LUISS

Research Center
for European Analysis
and Policy

EU Open Strategic Autonomy

Evidence on strategic dependences through trade and ownership linkages

Filippo Bontadini, Valentina Meliciani, Maria Savona,

Roberto Urbani, Ariel Wirkierman

Working Paper 10/2026

November 3, 2026

This research is realized with the support of the Policy Planning Unit of the Italian Ministry of Foreign Affairs and International Cooperation pursuant to Article 23-bis of Presidential Decree 18/1967. The opinions contained in this paper are solely those of the authors and do not necessarily reflect the opinions of the Ministry of Foreign Affairs and International Cooperation.

EU Open Strategic Autonomy: Evidence on strategic dependences through trade and ownership linkages

Filippo Bontadini, Luiss Guido Carli University, fbontadini@luiss.it

Valentina Meliciani, Luiss Guido Carli University, vmeliciani@luiss.it

Maria Savona, Luiss Guido Carli University, msavona@luiss.it

Roberto Urbani, Luiss Guido Carli University, rurbani@luiss.it

Ariel Wirkierman, University of Macerata, ariel.wirkierman@unimc.it

Abstract

Policies for open strategic autonomy usually measure external dependence by the location in which production occurs. This paper asks whether that assessment changes when value added is attributed to the country of the producer's ultimate owner. We combine the OECD Inter-Country Input-Output framework with the analytical Activities of Multinational Enterprises ownership dimension for 2000-2023, covering 76 economies, a rest-of-world aggregate, and 41 industries. The analysis develops three complementary descriptive measures: the ownership composition of gross output; a nearshoring ratio comparing regional with extra-regional foreign value added; and global supplier shares attributed by either production location or ultimate ownership. Results show that ownership materially changes the diagnosis of dependence. European economies have substantially higher foreign-owned output shares than the United States and China, particularly in high-tech manufacturing and knowledge-intensive business services. For Italy, regional integration is comparatively strong, but geography and ownership diverge in high-tech activities: production located within Europe is increasingly owned and controlled by non-European firms. At the global level, the European Union's share of supplied value-added declines under both concepts, China's rise in high-tech manufacturing is larger by geography than by ownership, and the United States retains a leading position in knowledge-intensive services. The evidence is descriptive rather than causal. It implies that monitoring systems for strategic autonomy should jointly track production location and ultimate corporate control, especially in technology- and knowledge-intensive sectors.

Keywords: open strategic autonomy; global value chains; multinational enterprises; ultimate ownership; nearshoring; trade in value added

JEL codes: F14; F23; L16; L23; O25

1. Introduction

In the past decade rising geopolitical tensions and frequent economic shocks have challenged the view that participation in global value chains can be assessed primarily in terms of efficiency gains. Governments and firms have become increasingly concerned with the vulnerabilities that may arise from dependence on foreign suppliers, technologies and productive capabilities and have included economic security among their objectives. In Europe, these concerns have become central to the debate on Open Strategic Autonomy (OSA), which aims to reconcile the benefits of economic openness with the capacity to safeguard critical economic and technological capabilities (European Commission, 2021; Draghi, 2024).

At the same time, the Global Value Chain (GVC) literature, that has long documented the growing international fragmentation of production and the importance of tracing value added across national borders rather than relying exclusively on gross trade flows (Baldwin and Lopez-Gonzalez, 2015; Los et al., 2015; Timmer et al., 2014; Borin and Mancini, 2019), has recently shifted the focus towards the implications of this fragmentation for resilience and exposure to external shocks (Antràs, 2020; Javorcik, 2020; Miroudot, 2020; Baldwin and Freeman, 2022). As a result, GVCs are increasingly viewed not only as vehicles for productivity, specialization and economic growth, but also as potential conduits of shock propagation and strategic dependence.

Much of the policy debate on economic security has focused on the geographical location of production and suppliers: where critical inputs are produced, how geographically concentrated sourcing is, and whether production can be relocated closer to domestic or regional markets or in regions/countries that share similar values. This perspective underpins the growing interest in reshoring, nearshoring and friendshoring. The European Commission's work on strategic dependencies identifies external dependence primarily through trade flows, import concentration and the location of production and supply (European Commission, 2021). Recent empirical studies document some changes in the balance between regional and global sourcing, with a reversal in the trend of an increasing share of global sourcing over regional (European) sourcing in Europe starting after the financial crisis (Bontadini et al., 2022, 2025).

This work has focused on the geographical distribution of value added in GVCs disregarding whether that value added is produced by foreign or domestic firms. Although multinational enterprises account for a substantial share of international production and are deeply embedded in both global and domestic value chains (Cadestin et al., 2018, 2019), ownership has received comparatively less attention in recent debates on strategic dependencies and economic security.

This distinction matters because the geography of production and the geography of ownership capture different dimensions of economic exposure. The location of production determines where physical productive capacity, employment, and many supply-chain activities are situated. Ultimate ownership, by contrast, is more closely related to strategic corporate decisions concerning investment, technological development and the control and allocation of intangible assets. The distinction has become particularly relevant as intangible assets, intellectual property and intra-firm trade have made the location of economic activity increasingly difficult to identify through conventional production statistics alone (Lipsey, 2010). International investment statistics likewise show that the immediate location of foreign investment can differ substantially from the location of ultimate ownership and control (Damgaard et al., 2019).

These issues are especially important from the perspective of technological sovereignty since decisions over intangible assets tend to be taken at the level of the ultimate owner, not necessarily where output is physically generated (Lipsey, 2010). This distinction is likely to be particularly important in high-technology manufacturing and knowledge-intensive business services (KIBS), where intangible assets, technological capabilities and multinational organization play a central role. Recent evidence also highlights the importance of considering technological dependence alongside trade and production linkages when assessing Europe's position in strategic sectors (Wirkierman et al., 2025), while recent policy assessments of European competitiveness emphasise that dependence on foreign-controlled capabilities in technology- and knowledge-intensive sectors can constrain the EU's technological sovereignty (Draghi, 2024). This has, in particular, sparked a debate on digital sovereignty, which calls for greater European control over the digital stack—that is, ownership and control of strategic digital infrastructures underpinning the development of artificial intelligence (Bria et al., 2025).

The distinction between production geography and ultimate ownership therefore raises a question that has received limited attention in the literature on GVCs and strategic autonomy: does the measurement of European countries' strategic dependence change when value added is attributed to the country of the producer's ultimate owner rather than to the country in which production takes place? This paper addresses this question by bringing the ownership dimension explicitly into the measurement of international production linkages. Rather than treating geography and ownership as alternative measures, we view them as complementary dimensions of economic dependence. Geography tells us where production occurs; ownership tells us which countries' firms ultimately control the producers generating that value added.

Empirically, we combine the OECD Inter-Country Input-Output framework with the analytical Activities of Multinational Enterprises (AMNE) ownership dimension for 2000–2023. This allows us to trace international production relationships across 76 economies, plus a rest-of-world aggregate, and 41 industries, while distinguishing between the geographical location of productive activity and the country of ultimate ownership. We use this information to develop three complementary diagnostics of strategic dependence.

First, we examine the ownership composition of gross output, asking how much productive activity located within a country is controlled by domestic, European and extra-European owners. This provides a direct measure of exposure to foreign corporate ownership that complements conventional indicators based on foreign production or imports. Second, we extend the analysis to vertically integrated GVCs and compare regional (within the EU) and extra-regional (outside the EU) foreign value-added sourcing under geography- and ownership-based definitions. Building on the nearshoring framework developed in Bontadini et al. (2022, 2025), we ask whether value chains that appear regional when suppliers are classified by production location remain equally regional when they are classified according to ultimate ownership. Third, we reverse the perspective and examine the shares of global value added supplied by the main economic areas, comparing the position of the European Union, the United States and China when value added is attributed by production geography and by corporate ownership. Together, these exercises capture three related but distinct dimensions of economic dependence: foreign control of domestic production, dependence on regional versus extra-regional value added within GVCs, and the capacity of major economies to control value-added production globally.

The results show that the distinction between geography and ownership is empirically important. First, European economies exhibit considerably higher shares of foreign-owned gross output than the United States and China, although a significant part of foreign ownership in EU countries reflects intra-European integration. Foreign ownership is particularly relevant in high-technology manufacturing and KIBS. Second, geography and ownership can lead to different assessments of the regionalization of European value chains. Third, the global supplier analysis confirms the declining weight of the EU in global value-added supply under both measures, while providing a more nuanced picture of the relative positions of China and the United States. China's rise in high-technology manufacturing is substantially stronger when measured by production location than by ultimate ownership, whereas the United States retains a particularly strong position in KIBS, which becomes even more pronounced when foreign affiliates are attributed to their ultimate owners. Taken together, these findings suggest that monitoring frameworks for open strategic autonomy should track production location and ultimate corporate control jointly, rather than relying on either dimension alone.

