Does foreign investment hurt job creation at home? The geography of outward FDI and employment in the USA

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Abstract

Rising political skepticism on the benefits of global economic integration has increased public scrutiny of the foreign activities of domestic firms in virtually all advanced economies. Decisions to invest in new activities abroad are seen by some commentators as potentially detrimental to domestic employment. We contribute to this debate by scrutinizing the relationship between outward 'greenfield' Foreign Direct Investments (FDI) and local employment levels. The analysis, at the scale of USA Economic Areas, finds a generally positive link between outward investment and local employment, but with an important range of differences across regions and sectors. Less developed regions benefit the most from the positive returns of outward FDI, and, particularly, from outward FDI if it is undertaken by firms in high-tech manufacturing and services industries. But there is a downside, in the form of increasing intra-regional inequalities between high-skilled and low-skilled workers in these areas.

1. Introduction

It has become increasingly commonplace to hear claims that offshoring or outward Foreign Direct Investment (FDI) is bad for the home economy. This concern is not new, of course. Early contributions, such as Frobel et al. (1980) and Martin and Rowthorn (1986), were concerned with a variety of possible trade-offs between the emerging new international division of labor and domestic employment, notably in the context of a vibrant debate about 'deindustrialization' in the 1980s (Harrison and Bluestone, 1982; Cohen and Zysman, 1987). In many western countries, some elected office holders, journalistic commentators and think-tanks support the notion of a zero-sum game between international expansion of a country's firms and maintaining domestic employment levels, declaring themselves in favor of 'bringing jobs back home' or reducing the foreign

activities of their domestic companies. The economic crisis induced by the Covid-19 pandemic has offered further momentum to these arguments. Revived industrial and economic recovery policies in several advanced economies make explicit reference—and, in some cases, offer financial incentives—to the 're-shoring' of foreign activities by domestic multinationals. These measures are premised on both a push for a reduction in supply chain risk and on the generation of employment and wage benefits at home. Some of this certainly pre-dates the Pandemic, and has to do with a major 'China shock' to manufacturing employment in the 2010s (Autor et al., 2016).

This rise in recent skepticism, however, comes against the background of a large body of academic research over several decades, that has documented complex mixes of negative and positive relationships between trade and international investment and domestic employment and wages, reflecting the interplay of industry, region, timing and a host of other specific channels (Autor, 2018). It has been a long and extensive pathway for economists, geographers and others to understand these complex and sometimes counter-intuitive relationships.

In this paper, we report on the effects of a specific type of internationalization, that of outward FDI, on the source country's firms and employment at the regional scale. Concern with the geographical or spatial effects of FDI on the source country did receive some early attention in the literature, with a descriptive contribution from Owens (1980). Following that, the 'global value chain' paradigm, dating mostly from the 1990s, focused on understanding geographical divisions of labor in different industries; most of its empirical output on effects is about developing countries, though it has occasionally researched how global value chains affect employment and activity in the developed world (Gereffi and Korzeniewicz, 1994; Contractor et al., 2010). It employs a sectoral and descriptive approach to global value chains, in terms of allocation of functions and power relations between different actors in the chain, with many descriptive cases on home country effects.[1]

In economics, some research focuses on theoretical explorations of optimal global sourcing equilibria, that is, optimal global commodity chains (Antras and Helpman, 2004). Empirical research in economics emphasizes firm strategy and performance in generating those chains (e.g., Melitz, 2003; Helpman et al., 2004). It also models potential substitution effects between domestic and foreign labor and when it does so, it is usually at the national scale. These investigations reach opposing conclusions about the employment effects of outward FDI. Some studies support the idea of substitution between foreign affiliates' employment and home country employment (e.g., Braconier and Ekholm, 2000; Brainard and Riker, 2001; Becker et al., 2005; Cuyvers et al., 2005; Konings and Murphy, 2006). Other contributions find no evidence of such a substitution effect, or even an increase in firm-level employment in the home country following the foreign expansion of the parent company through FDI (e.g., Lipsey et al., 2000; Castellani et al., 2008; Masso et al., 2008; Barba Navaretti et al., 2010; Yamashita and Fukao, 2010; Hijzen et al., 2011).

