using 'all variables' sample (i.e. complete financial information of subsidiary and GUO) and 'no liab' sample (i.e. no liability information of subsidiary and GUO)

	(2) Table 2	Sample 1 'all vars'	Sample 1 cgsg	Sample 2 'no liab'	Sample 2 cgsg	Sample 3 cgsg
Reg Div TBT	-1.5305	-1.7562	-0.8009	-0.9098	-0.8036	-1.5305
	(1.4305)	(1.4125)	(1.5514)	(1.5693)	(1.5774)	(1.4305)
Reg Div SPS	1.1367	1.5803	0.7906	0.9101	0.7992	1.1367
	(1.7117)	(1.7969)	(1.9758)	(1.9980)	(2.0001)	(1.7117)
Tariff host country	0.2022***	0.1953***	0.1431**	0.1475**	0.1400**	0.2022***
	(0.0458)	(0.0603)	(0.0601)	(0.0593)	(0.0595)	(0.0458)
Tariff home country	0.0287	-0.0776**	-0.0729*	-0.0695	-0.0713*	0.0287
	(0.0509)	(0.0390)	(0.0421)	(0.0423)	(0.0418)	(0.0509)
Subsidiary-level variables						
Employment	0.1334***	0.1435***	0.1926***	0.1891***	0.1939***	0.1334***
	(0.0186)	(0.0189)	(0.0247)	(0.0239)	(0.0241)	(0.0186)
Labour productivity	0.0454***	0.0284**	0.0377**	0.0380**	0.0379**	0.0454***
	(0.0156)	(0.0114)	(0.0164)	(0.0162)	(0.0164)	(0.0156)
No. owned patents	0.0215*	0.0184	0.0236*	0.0214	0.0213	0.0215*
	(0.0124)	(0.0113)	(0.0126)	(0.0134)	(0.0134)	(0.0124)
Current liabilities		0.0804***				
		(0.0110)				
Non-current liabilities		0.0221***				
		(0.0023)				
GUO-level variables						
Employment		0.0895***		0.0758**		
		(0.0203)		(0.0297)		
Labour productivity	0.0454***	0.0284**	0.0377**	0.0380**	0.0379**	0.0454***
	(0.0156)	(0.0114)	(0.0164)	(0.0162)	(0.0164)	(0.0156)
No. owned patents		-0.0054		-0.0076		
		(0.0054)		(0.0058)		
Current liabilities		0.0202				
		(0.0195)				
Non-current liabilities		-0.0169				
		(0.0121)				
RTA (inventors) weighted	0.0017	-0.0013	-0.0014	-0.0007	-0.0010	0.0017
	(0.0026)	(0.0034)	(0.0036)	(0.0035)	(0.0035)	(0.0026)
Constant	19.8886***	16.7723***	19.6570***	18.7760***	19.6570***	19.8886***
	(0.3062)	(0.7667)	(0.3582)	(0.7919)	(0.3519)	(0.3062)
No. observations	276996	152348	152348	158872	158872	276996
AIC	2.5760e+12	1.2713e+12	1.4214e+12	1.4329e+12	1.4392e+12	2.5760e+12
BIC	2.5760e+12	1.2713e+12	1.4214e+12	1.4329e+12	1.4392e+12	2.5760e+12
No. groups	9847	3983	3983	4543	4543	9847
Firm, GUO, host-home country pair in home sector	Yes	Yes	Yes	Yes	Yes	Yes
region NUTS 2, host-country/home-sector, home-country/home-sector	Yes	Yes	Yes	Yes	Yes	Yes
Time variant host-sector FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

Table A4.1 / Interaction between trade policies in the home sector and the number of patents owned by the subsidiary