The remainder of the paper is organized as follows. Section 2 presents the data and empirical strategy and explains how the OECD ICIO-AMNE framework is used to distinguish geography- and ownership-based measures of production and value-added flows. Section 3 presents the empirical results, first examining foreign ownership of gross output, then comparing geography- and ownership-based measures of regional and global sourcing and finally assessing the global supplier position of the EU, the United States and China. The main findings, their heterogeneity across countries and sectors, and the limitations of the analysis are also discussed. Section 4 concludes and draws implications for the monitoring and design of European Open Strategic Autonomy policies.

2. Data and empirical strategy

2.1 Data and measurement

The analysis combines annual OECD analytical AMNE inter-country input-output tables with a bilateral output-by-owner file (OECD, 2026). The annual ICIO-AMNE files span 2000-2023. The data includes 77 country codes, comprising 76 economies and a rest-of-world aggregate, and 41 industries. The inter-country input-output (ICIO) matrix splits supplying country-industries into domestically and foreign owned activities, with the intermediate flow matrix also distinguishing purchasing industries based on ownership. Final demand is disaggregated into household consumption, non-profit institutions serving households, government consumption, gross fixed capital formation, inventories, and other non-resident demand categories; the ownership distinction is applied here only for supplying country-industries.

The bilateral output-by-owner matrix allocates country-industries' gross output by country of ultimate ownership. Annual bilateral output levels are averaged within four periods (2000-2007, 2008-2011, 2012-2019 and 2020-2023) before shares are computed; unless otherwise noted, all ownership shares reported in the text are these period averages.

The data exhibits significant variation from one year to the next, reflecting changes in ownership of multinational companies that can result in large shifts from domestic to foreign-owned cells. To minimise such fluctuation and

identify structural features of global production, we focus on averages of four periods: 2000-2007, 2008-2011, 2012-2019, and 2020-2023. This is e same periodization is applied to the ICIO transaction matrix, final-demand matrix, value added, taxes less subsidies, and gross output.

In this analysis we focus on a sample of large European economies, Italy, Germany, France, which we compare with the United Kingdom, the United States, and China. We then also report evidence on the EU27, the United Kingdom, the United States, China, and, where appropriate, Japan and the rest of the world. The European ownership group is defined as the EU27; the United Kingdom is treated separately in global supplier tables but is included with the EU27 in the European macro-region used for nearshoring classification. This choice preserves a stable geographical region over the long sample while allowing the UK's ownership position to remain visible. Accordingly, in the ownership composition of output reported in Figure 1, UK-owned production located in the EU27 is classified as foreign European ownership rather than as extra-EU ownership.

Sector groupings. The paper reports total-economy results together with two strategic macro-sectors: high-tech manufacturing and knowledge-intensive business services (KIBS). The high-tech label is broader than the strict Eurostat high-tech category, because the aggregation of ICIO industries requires combining high- and medium-high-tech manufacturing (Eurostat). It includes the manufacture of chemicals (C20), pharmaceuticals (C21), computers, electronics and optical products (C26), electrical equipment (C27), machinery and equipment (C28), motor vehicles (C29), and other transport equipment (C30). KIBS include publishing, audiovisual and broadcasting (J58T60), telecommunications (J61), IT and information services (J62T63), finance and insurance (K64T66), and professional, scientific and technical activities (M69T75).

Construction of the analytical variables. Our analysis relies on two key variables. First, we look at gross output, where for each of the six countries of interest we use the bilateral output-by-owner matrix to allocate gross output across six mutually exclusive ownership groups: Domestic, EU, United States, China, Japan, and Rest of World. A firm is classified as domestic when its owner country equals the host country.

Second, we are also interested in GVCs and we therefore move from a gross-output to tracing value added contributions flowing into production of final goods from suppliers across countries and industries everywhere in the World.

The value-added analysis starts from the standard input-output system (Leontief, 1936; Miller and Blair, 2009). Let **Z** denote intermediate transactions, **x** gross output, and **f** final demand excluding inventories. Technical coefficients are and the Leontief inverse is . Let **v** be the vector of value added plus taxes less subsidies per unit of gross output. The matrix of value added activated by final demand is constructed as:

$$VBF = diag(v)\, B\, diag(f)$$

Rows identify source country-industry-ownership units that provide value added; columns identify the country-industry-ownership subsystems whose final demand activates that value added. Looking at the columns of we can therefore focus on vertically integrated subsystems à la Pasinetti, i.e. global value chains. This means that we decompose the production of final products by the value added contribution of each country-industry. For

example, a car reaching completion in Germany is reallocated to the contribution of value added that all countries and industries make along the whole GVC (e.g. diesel engines produced in Italy, design services supplied in France, electronic components from South Korea etc.). The ICIO-AMNE allows to further decompose value added contribution within each country-industry into the value added supplied by foreign and domestic firms. Going back to our example, we can look at the portion of value added that the Italian manufacturing sector supplies to the production of German cars and split this into the value added supplier by Italian-owned companies (domestic owned value added contribution) and by companies whose ultimate owners are not Italian (foreign owned value added contribution). The matrix does not provide information on the ultimate ownership of the foreign owned value added contributions, in other word we know how much value added flows into German cars from non-Italian firms operating in Italy, but we do not know where ownership of such companies is ultimately located.

To retrieve this information we rely on gross output shares from the bilateral output-by-owner matrix for gross output. In doing so we are assuming that ownership shares of value added (unobserved in our data) are following gross output shares (observed in the bilateral output-by-owner matrix).

Our data allows us to allocate gross output and value added flows according to two criteria. On the one hand, the geography-based allocation looks at the country where production occurs. On the other hand, ownership-based allocation focuses on the country of ultimate ownership.

In order to study geography- and ownership-based nearshoring, we identify Nearshoring ratio following Bontadini et al (2025) as:

$$NR = Regional\ foreign\ value\ added \Big/ Global\ foreign\ value\ added$$

To compute this metric, we distinguish between value added contributions to each vertically integrated GVC that is coming from within (regional) and outside of (global) the same region as the country of completion. Whether we define regional based on geography or ownership will change capture different value added flows. Going back to our German car example, geography-based regional value added will include all contributions made to the GVC by firms located in the EU, regardless of their ownership. Conversely, ownership-based regional value added will consider value added made by companies everywhere in the world with European ultimate owners. Global foreign value added is measured as the value added coming from extra-regional foreign suppliers, again identified based on either geography or ownership.[1]

The nearshoring ratio has a straightforward interpretation. Values above one indicate that regional foreign sourcing exceeds extra-regional foreign sourcing; a value below one indicates the reverse. This ratio-based

[1] Domestic value added is excluded from this calculation, we focus on foreign value added, i.e. the value added that enters the country of completion of a GVC from outside its borders.

treatment follows the regional-sourcing logic developed in related European value-chain work (Bontadini et al., 2025). A rise in the ratio is described as movement towards regional sourcing, i.e. nearshoring.

2.2 Empirical strategy

Our empirical strategy relies on a range of accounting decompositions based on geography vs. ownership. We use these as diagnostics of countries' economic dependence vis-à-vis foreign partners. Comparing the two isolates the measurement consequences of corporate control. In the following section we perform three exercises to study this.

First, we look at gross output within each country's borders and distinguish ownership shares. This illustrates the share of gross output produced in each country that is contributed by foreign-owned companies and offers evidence on where the ultimate owner of these companies is located. This is a first diagnostic of countries' exposure to foreign ownership and a so-far understudied facet of countries' economic dependence.

The second analysis measures the balance between regional and extra-regional foreign value added embodied in GVCs. This analysis complements existing evidence on the growing importance of foreign, and especially extra-regional, value added in GVCs by proposing to allocate value added based on ownership rather than geography.

The third analysis changes perspective from destination dependence to supplier position. It asks what share of global supplied value added belongs to the EU, United States, China, United Kingdom, Japan, and rest of the world. Here too, the comparison between geography and ownership identifies whether production located in a region is disproportionately controlled by firms headquartered elsewhere.

3. Results and discussion

3.1 Foreign ownership of gross output

Figure 1 reports the foreign-owned share of gross output and its owner-region composition. The share of foreign owned gross output has grown steadily across all countries, except France, over the observed periods. In 2020-2023, foreign owners accounted for 25.0% of UK gross output, 15.8% in Italy, 15.7% in Germany, and 13.4% in France, compared with 8.8% in the United States and 7.9% in China (Figure 1). Italy's foreign-owned share increased from 11.4% in 2000-2007 to 15.8% in 2020-2023. The United Kingdom remained the most foreign-ownership-intensive economy in the comparison throughout the sample.