Getting an accurate picture of economy-wide impacts in the source country is difficult because the net effect of productivity gains and labor input substitution varies across types

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1 From a geographical standpoint, more attention has been given to how specific economies are affected by inward FDI, and the majority of cases considered are in the developing economies—for a review, see Bermejo Carbonell and Werner (2018). There are relatively few geographers' studies of the effects of inward FDI on regions, and even fewer on regions in developed countries—with the early exception of Leichenko and Erickson (1997).

of firms and types of strategies. In order to estimate net aggregate impacts of FDI, firm- or sector-level insights have been aggregated up, by conceptualizing the channels through which they generate economy-wide effects (e.g., Brainard and Riker, 2001). Such studies suggest an aggregate positive effect of outward FDI on employment in the home country (e.g., Federico and Minerva, 2008; Waldkirch et al., 2009; Bajo-Rubio and Díaz-Mora, 2015).

The trade literature—which, effectively, could include the effects of outward FDI as well as substitution of foreign outputs for domestically produced ones, or a combination of both—does find that under certain circumstances there can be negative effects on employment and wages (Harrison et al., 2010). The link to geography is that such recent effects are highly geographically variable, and when they are strong, they tend to be regionally concentrated, as in the 'China shock' to the US Midwest (Autor et al., 2016; Autor, 2018). But these regional results are relatively scarce in the literature.

Moreover, there has been relatively little attention to the specific geographies of how outward FDI might affect employment and wages at home. If outward FDI offshores existing employment, then research on it would pick up on a subset of the effects examined in the trade literature; but if outward FDI makes home economy firms more competitive, or allows them to grow, then research on it would pick up on the firm- and possibly economy-wide effects in the firm-based literature. A fine geographical breakdown of both these effects would allow us to see the interplay of potential losses of employment through offshoring due to outward FDI, and potential gains due to improving firm performance and size at home. To our knowledge, this has not been done in the geography or economics literatures, and in this paper we aim to fill in this gap.

To do this, we analyze the domestic employment impacts of outward FDI undertaken by US multinational companies at the economic area (EA) scale. We focus specifically on the 'greenfield' dimension of FDI, meaning brand new overseas investment projects (Ashraf et al., 2016). These are precisely the investments increasingly denounced in the political arena. Our results, based on a three-way fixed effects (FEs) estimation approach, suggest an overall positive link between outward 'greenfield' FDI and employment levels in the USA, consistent with the existing literature on economy-wide effects. However, more disaggregated analysis reveals effects that vary considerably across both industries and regions, between and within industries, and between 'lagging' versus 'leading' regions, thus intersecting with some of the results in the 'trade shock' literature.

There are four specific findings of the research reported in this paper. First, we find that the link between outward FDI and domestic employment in the EA that sources the investment is generally positive. Second, positive domestic employment effects of outward FDI are highest in high-tech manufacturing and services industries. Third, less developed regions benefit the most from the positive returns of outward FDI, especially when the FDI is sourced by their high-tech manufacturing and services firms. However, and this is our fourth original finding, such aggregate regional effects might also increase intra-regional inequalities, in the form of increased gaps between high-skilled and low-skilled workers, as well as between workers in the most successful firms and other firms.

The rest of the paper is organized as follows. Section 2 develops the conceptual design that drives the empirical analysis. Section 3 describes the dataset and presents the empirical modeling. Section 4 presents broad facts of recent dynamics of outward FDI and employment in the USA. Section 5 presents and discusses the results of our analysis. The concluding section draws out some potential implications for policy and economic development strategy.