	Original model		Interaction with no. of owned patents							
	(1) Whole sample	**(2) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**	**(3) Whole sample**	**(4) Extra-EU GUOs**
Trade policies host sector										
Reg Div TBT	-0.3837 (0.9902)	-1.5305 (1.4305)	-0.4178 (0.9982)	-1.6854 (1.4143)	-0.3992 (0.9937)	-1.5611 (1.4305)	-0.4255 (1.0002)	-1.6413 (1.4171)	-0.3930 (0.9931)	-1.5519 (1.4277)
Reg Div SPS	-0.0992 (0.9905)	1.1367 (1.7117)	-0.0850 (1.0009)	1.2430 (1.7006)	-0.1061 (0.9981)	1.1243 (1.7129)	-0.0091 (0.9983)	1.2230 (1.6958)	-0.0700 (0.9931)	1.1611 (1.7077)
Tariff host country	0.1332*** (0.0517)	0.2022*** (0.0458)	0.1361*** (0.0522)	0.2111*** (0.0470)	0.1334** (0.0519)	0.2045*** (0.0461)	0.1276** (0.0521)	0.2035*** (0.0455)	0.1317** (0.0519)	0.2021*** (0.0457)
Tariff home country	0.0689 (0.0487)	0.0287 (0.0509)	0.0650 (0.0493)	0.0258 (0.0514)	0.0679 (0.0489)	0.0289 (0.0510)	0.0632 (0.0496)	0.0244 (0.0520)	0.0637 (0.0495)	0.0262 (0.0514)
Interaction with no. owned patents										
No. owned patents X Reg Div TBT			0.1344 (0.0873)	0.1576* (0.0868)						
No. owned patents X Reg Div SPS					0.1646 (0.1651)	0.1541 (0.1799)				
No. owned patents X Tariff host country							0.0251*** (0.0090)	0.0247*** (0.0090)		
No. owned patents X Tariff host country									0.0170* (0.0087)	0.0100 (0.0079)
No. observations	678859	276996	678859	276996	678859	276996	678859	276996	678859	276996
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time invariant FE: Firm, GUO, host-home country pair in home sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant FE: region NUTS 2, host-country/home-sector, home-country/home-sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant host-sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

Table A5.1 / Interaction between RTA computed with respect to the technological interest of the GUO, interacted by the distance between FDI origin and destination countries. Model specification on host sector

	(1) Whole sample	(2) Extra-EU GUOs	(1) Whole sample	(2) Extra-EU GUOs	(1) Whole sample	(2) Extra-EU GUOs	(1) Whole sample	(2) Extra-EU GUOs
GUO-level based RTA								
RTA (inventors)	0.0602*** (0.0232)	0.1888*** (0.0436)						
RTA (inventor) x Distance	-0.0088*** (0.0034)	-0.0243*** (0.0056)						
RTA (inventors) weighted			0.0719** (0.0296)	0.1919*** (0.0432)				
RTA (inventors) weighted x Distance			-0.0106** (0.0044)	-0.0251*** (0.0058)				
RTA (owners)					0.0561*** (0.0212)	0.1854*** (0.0395)		
RTA (owners) x Distance					-0.0088*** (0.0032)	-0.0251*** (0.0054)		
RTA (inventors) weighted							0.0681** (0.0276)	0.1745*** (0.0419)
RTA (inventors) weighted x Distance							-0.0103** (0.0041)	-0.0240*** (0.0058)
No. observations	1117290	508150	1117290	508150	1117290	508150	1117290	508150
No. group	114385	51935	114385	51935	114385	51935	114385	51935
AIC	6.4616e+12	3.5961e+12	6.4611e+12	3.5959e+12	6.4617e+12	3.5961e+12	6.4614e+12	3.5961e+12
BIC	6.4616e+12	3.5961e+12	6.4611e+12	3.5959e+12	6.4617e+12	3.5961e+12	6.4614e+12	3.5961e+12
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trade Policies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time invariant FE: Firm, GUO, host-home country pair in host sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant FE: region NUTS 2, host-country/host -sector, home-country/host -sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time variant home-sector FE	No	No	No	No	No	No	No	No

Note: Clustered standard error in parenthesis. * p < .10, ** p < .05, *** p< .01

Figure A1.1 / Total assets of foreign-owned firms by NUTS 2 Rev 2.0 (2016) and NACE two-digit sectors: Group 1