The composition of foreign ownership also shows different patterns across countries. In 2020-2023, EU owners accounted for 7.9% of Italian gross output, approximately half of the total foreign-owned share. The corresponding EU-owner shares were 6.2% in Germany, 5.8% in France, and 8.2% in the United Kingdom. US ownership was especially large in the United Kingdom, at 11.8% of gross output. These patterns show why a simple foreign/domestic split is insufficient for strategic analysis: intra-European ownership and extra-European ownership imply different exposures. European countries exhibit larger shares of foreign ownership

gross output compared to the US and China, however when we exclude intra-European gross output, foreign penetration in gross output decreases to levels on a part with both China and the US.

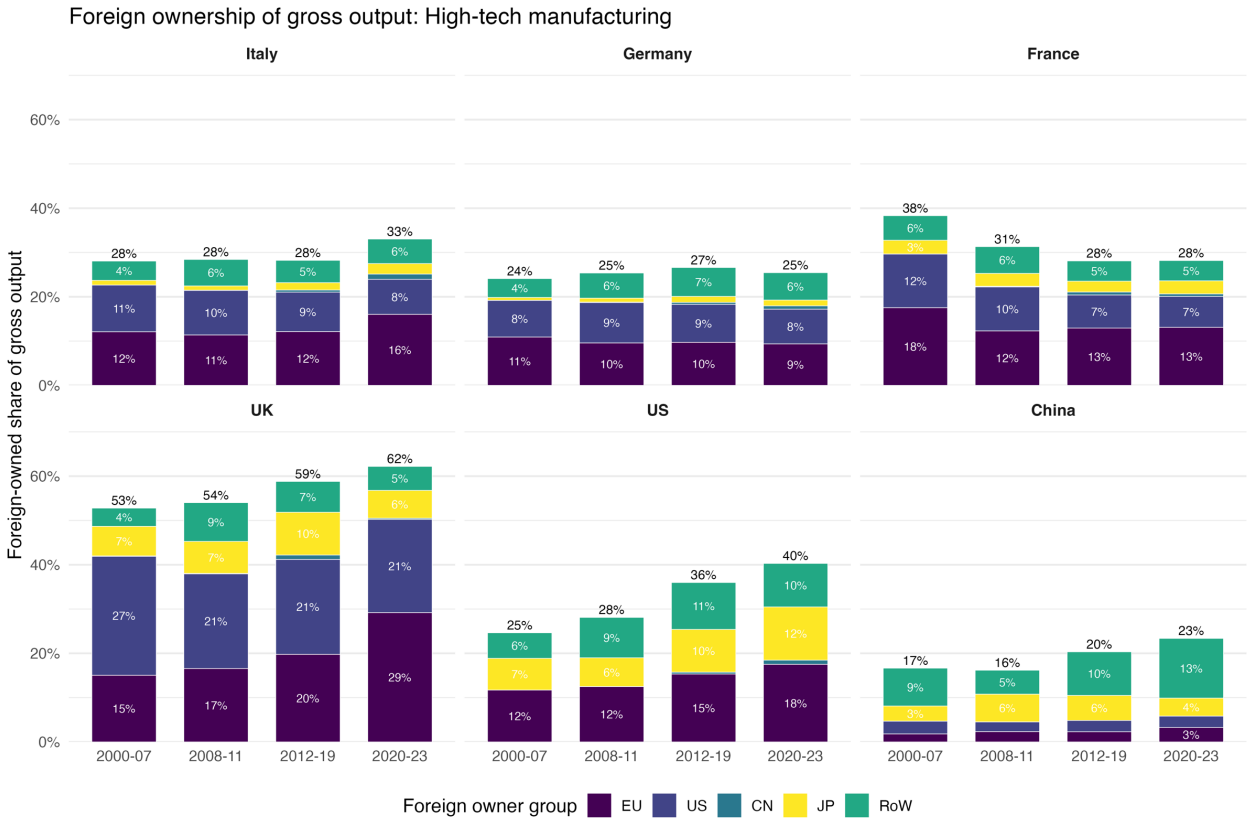
Figure 1. Foreign ownership composition of gross output, total economy



Note: Bars report the foreign-owned share of gross output, decomposed by the macro-region of the ultimate owner (EU, United States, China, Japan and rest of the world); domestically owned output is excluded from the bars, so that bar heights measure total foreign ownership. Labels above each bar give the total foreign-owned share, labels within each segment the contribution of the corresponding owner group. Shares are computed on gross output aggregated across the 41 ICIO industries of each economy and averaged within each period. Source: authors' calculations on OECD ICIO-AMNE data.

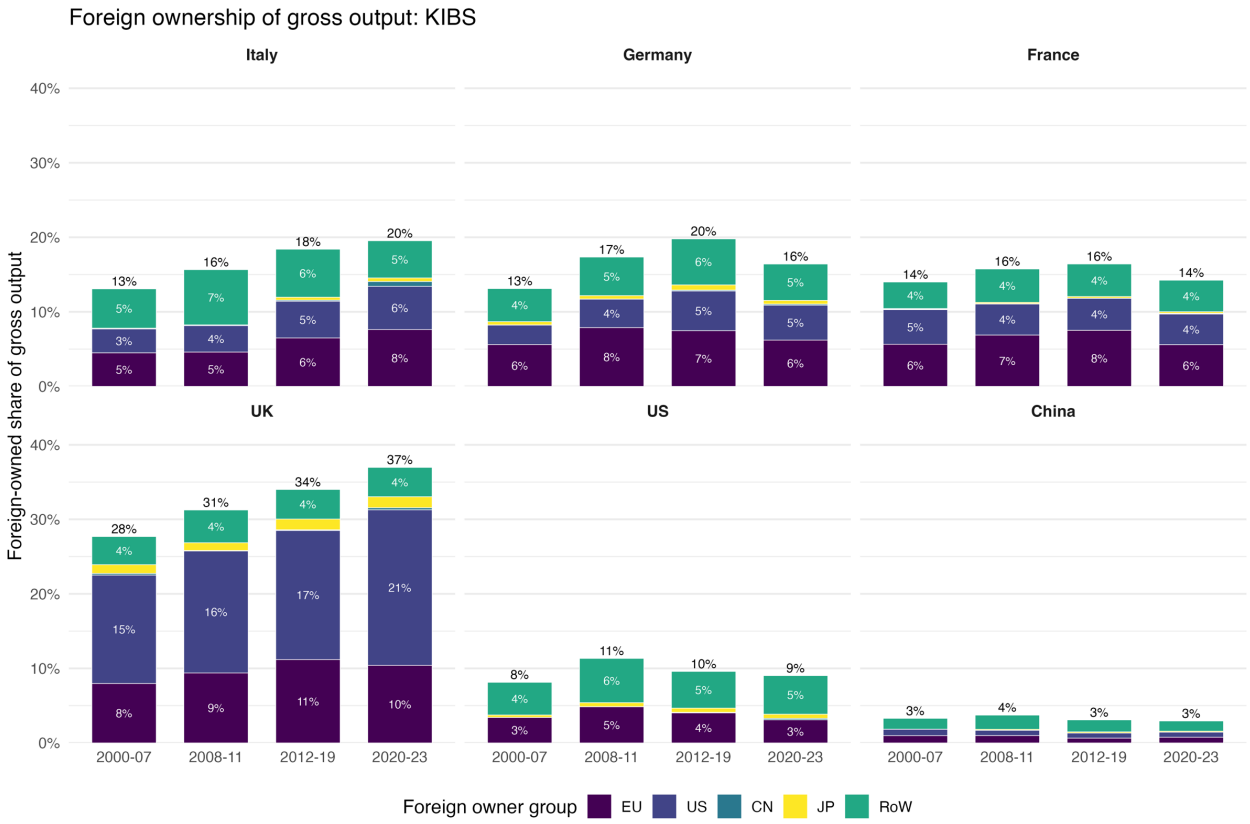
Figures 2 and 3 repeat the decomposition for high-tech manufacturing and KIBS. Foreign penetration is generally higher in high-tech manufacturing than in the total economy. EU and Japanese owners are prominent suppliers of high-tech output, while US ownership is particularly important in the United Kingdom and, to a lesser extent, in continental Europe. In KIBS, EU and US owners dominate the foreign component. Although foreign ownership shares in KIBS? are lower than in high-tech manufacturing for several countries, they remain above total-economy averages in the European sample. The descriptive association is consistent with the concentration of intangible assets and multinational organisation in technology- and knowledge-intensive activities.

Figure 2. Foreign ownership composition in high-tech manufacturing



Note: As in Figure 1, restricted to high-tech manufacturing (C20, C21, C26, C27, C28, C29 and C30; see Appendix B). Bars report the foreign-owned share of the macro-sector's gross output by macro-region of the ultimate owner, and are therefore not comparable in level with the total-economy shares of Figure 1. Note the different scale of the vertical axis. Source: authors' calculations on OECD ICIO-AMNE data.

Figure 3. Foreign ownership in KIBS



Note: As in Figure 1, restricted to knowledge-intensive business services (J58T60, J61, J62T63, K64T66 and M69T75; see Appendix B). Bars report the foreign-owned share of the macro-sector's gross output by macro-region of the ultimate owner. Note the different scale of the vertical axis relative to Figure 2. Source: authors' calculations on OECD ICIO-AMNE data.