2. Conceptual framework

There are high sunk costs for a firm that comes with internationalization (e.g., acquisition of information about foreign markets for exporting or establishment of distribution channels and physical facilities for FDI). Exporting firms tend to show ex ante higher productivity levels than non-exporting firms (Bernard and Jensen, 1995, 1999; Melitz, 2003). But a firm can opt to serve foreign markets either through exporting or horizontal FDI, with such investments replicating abroad same activities and functions pursued domestically. Data on US exports and affiliate sales show that only the most productive firms can engage in horizontal FDI, firms with intermediate levels of productivity export, while firms with lower productivity levels restrict themselves to serving the domestic market (Helpman et al., 2004). Thus, there is an intra-industry selection mechanism related to both forms of internationalization.

The picture becomes more complex when attempting to identify the economy-wide effects of these firm-level processes. The existing literature does not generate clear predictions on the impacts of outward FDI on the home country in terms of output (e.g., Blonigen, 2001; Head and Ries, 2001; Desai et al., 2005), productivity (e.g., Braconier et al., 2001; van Pottelsberghe de la Potterie and Lichtenberg, 2001), and employment (e.g., Brainard and Riker, 2001; Konings and Murphy, 2006; Castellani et al., 2008). Depending on the nature of the investment and its motive, there can be some combination of labor substitution and complementarity in shaping home-economy employment impacts. Outward vertical FDI—that is, investments involving the relocation abroad of parts of the value chain—can be expected to induce a short-run substitution effect of employment between the home country and the foreign location(s). However, in the long run, cost-saving outward FDI can increase the productivity and competitiveness of the parent company, and this can translate not only into a higher output or market share for an individual firm, but also into a potentially increased demand for labor at home through scale effects for the industry as a whole through consumer surplus (Castellani et al., 2008). This is likely to be particularly true when foreign affiliates produce only certain components of the final product sold by the multinational firm, such that there is increased scale for the components that continue to be produced in the home country, as reflected in increased intra-firm trade (Barba Navaretti and Venables, 2004). Conversely, when looking at outward horizontal FDI, one would expect a negative home country employment effect when FDI is used to offshore activities formerly located at home. But if such offshoring of final outputs is sourced in a major way by inputs, intermediate components, or parts from the domestic facilities of the parent company, then increased sales in the foreign market will have a positive multiplier effect in the home country (Castellani et al., 2008; Barba Navaretti et al., 2010).

A second home labor market effect is generated by acquisition of technology or knowledge abroad through FDI (Barba Navaretti et al., 2010). When outward FDI occurs in technologically advanced countries and/or knowledge-intensive clusters, it can facilitate technology transfer from the host location to the firm's home country or region (Cantwell, 1995; Castellani and Pieri, 2013; D'Agostino et al., 2013). This can increase the productivity and product quality of the parent company, increasing market share, and hence leading to an increased demand for labor in the home market. In addition, multinational firms engaging in outward (vertical and horizontal) FDI may create a feedback effect on employment through expanded headquarter activities (e.g., legal, logistical, administrative, managerial and R&D services), all of which should grow with a globalizing firm and tend

to be concentrated in the home country (Helpman and Krugman 1985; Agarwal 1997; Castellani et al. 2008).

This perspective leads to the formulation of our conceptual framework, consisting of three main hypotheses. The first one is as follows:

Hypothesis 1—Outward FDI increases domestic employment in the domestic local labor market

Such effects, however, can vary significantly within and between local labor markets, due to different levels of skill-complementarity or substitution with respect to the FDI. On the one hand, both vertical and horizontal FDI are likely to induce an increase in demand for skilled workers as long as control and strategic functions and high-value added activities are intensified in the parent company. In this case, the domestic employment of the investing firm will shift toward high-skilled workers in response to outward internationalization. In another case, if internationalization enhances the efficiency and competitiveness of the firm, through cost saving in the production process carried out abroad (in the case of vertical FDI), or due to increased demand for inputs, intermediate components, or parts from the home country (in the case of horizontal FDI), then we also expect an increase in the demand for unskilled workers involved in the home country phases of the production process (Barba Navaretti et al., 2010). Therefore, the effect on the high-skilled segment of the labor market is unambiguous while effects on lower skilled workers might arise under specific conditions. This reasoning leads to an additional hypothesis.