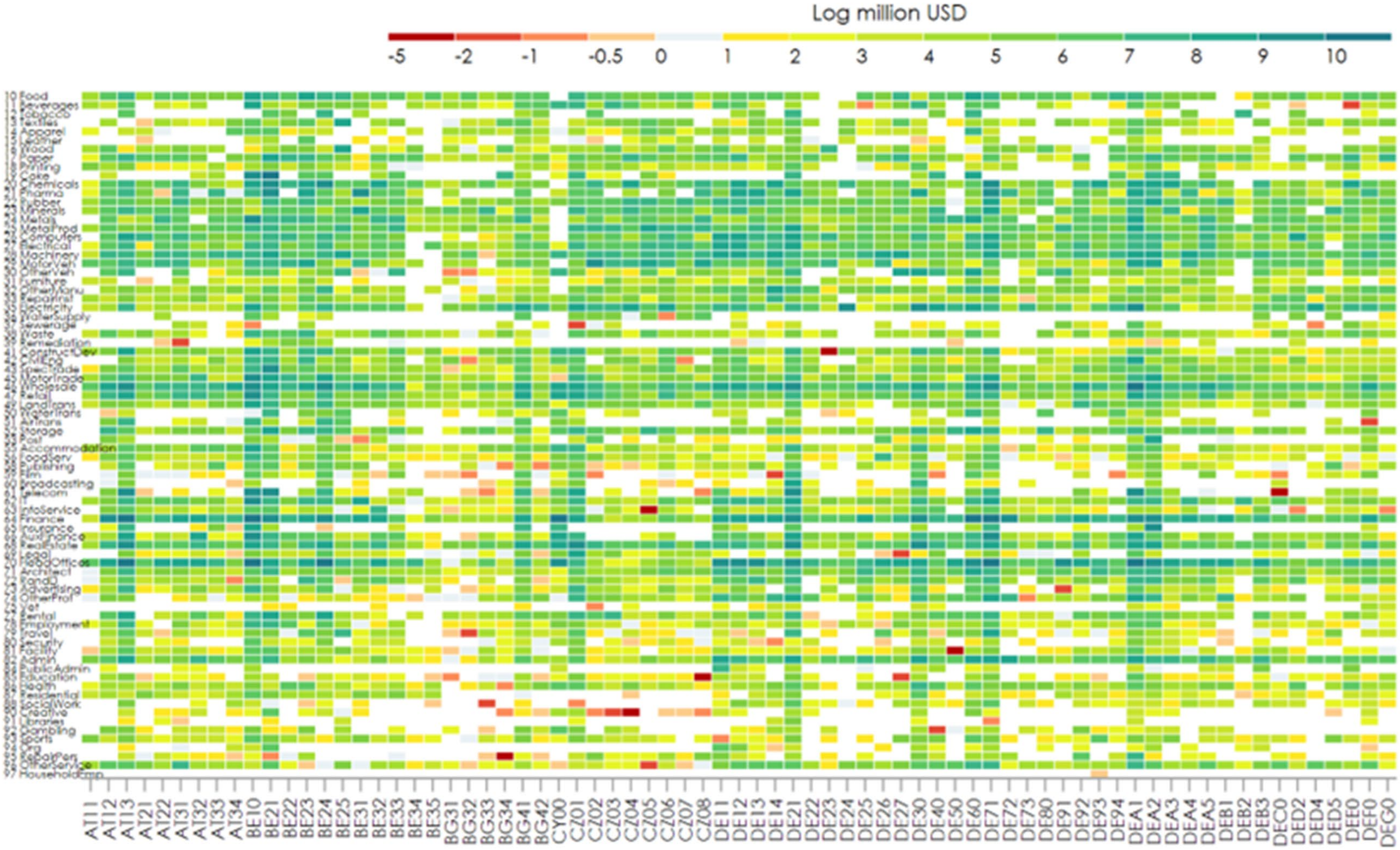

Figure A1.2 / Total assets of foreign-owned firms by NUTS 2 Rev 2.0 (2016) and NACE two-digit sectors: Group 2

Figure A1.3 / Total assets of foreign-owned firms by NUTS 2 Rev. 2.0 (2016) and NACE two-digit sectors: Group 3