The evidence presented so far focuses on *gross output* produced within each country's border and allocates it based on ownership. This sheds light on economic dependence in the form of productive activity within a country that foreign multinational companies carry out. The on-going policy debate around economic dependence has, however, focused on value added contributions of foreign suppliers within a country's *GVC*. These have traditionally been understood only in terms of the geographic location of foreign suppliers rather than their ownership. The next section focuses on this distinction.

3.2 Regional and global sourcing: nearshoring under the two concepts

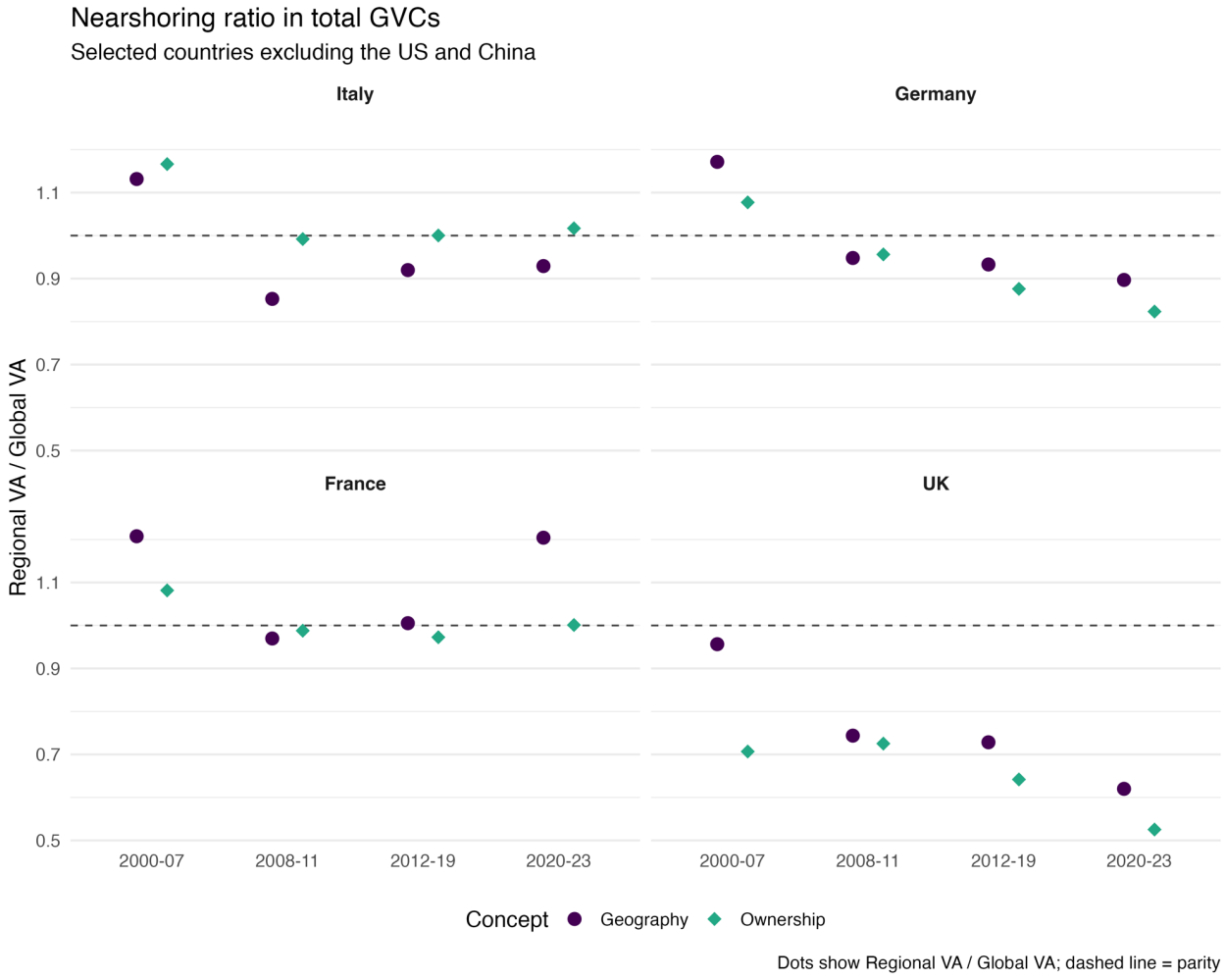
Going beyond gross output within a given country, it is important to take a vertically integrated approach to study how final demand in a given country triggers production across countries and industries, through GVCs. This gives a picture of a country's economic dependence in terms of the amount of value added that it must import from abroad in order to satisfy its final demand. The concept of nearshoring we discussed above, captures the extent to which production activated abroad by a country's final demand has relocated within the same region as the country of completion.

To further illustrate the difference in how the same value added flow is treated depending on whether we rely on a geography or ownership concept we can go back to the example of German cars. Let's consider specifically

the value added of a US subsidiary in Italy that flows into the production of a German car. From a geographic standpoint, this is a regional flow: production occurs in Italy and is activated by a German GVC. From an ownership point of view, in contrast, this is a global flow: the German car GVC activates production carried out by a US-owned company, i.e. with ownership from outside the EU.

This distinction is visible in the nearshoring ratios. For Italy's total economy, the geography-based ratio moves from 1.132 in 2000-2007 to 0.929 in 2020-2023, whereas the ownership-based ratio moved from 1.166 to 1.017. At the end of the sample, regional foreign value added was therefore slightly smaller than global foreign value added by production location but slightly larger by owner location.

Figure 4. Nearshoring ratio for the total economy



Note: Markers report the nearshoring ratio for the total economy, defined as regional over extra-regional foreign value added embodied in the final demand of each destination country; domestic value added is excluded from both numerator and denominator. The dashed line marks parity: values above one indicate that regional sourcing exceeds extra-regional sourcing. Circles attribute value added to the country of production (geography), diamonds to the country of the producer's ultimate owner (ownership). The European macro-region comprises the EU27 and the United Kingdom. Ratios are computed on value-added levels aggregated within each period. Source: authors' calculations on OECD ICIO-AMNE data.

Table 1 reports the 2020-2023 ratios used in the country and sector comparisons that follow.

Table 1. Nearshoring ratios by country, concept, and sector, 2020-2023

Country	Total: Geo	Total: Own	High-tech: Geo	High-tech: Own	KIBS: Geo	KIBS: Own
Italy	0.929	1.017	1.062	0.989	1.233	1.028
Germany	0.897	0.823	0.924	0.748	0.992	0.901
France	1.204	1.001	1.292	1.018	1.216	1.047
United Kingdom	0.620	0.525	0.717	0.701	0.734	0.465

Note: the nearshoring ratio is regional foreign value added over extra-regional foreign value added embodied in the final demand of each destination country. Domestic value added is excluded from both numerator and denominator, so that values above one indicate regional sourcing in excess of extra-regional sourcing. Geo. attributes value added to the country of production, Own. to the country of the producer's ultimate owner. The European macro-region comprises the EU27 and the United Kingdom, whereas the United Kingdom is reported separately from the EU27 in the supplier-share analysis of Section 3.3 (see Section 2.1); High-tech denotes high-tech manufacturing and KIBS knowledge-intensive business services, aggregated as in Appendix B. Ratios are computed on value-added levels for the 2020-23 period average. Source: authors' calculations on OECD ICIO-AMNE data.

Table 1 tabulates the 2020-23 markers of Figures 4-6. The central result is that the relationship between ownership and regional integration varies systematically across countries and sectors. Ownership makes a value chain appear more regional when firms headquartered in the region control production abroad, and less regional when extra-regional firms control production located inside the region. The adjustment is not a constant proportional correction: it raises the measured regional share in some countries and sectors and lowers it in others, so that the ownership-based ratio cannot be obtained by rescaling the geography-based one.

Italy illustrates both possibilities. At the total-economy level, its ownership-based nearshoring ratio exceeds the geography-based ratio in every reported period. In 2020-2023 the gap was 0.088 ratio points (1.017 versus 0.929). The result indicates that Italian-controlled and other European-controlled firms account for more foreign value added than production-location measures alone imply. It does not mean that Italian supply chains became more regional over the full period: both ratios were lower in 2020-2023 than in 2000-2007.

France shows the opposite ordering at the end of the sample. Its 2020-2023 ratio was 1.204 by geography but 1.001 by ownership. Germany's ratios were 0.897 and 0.823, respectively, while the United Kingdom's were 0.620 and 0.525. For these three economies, some production located within the European macro-region is controlled by owners outside that region, lowering regional integration when ownership is considered.