Hypothesis 2—The impact of outward FDI varies across types of workers within each local labor market, with the skill-biased effect being stronger in knowledge-intensive activities

There are many channels linking outward FDI and local labor markets. Parent companies are connected with other local firms in the home country through backward and forward linkages, and these firms could be located in the same region or in other regions of a country, and these linkages could involve firms in the same industry or in other industries. Investing firms headquartered in less developed regions are less likely to find locally the inputs and the talent pool needed to service their foreign expansion; at the same time, they might benefit from a comparative cost advantage vis-à-vis other regions in their home country. Therefore, local benefits from outward internationalization might be stronger in less developed regions. While low-skilled labor can be more easily found in the destination countries of outward FDI (with negative substitution effects in both advanced and less developed regions), certain knowledge-intensive activities may find a combination of lower costs and high-quality inputs or business environment when they are located in lower income home country regions, an alternative to offshoring (Waldkirch et al., 2009). This comparative cost advantage might then benefit the lower-cost skilled workers of such regions. This leads to our third hypothesis.

Hypothesis 3—The overall employment impact of outward FDI will be positive and comparatively stronger in lower-income (i.e., 'lagging') home-country regions

We can now consider how the findings from investigations of all the three hypotheses might combine. If Hypothesis #1 is confirmed, then the combination of heterogeneous spatial and sectoral effects—conceptualized in our Hypotheses #2 and #3—could play out in the different sectoral and regional ways, as summarized in Table 1.

When neither Hypothesis #2 nor Hypothesis #3 is verified, the positive overall effect of outward FDI does not increase inter-regional and intra-regional inequalities. Conversely, if

Table 1. The heterogeneous impacts of outward FDI and regional inequalities

		Hypothesis #2	
		Not verified: homogenous sectoral impact	Verified: positive impact in high knowledge-intensive sectors
Hypothesis #3	Not verified: homogenous spatial effects	Inter-regional inequalities = Intra-regional inequalities =	Inter-regional inequalities = Intra-regional inequalities ↑
	Verified: positive impact in less developed regions	Inter-regional inequalities ↓ Intra-regional inequalities =	Inter-regional inequalities ↓ Intra-regional inequalities ↑

Notes: Authors' elaboration.

less dynamic regions benefit relatively more (Hypothesis #3 is verified) but no specific sectoral pattern is identified (Hypothesis #2 is not verified), the process of regional convergence would be coupled by stable intra-regional inequalities. On the contrary, when positive effects remain confined to knowledge-intensive sectors (Hypothesis #2 is verified) in all regions (Hypothesis #3 is not verified), intra-regional gaps might widen due to the skill-bias of increased employment and wages.

Finally, if both our hypotheses are jointly verified with employment benefits concentrated in knowledge-intensive sectors in less dynamic regions, outward FDI can be expected to reduce inter-regional inequalities, by favoring lower-income regions, but increasing intra-regional disparities through the expansion of the most knowledge-intensive sectors. In this case, outward FDI would also foster structural change in such less developed regions by selecting for knowledge-intensive sectors and skilled employment.

3. Empirical framework

3.1. Data description

The empirical analysis is based on a balanced panel dataset constructed at the geographical level of the 179 EAs identified by the US Bureau of Economic Analysis, and for eight NAICS industries. These industries are classified as either high-tech or low-tech. Certain two-digit level NAICS primary industries—namely, sectors '11—Agriculture, Forestry, Fishing, Hunting', '21—Mining, Quarrying, Oil and Gas Extraction', '22—Utilities' and '23—Construction'—were classified as a whole. For the rest, the four-digit level was used, aggregating manufacturing and services sectors according to their technological intensity. There are two reasons for this procedure. First, outward FDI is likely to produce employment returns in the home economy according to the different technological level of each industry, due to different substitution and complementarity effects according to skill. Second, four-digit level sectors within the same two-digit level sector often vary by technological intensity. We adopted the procedure used by Muro et al. (2018), who employ Moody's Analytics data on R&D spending and intensity of workers with science, technology, engineering or mathematics (STEM) educational background over the period 1996–2015 to identify from the bottom up the categories of low- and high-tech manufacturing industries, and low- and high-tech services

industries.[2] Using R&D spending and intensity of STEM workers to classify industrial sectors in terms of technological level reflects the notion that both dimensions 'are critical components of how new innovations translate to commerce and economic growth' (Muro et al., 2018, 17). The classification results in eight industry groups, that are detailed in Online Appendix Table A1.