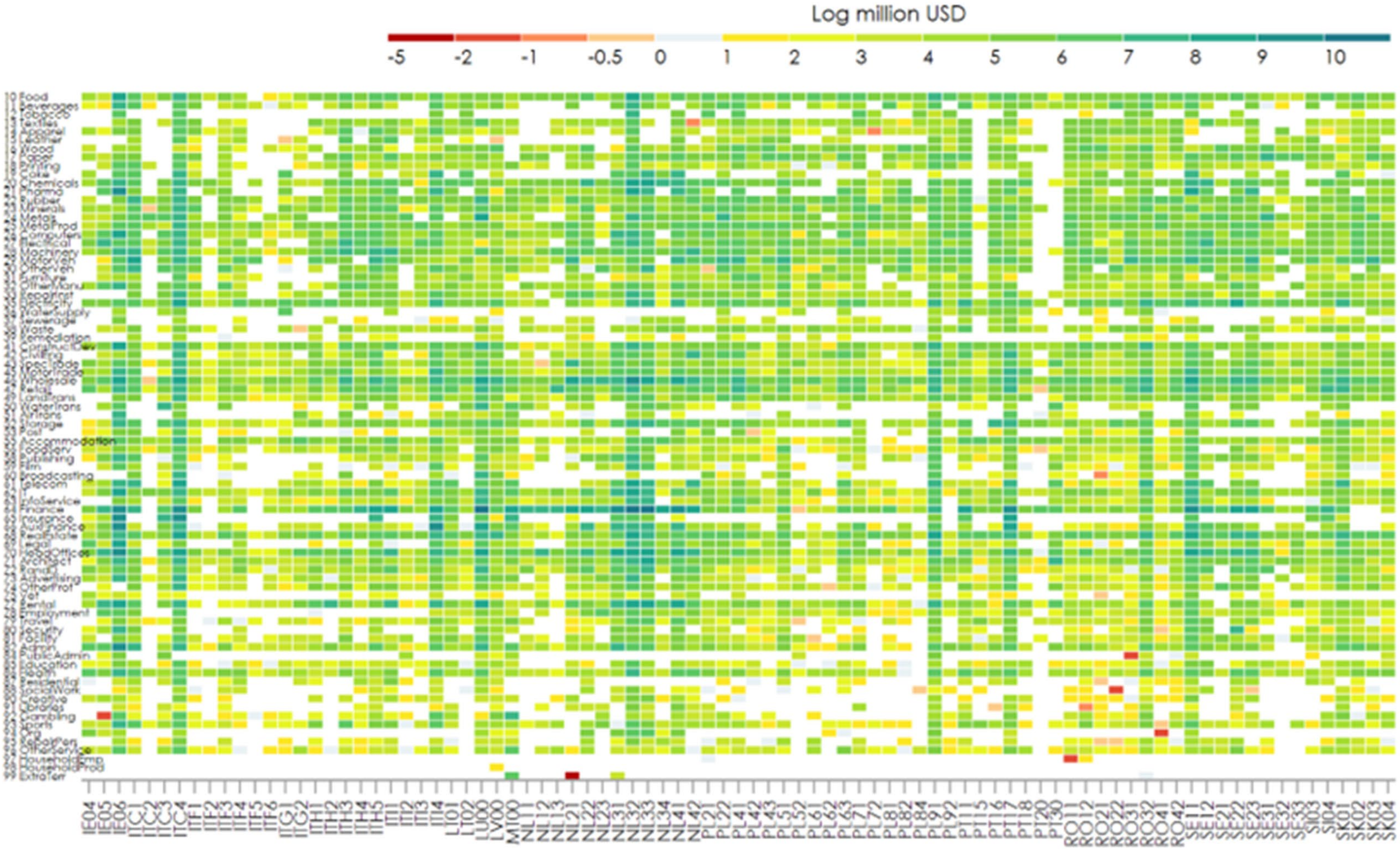

Figure A1.4 / RTA (inventors) by CPC3 and NUTS 2 Rev. 2.0 (2016): Group 1

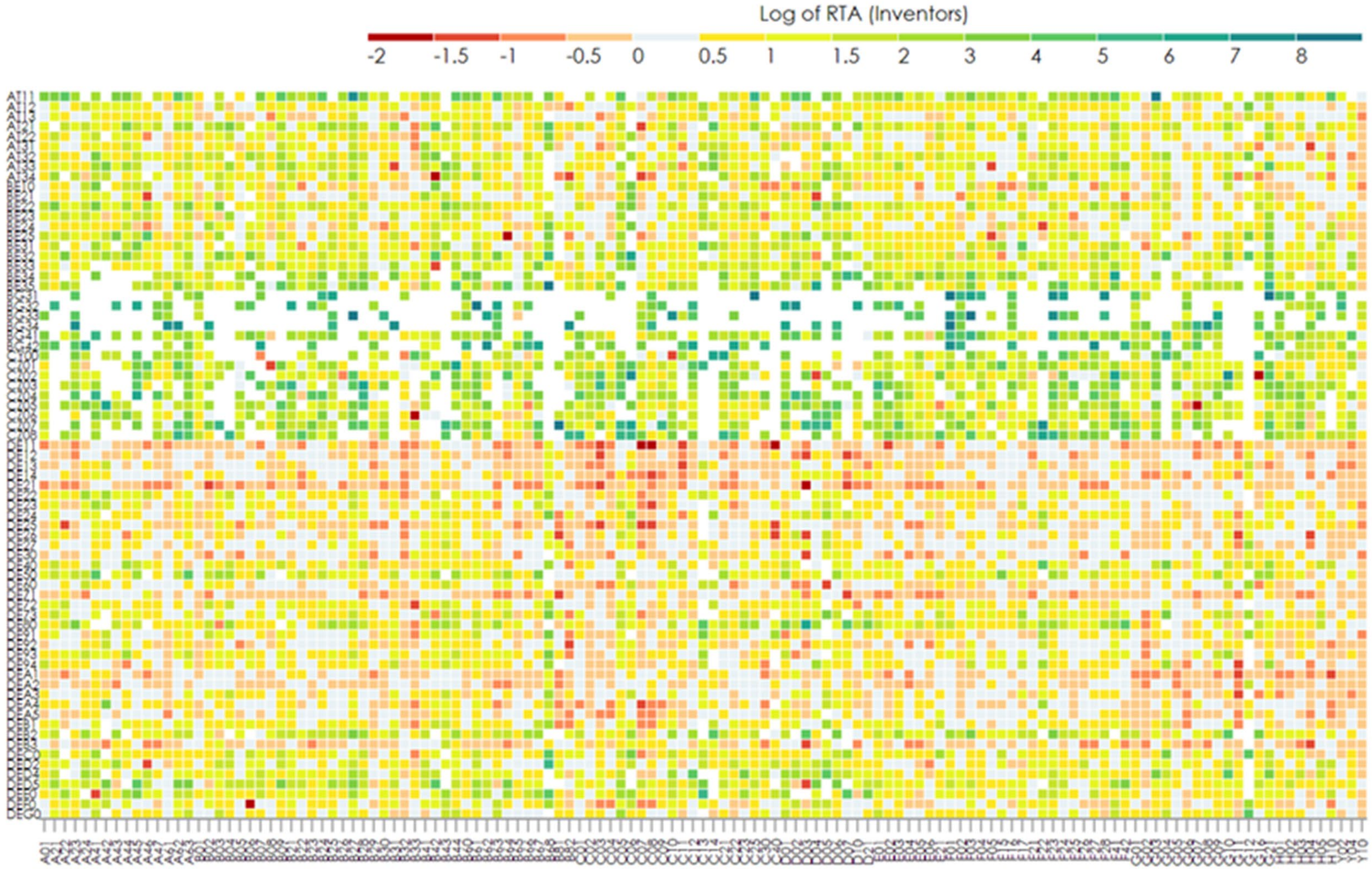

Figure A1.5 / RTA (inventors) by CPC3 and NUTS 2 Rev. 2.0 (2016): Group 2

Figure A1.6 / RTA (inventors) by CPC3 and NUTS 2 Rev. 2.0 (2016): Group 3

IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche" (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

Postanschrift: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at

Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

wiiw.ac.at

https://wiiw.ac.at/p-7343.html