High-tech manufacturing

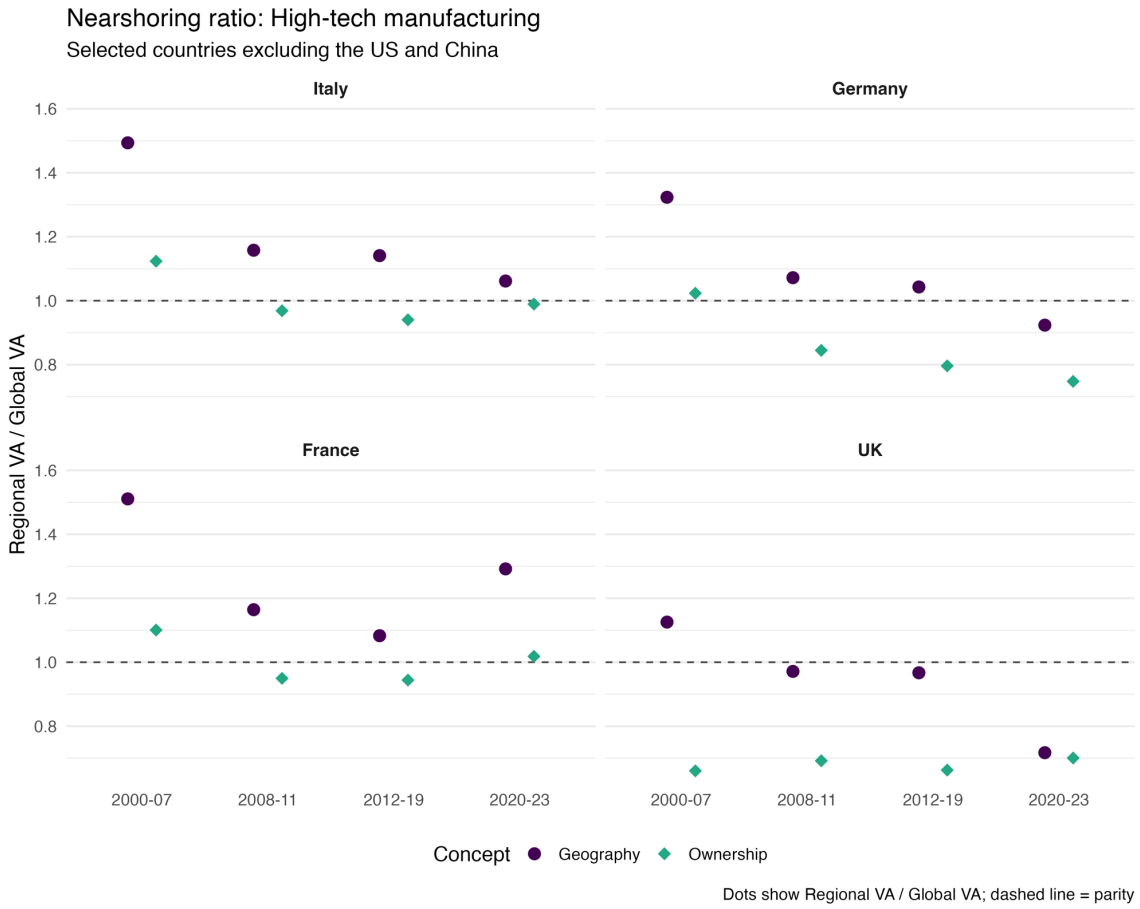
High-tech manufacturing displays the clearest geography-ownership divergence. We find, across the board, that the geography concept yields higher levels of regionalisation of GVCs compared to the ownership concept.

This means that in high-tech manufacturing sectors a significant share of value added supplied within Europe is produced by non-EU owned firms.

Italy's nearshoring ratio fell from 1.494 to 1.062 by geography between the first and last periods, and from 1.124 to 0.989 by ownership. Thus, production-location data still place Italy marginally above the regional/global threshold in 2020-2023, while ownership attribution places it approximately at parity. The difference is consistent with a growing presence of non-European owners among firms producing high-tech goods inside Europe.

The same ordering appears in Germany and France. Germany's 2020-2023 high-tech ratio was 0.924 by geography and 0.748 by ownership. France recorded 1.292 and 1.018. The United Kingdom was below one under both concepts, at 0.717 and 0.701. Across the continental economies, ownership adjustment weakens the apparent regionality of high-tech sourcing. This is particularly relevant for policy because local production capacity and regional corporate control are distinct dimensions of technological sovereignty.

Figure 5. Nearshoring ratio in high-tech manufacturing



Note: As in Figure 4, for high-tech manufacturing. The vertical distance between the two markers of a given country and period measures the extent to which corporate control departs from productive location: a diamond below the corresponding circle indicates that part of the regionally located foreign value added is controlled from outside the macro-region. Source: authors' calculations on OECD ICIO-AMNE data.

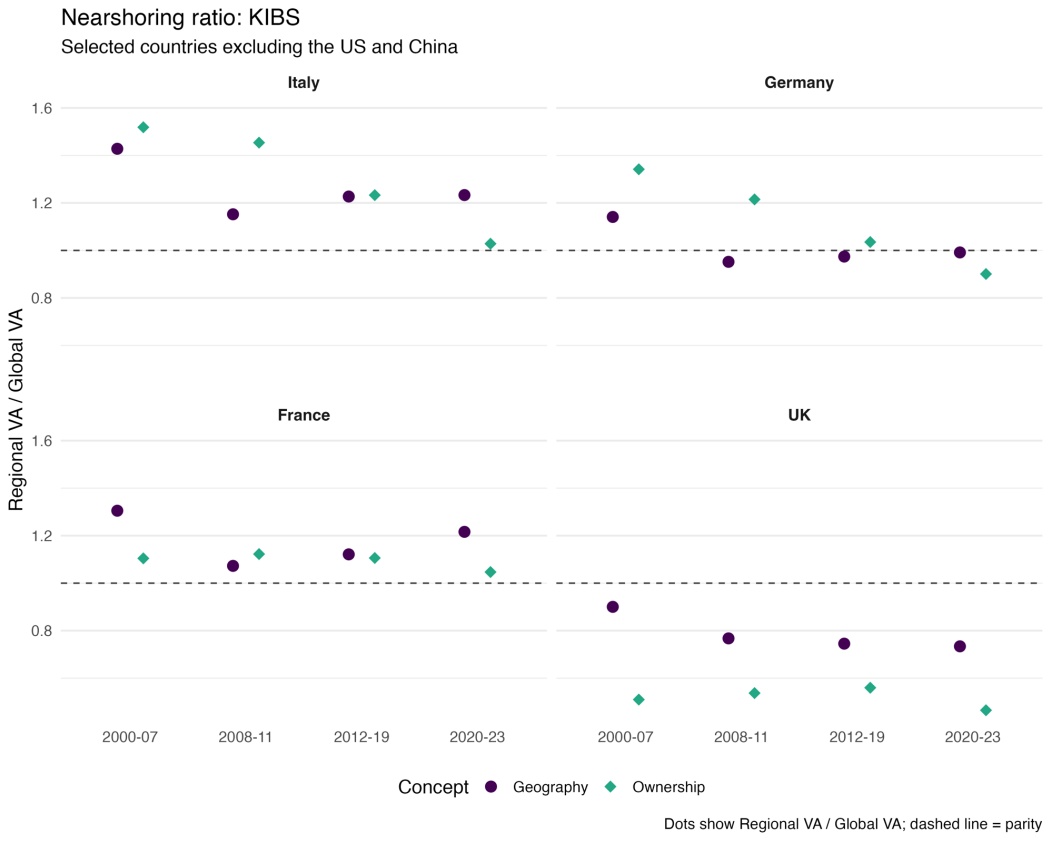
Knowledge-intensive business services

KIBS begin the sample with strong regional integration in continental Europe. Italy's ratios in 2000-2007 were 1.428 by geography and 1.519 by ownership. By 2020-2023 they had declined to 1.233 and 1.028. The ownership advantage therefore almost disappeared even though the geography-based ratio remained comfortably above one. Germany moved from 1.141 and 1.342 to 0.992 and 0.901. France remained above one under both concepts in 2020-2023, while the United Kingdom remained markedly global.

Taken together, these figures tell that for continental Europe a rather different pattern emerges, compared to high-tech manufacturing sectors. Nearshoring in ownership terms is lower than in geographic terms, hinting to the important role of EU multinationals operating outside of the EU for KIBS GVCs; however the wedge between ownership and geography nearshoring decreases significantly, reflecting the growing presence of extra-EU firms operating in KIBS GVCs in Europe.

The decline in the ownership-based ratio suggests that extra-European ownership has become more important within European service production. This evidence is consistent with a control-based channel of dependence, but it is not a direct test of the mechanism. The analysis does not allow us to go deeper into qualifying this ownership structure in terms of particular acquisitions, presence of large digital platforms, or intellectual-property arrangements behind the aggregate pattern.

Figure 6. Nearshoring ratio in knowledge-intensive business services



Note: As in Figure 4, for knowledge-intensive business services. Source: authors' calculations on OECD ICIO-AMNE data.

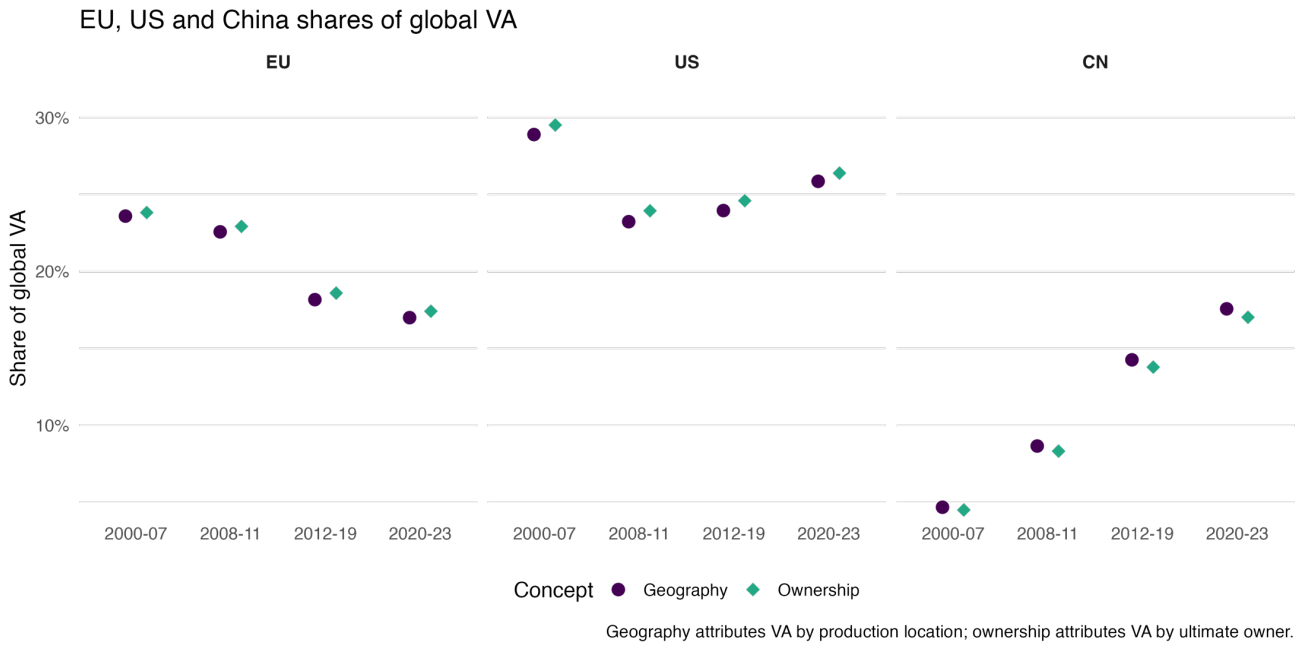
3.3 Macro-regions as suppliers of global value added

Finally, the analysis turns to the extent to which countries are suppliers, rather than buyers, of value added to the global economy. We therefore look at the share of global value added that the US, China and the EU account for; this measure of course related to the size of the supplier and we therefore group EU countries together in order to make the comparison with the other two largest economies more intuitive.

The supplier-side results reveal a broad reallocation of global value-added shares. At the total-economy level, the EU's geography-based share fell from 23.6% in 2000-2007 to 17.0% in 2020-2023. Its ownership-based share fell from 23.8 to 17.4 per cent. China's geography-based share rose from 4.7 to 17.6 per cent, while its ownership-based share rose from 4.5 to 17.0 per cent. The US geography-based share declined from 28.9 to 25.9% but recovered from its 2008-2011 level; its ownership-based share was 26.4% in 2020-2023.

The close EU geography and ownership shares imply that reallocation by owner does not reverse the region's declining global position. Ownership slightly raises the EU share, but only by 0.4 percentage points in 2020-2023. China's ownership share is 0.6 points below its geography share, indicating that some value added produced in China is controlled by non-Chinese firms. The US ownership share exceeds its geography share by 0.5 points, consistent with US multinationals controlling production outside the United States.

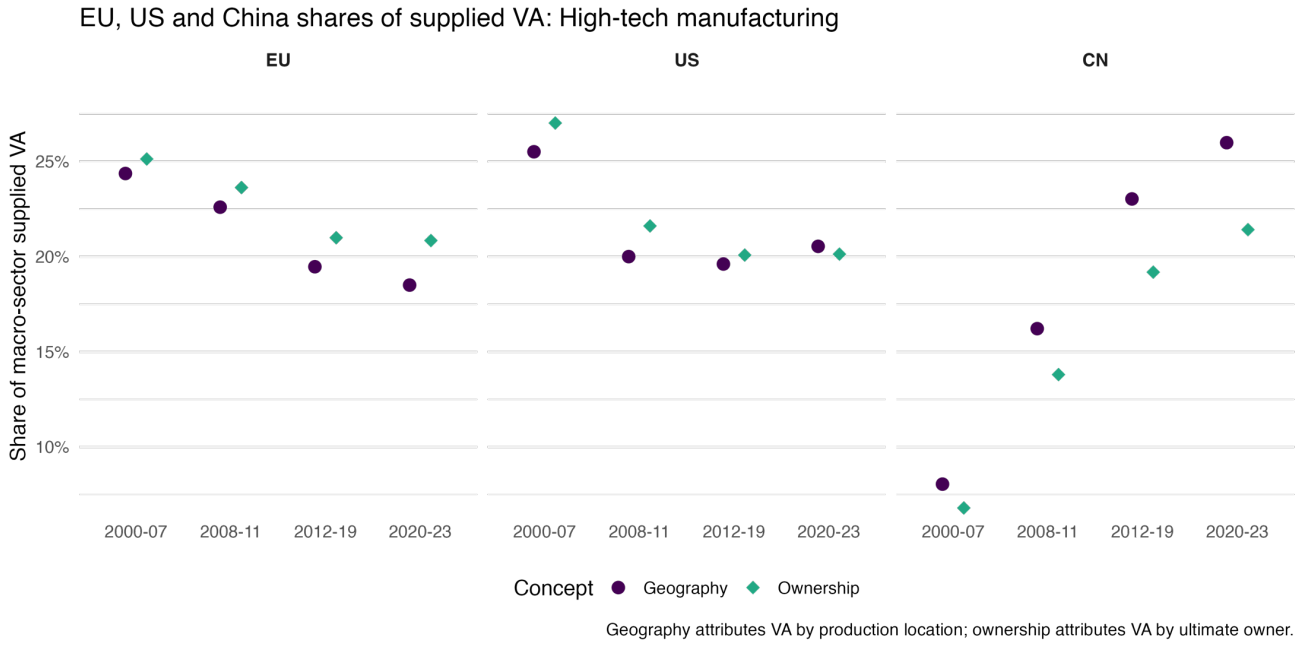
Figure 7. EU, US and China shares of global supplied value added



Note: Markers report the share of globally supplied value added attributed to the EU27, the United States and China at the total-economy level. Circles attribute value added to the country in which production takes place (geography), diamonds to the country of the producer's ultimate owner (ownership). Since the two concepts partition the same value-added total, the gap between the markers measures reallocation across attribution criteria rather than a change in the aggregate. Shares are computed on the value added activated by world final demand and averaged within each period. Source: authors' calculations on OECD ICIO-AMNE data.

Sectoral results sharpen this picture. In high-tech manufacturing, China's geography-based supplier share rose from 8.0 to 26.0 per cent, becoming the largest of the three macro-regions in 2020-2023. Its ownership-based share rose from 6.8 to 21.4 per cent. The 4.6-point gap between the two concepts is much larger than in the total economy and indicates substantial foreign control of high-tech production located in China. The EU's 2020-2023 high-tech share was 18.5% by geography and 20.8% by ownership; the US shares were 20.5 and 20.1 per cent. Ownership attribution therefore narrows China's apparent lead.

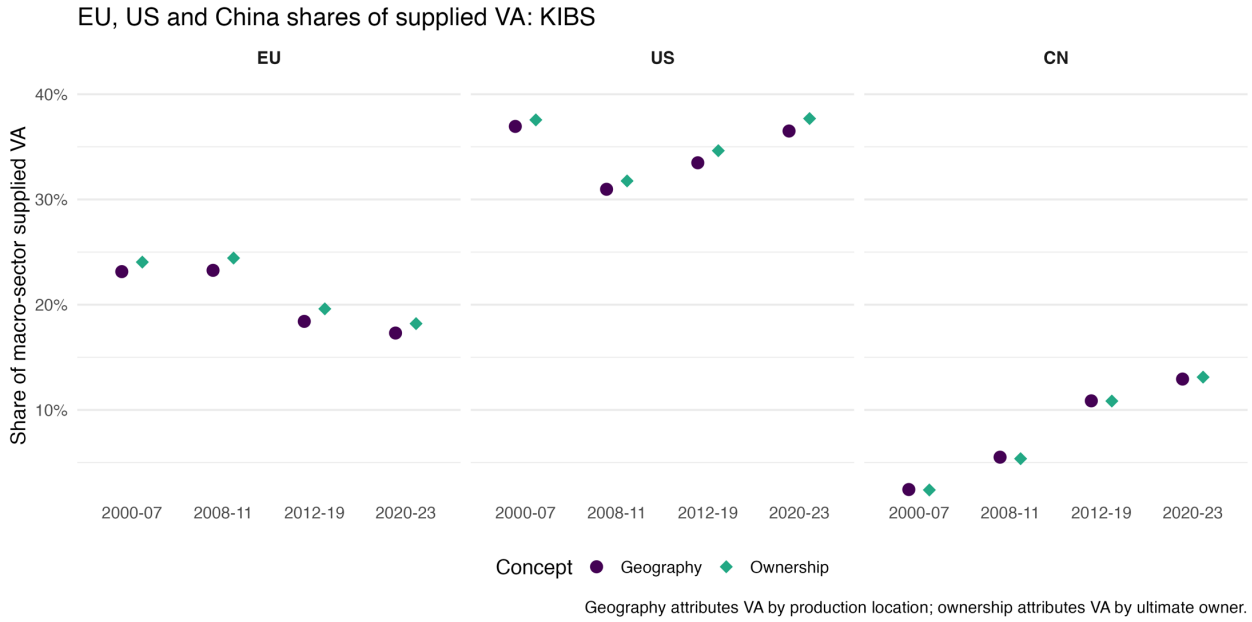
Figure 8. Supplier shares in high-tech manufacturing



Note: As in Figure 7, for high-tech manufacturing; shares are expressed relative to the value added supplied by the macro-sector worldwide and are therefore not comparable in level with Figure 7. A diamond below the corresponding circle indicates that part of the value added produced in the region is controlled by firms owned elsewhere. Source: authors' calculations on OECD ICIO-AMNE data.

In KIBS, the United States remains the leading supplier. Its share in 2020-2023 was 36.5% by geography and 37.7% by ownership. The EU shares were 17.3 and 18.2 per cent, down from 23.1 and 24.1% in 2000-2007. China's KIBS share rose to approximately 13% under both concepts. These results distinguish two forms of structural change: China leads the shift in the geography of high-tech manufacturing, while the United States retains a markedly stronger position in knowledge-intensive services and gains further weight when foreign affiliates are assigned to their ultimate owners.

Figure 9. Supplier shares in KIBS



Note: As in Figure 7, for knowledge-intensive business services; shares are expressed relative to the value added supplied by the macro-sector worldwide. Source: authors' calculations on OECD ICIO-AMNE data.

3.4 Discussion: heterogeneity, mechanisms and robustness

The comparison across total activity, high-tech manufacturing, and KIBS shows meaningful evidence. The geography-ownership gap is largest where multinational firms, tradability of output and intangible assets are central to production. In high-tech manufacturing, foreign-owned affiliates can locate plants inside a region while strategic functions remain controlled in the headquarters countries (Baldwin and Lopez Gonzalez, 2015). Notably, and perhaps more interestingly, when looking at KIBS, cross-border ownership may organize the delivery of digital, financial, and professional services even when production is recorded locally.

Three mechanisms are consistent with the observed patterns. First, multinational production networks separate the location of affiliates from the location of ultimate control. Second, intangible assets and intra-group coordination may give headquarters a disproportionate role in technology- and knowledge-intensive sectors. Third, mergers, acquisitions, and greenfield investment can alter ownership exposure without relocating existing production. The present analysis cannot discriminate among these channels because it observes country-industry-period ownership shares rather than firm-level transactions or governance decisions.

Country heterogeneity also reflects institutional and economic structure. The United Kingdom combines high foreign ownership of gross output with globally, extra-EU, oriented sourcing. Interestingly, this pattern was present well before the Brexit vote in 2016. Continental European economies are more regionally integrated, but the strength and direction of the ownership adjustment differ. Italy's total economy appears more regional under ownership, whereas its high-tech manufacturing is less regional. Germany has ratios below one at the end of

the sample under both concepts, and France preserves a geography-based regional advantage that is substantially attenuated by ownership.

The global supplier analysis provides complementary evidence. China's high-tech rise is smaller under ownership than geography, while the EU's share is larger under ownership than geography. This is exactly the pattern expected when foreign multinationals operate production capacity in China and European multinationals operate affiliates abroad.

The nearshoring analysis is replicated on an extended sample that adds the United States and China to the four European focus economies. The extended comparison confirms that continental Europe is far more regionally integrated than the United States and, in most periods, than China.

Furthermore, results are calculated for four macro-sectors rather than only the total economy. The high-tech and KIBS findings are not simple reflections of aggregate country size; they display distinct geography-ownership gaps and trends.

Italy's results illustrate the analytical value of the distinction. Aggregate value-added sourcing is slightly more regional under ownership than geography in the latest period, which suggests that Italian and other European multinationals extend regional control beyond the location of production alone. Yet high-tech manufacturing exhibits the opposite pattern. A geography-only indicator would classify Italy as marginally regionally oriented, while ownership places regional and global sourcing at parity. Policy conclusions drawn from the total economy therefore do not automatically apply to strategic industries.

The supplier-side results also reveal a tension between regional sourcing and global competitive position. European value chains can become more regionally organized even as the EU's share of global supplied value-added declines. Nearshoring is a property of where a destination system sources relative to its region; supplier share is a property of how much value added a region supplies to the world. Improving one does not guarantee improvement in the other. Policies focused exclusively on shortening supply chains may therefore overlook the need to maintain capabilities that allow European firms to supply value added globally.

The rise of China in high-tech manufacturing is substantial under both concepts, but ownership moderates its scale. This distinction should prevent two opposite errors. Attributing all production located in China to Chinese corporate control overstates the ownership position of Chinese firms. Ignoring the scale of Chinese production because part is foreign owned understates location-based exposure. The United States presents the mirror image in KIBS: its ownership-based position is stronger than its production-location share, consistent with multinational control of service activity outside US territory.

4. Conclusions and policy implications

The paper has contributed to the evidence and debate on strategic dependency by distinguishing production location from ultimate production ownership and control. It has done so by looking at whether dependency changes when global value-added flows are attributed to ultimate ownership rather than to production geography.

Using the OECD ICIO-AMNE tables for 2000-2023, it has compared the ownership composition of gross output, the balance between regional and extra-regional foreign value added, and the global supplier shares of the main macro-regions under the two concepts.

Three findings stand out. First, foreign ownership is substantially more important in European gross output than in the United States or China, although for EU countries this reflects a high-degree of intra-EU integration. Foreign ownership shares of gross output are highest in high-tech manufacturing, where the UK and the US stand out as the two countries with higher foreign ownership penetration. KIBS show more nuanced patterns, with the EU and especially the UK exhibiting once again the highest level of foreign ownership penetration. Second, geography and ownership can lead to different assessments of nearshoring, and in either direction. Italy is marginally more regional by ownership than by geography at the total-economy level in 2020-23, whereas its high-tech manufacturing is less regional once ultimate ownership is taken into account; Germany, France and the United Kingdom display the second pattern more clearly. Third, the EU's share of globally supplied value added declines under both concepts, China's ascent in high-tech manufacturing is more pronounced by geography than by ownership, and the United States retains a dominant position in KIBS that ownership attribution reinforces.

The evidence presented here changes how strategic dependence should be looked at and addressed from a policy perspective. A regional production footprint is not equivalent to regional control, and foreign ownership is not equivalent to foreign production. For physical resilience, the location of plants, workers, infrastructure, and suppliers may be decisive. For more strategic functions, such as technological direction, intellectual property, investment decisions, ultimate ownership may be more informative. A credible monitoring framework must retain both dimensions, as these might inform how strategies of nearshoring or friendshoring are devised in different countries.

More specifically, five implications follow for the design of European and Italian policy.

First, European and Italian dashboards of strategic dependence should report two parallel accounts: production geography and ultimate ownership, distinguishing domestic, intra-European, and extra-European exposure. Collapsing them into a single indicator would conceal the sector-specific patterns documented here. More broadly, nearshoring policies should not rely solely on the location of first-tier foreign suppliers. A production shift into Europe may leave ultimate ownership unchanged, while an outward investment by a European firm may strengthen European control over extra-regional capacity. Procurement, industrial-policy, and resilience assessments should therefore map owner-country information alongside supplier-country information.

The second implication concerns sector targeting. High-tech manufacturing and KIBS display larger ownership-geography divergences than the total economy. Screening and monitoring resources should therefore prioritise sectors in which corporate control can affect technology, data, intellectual property, or the allocation of strategic capacity. This does not imply that foreign ownership is inherently harmful. Foreign affiliates are often more productive than their domestic counterparts and contribute output, employment, knowledge, and integration. The key policy question is whether concentration of control creates vulnerabilities that cannot be mitigated by diversification, governance safeguards, or European capability building.

Third, investment screening and investment attraction should be treated as complementary rather than substituting and can be used jointly to strategically select FDI inflows. Screening can identify transactions that create unacceptable concentration or loss of control, while attraction policies can bring capital and technology into Europe. Ownership-adjusted indicators help distinguish cases where local capacity is expanding under non-European control from cases where European firms are expanding their control abroad. The evidence does not support a blanket restriction on foreign investment. In line with recent literature (Crescenzi and Harman, 2023), regional EU upgrading should carefully mix FDI attraction depending on the specific sector.

Fourth, the decline in the EU's global supplier share calls for attention to capability formation, not only risk reduction. Policies that diversify sourcing without strengthening research, scale-up finance, skills, and productive capacity may improve resilience while leaving Europe's global supplier position weaker. In high-tech manufacturing, the EU's ownership share exceeds its geography share, indicating that European firms retain productive control abroad, but the declining trend remains unchanged. Policy should consider how those multinational networks can support, rather than substitute for, capabilities inside Europe.

These implications extend beyond what the data directly establish. The paper documents measurement differences and structural trends; it does not evaluate particular screening regimes, subsidies, procurement rules, or reshoring programmes. In addition, a few Several limitations bound generalization. The analysis uses country-industry averages and cannot identify critical products, bottleneck firms, or single-source dependencies. The four periods smooth volatility and cannot date structural breaks. The regional definitions do not encode political alignment and therefore do not measure friendshoring. Ultimate ownership is inferred from analytical AMNE output shares and may not perfectly trace the ownership of every value-added flow. Finally, descriptive change between periods cannot be attributed to recent policy initiatives or geopolitical events. Policy design requires additional evidence on firm conduct, product criticality, substitution possibilities, and the welfare costs of intervention.

This work opens a novel research avenue around economic security and the international fragmentation of production. Future work should look at finer product and firm-level data and the explicit treatment of critical inputs and substitution possibilities, as well as event-based analysis of how ownership and geography affect adjustment during disruptions.

References

Antràs, P. (2020). De-globalisation? Global value chains in the post-COVID-19 age. *NBER Working Paper*, No. 28115. National Bureau of Economic Research, Cambridge, MA.

Baldwin, R., and Freeman, R. (2022). Risks and global supply chains: What we know and what we need to know. *Annual Review of Economics*, 14, 153-180.

Baldwin, R., and Lopez-Gonzalez, J. (2015). Supply-chain trade: A portrait of global patterns and several testable hypotheses. *The World Economy*, 38(11), 1682-1721.

Bontadini, F., Meliciani, V., Savona, M., and Wirkierman, A. (2022). Nearshoring and farsharing in Europe within the global economy. *EconPol Forum*, 23(5), 37-42.

Bontadini, F., Meliciani, V., Savona, M., and Wirkierman, A. L. (2025). Nearshoring and farsharing in Europe within the global economy: Regional trends, structural components and sectoral patterns. *Journal of Industrial and Business Economics*, 52, 1067-1105.

Borin, A., and Mancini, M. (2019). Measuring what matters in global value chains and value-added trade. *World Bank Policy Research Working Paper*, No. 8804. World Bank, Washington, DC.

Bria, F., Timmers, P., and Gernone, F. (2025). *EuroStack – A European Alternative for Digital Sovereignty*. Bertelsmann Stiftung, Gütersloh.

Cadestin, C., De Backer, K., Desnoyers-James, I., Miroudot, S., Rigo, D., and Ye, M. (2018). Multinational enterprises and global value chains: The OECD analytical AMNE database. *OECD Trade Policy Papers*, No. 211. OECD Publishing, Paris.

Cadestin, C., De Backer, K., Miroudot, S., Rigo, D., Ye, M., and Zhu, D. (2019). Multinational enterprises in domestic value chains. *OECD Science, Technology and Industry Policy Papers*, No. 63. OECD Publishing, Paris.

Crescenzi, R., and Harman, O. (2023). *Harnessing Global Value Chains for Regional Development: How to Upgrade through Regional Policy, FDI and Trade*. Routledge, London.

Damgaard, J., Elkjaer, T., and Johannesen, N. (2019). What is real and what is not in the global FDI network? *IMF Working Paper*, No. 19/274. International Monetary Fund, Washington, DC.

Draghi, M. (2024). *The Future of European Competitiveness*. Report to the European Commission, Brussels.

European Commission (2021). Strategic dependencies and capacities. Commission Staff Working Document SWD(2021) 352 final, Brussels.

Eurostat (n.d.). High-tech industry and knowledge-intensive services: Annex 3 - High-tech aggregation by NACE Rev. 2. European Commission.

Javorcik, B. (2020). Global supply chains will not be the same in the post-COVID-19 world. In R. E. Baldwin and S. J. Evenett (eds.), *COVID-19 and Trade Policy: Why Turning Inward Won't Work*. CEPR Press, London.

Leontief, W. (1936). Quantitative input and output relations in the economic systems of the United States. *Review of Economics and Statistics*, 18(3), 105-125.

Lipsey, R. E. (2010). Measuring the location of production in a world of intangible productive assets, FDI, and intrafirm trade. *Review of Income and Wealth*, 56(s1), S99-S110.

Los, B., Timmer, M. P., and de Vries, G. J. (2015). How global are global value chains? A new approach to measure international fragmentation. *Journal of Regional Science*, 55(1), 66-92.

Miller, R. E., and Blair, P. D. (2009). *Input-Output Analysis: Foundations and Extensions*. Cambridge University Press.

Miroudot, S. (2020). Resilience versus robustness in global value chains: Some policy implications. In R. E. Baldwin and S. J. Evenett (eds.), *COVID-19 and Trade Policy: Why Turning Inward Won't Work*. CEPR Press, London.

OECD (2026). Analytical AMNE inter-country input-output tables and bilateral output by country of ownership, 2000-2023. Dataset and accompanying country-industry reference workbook used in the MAECI project.

Timmer, M. P., Erumban, A. A., Los, B., Stehrer, R., and de Vries, G. J. (2014). Slicing up global value chains. *Journal of Economic Perspectives*, 28(2), 99-118.

Wirkierman, A. L., Ciarli, T., and Savona, M. (2025). Employment imbalances in EU regions: Technological dependence or high-tech trade centrality? *Regional Studies*, 59(1), 2392794.

Appendix A. Variable Definitions

Variable	Definition	Role
gross_output_owner	Host-country-industry gross output allocated to an ultimate-owner group	Outcome for RQ1
owner_share	gross_output_owner divided by total host gross output	Outcome for RQ1
VBF	Value added activated by final demand, diag(v) B diag(f)	Core analytical matrix
va_Regional	Foreign VA produced/owned in another country of the host macro-region	Nearshoring numerator
va_Global	Foreign VA produced/owned outside the host macro-region	Nearshoring denominator
nearshoring_ratio	va_Regional divided by va_Global	Outcome for RQ2
share_global_va	Supplier-attributed VA divided by total VBF value added	Outcome for RQ3
concept	Geography or Ownership	Grouping variable
period	Four averages covering 2000-2023	Time grouping
macro_sector	Approximate ICIO-to-technology/service aggregation	Heterogeneity group

Note: the table defines the variables constructed in the analysis and the role each plays in the empirical design. VBF is the matrix of value added activated by final demand, diag(v) B diag(f), where B is the Leontief inverse and f excludes changes in inventories. Owner groups (domestic, EU, United States, China, Japan and rest of the world) are mutually exclusive and exhaustive, so that owner shares sum to one within each host country-industry and period. Where no usable bilateral ownership split is available for a source country-industry, value added is assigned to domestic ownership; this preserves the total but may understate foreign ownership. Source: authors' elaboration.

Appendix B. Macro-sector Classification

Macro-sector	ICIO industries
Low-tech manufacturing	C10T12, C13T15, C16, C17T18, C31T33
High-tech manufacturing	C20, C21, C26, C27, C28, C29, C30
KIBS	J58T60, J61, J62T63, K64T66, M69T75
Low knowledge-intensive services	G45T47, H49, H52, H53, I55T56, L68, N77T82, S94T96

Note: macro-sectors aggregate ICIO industries following the Eurostat classification of high-tech industries and knowledge-intensive services (Eurostat, n.d.). ICIO industries are more aggregated than NACE Rev. 2 two-digit sectors: the high-tech group therefore combines high- and medium-high-tech manufacturing, and the mapping should be read as approximate. Industries not listed (agriculture, mining and quarrying, energy and water, construction, and non-market services) enter total-economy results only. Source: authors' elaboration on Eurostat (n.d.) and the OECD ICIO industry classification.