Data used in the empirical analysis are for employment and outward 'greenfield' FDI. County-level sectoral employment data are drawn from the *Quarterly Census of Employment and Wages* (QCEW) provided by the US Bureau of Labor Statistics, while FDI data are drawn from the *fDi Markets* database provided by the *Financial Times*. In particular, the *fDi Markets* database provides information on brand new 'greenfield' inward and outward investment projects in terms of year of origination, source and destination region, industrial sector at the four-digit NAICS level, monetary value of the project and number of jobs created through the investment. The *fDi Markets* database represents the best available source to analyze FDI-related phenomena at the sector and sub-national level over a long time period. However, its detailed information comes with the limitation that it covers only 'greenfield' FDI, thus excluding FDI in the form of mergers and acquisitions (M&A). Despite some potential shortcomings, the overall validity and reliability of the *fDi Markets* database has been affirmed by many empirical studies. A detailed discussion of the features of the dataset and its coverage vis-à-vis other data sources on global FDI is included in, *inter alia*, Crescenzi et al. (2014) and Dogaru et al. (2015). While *fDi Markets* has been extensively used in economic geography for the analysis of inward FDI, a growing body of literature has also successfully leveraged *fDi Markets* to study outward FDI at the regional level with a focus on European regions (Castellani and Pieri, 2013, 2016; D'Agostino et al., 2013; Crescenzi and Iammarino, 2017; Comotti et al., 2020). Overall, scholarly papers as well as official reports by, among others, the European Commission and the United Nations Conference on Trade and Development (UNCTAD) are convergent in supporting the use of the *fDi Markets* database for the regional analysis of outward FDI. However, as most regional-level datasets based on the aggregation of firm-level data, *fDi Markets* may suffer from some sort of headquarter bias. As extensively documented by, for example, the Organisation for Economic Co-operation and Development, 'capital-city regions tend to concentrate headquarters of large firms . . .: on average they control 7 percentage points more employment than is located in their region' (OECD, 2017, 10). This suggests that, on average, 7 percentage points of the labor force that is attributed to the 'core regions' is only controlled by their firms but not actually located there. It is therefore possible that some of the outward FDI attributed to the regions where firms are headquartered might instead affect (on average) 7% of the workers located in other establishments of the same company. With larger multinationals and multi-establishment firms, this effect might be stronger and involve a larger percentage of the labor force located in secondary establishments. Therefore, while some degree of headquarter bias is inevitable with virtually all firm-level data sources, we have followed state-of-the-art methods to minimize any possible effect on our estimates. First, *fDi Markets* reports for each investment project both the parent company (i.e., the legal entity that

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2 It is worth noting that Muro et al. (2018) provide a classification of four-digit manufacturing and services NAICS sectors with respect to the Canadian economy. However, they clearly state that they 'measure advanced industries . . . for Canadian Census Metropolitan Areas (CMAs) and provinces and American Metropolitan Statistical Areas (MSAs) and states' (p. 17), such that we are quite confident in applying their taxonomy to the US economy.

controls the new investment) and the investing company (i.e., the entity materially responsible for the new investment, and that is often a specific subsidiary of the parent company). Where possible, we have attributed the origin of the investment to the latter. Second, while the 525 US-based Forbes 2000 multinational enterprises (MNEs)—that is, the largest multi-establishment companies that would make the bias stronger—account for a significant share of total outward FDI, we should keep in mind that our dataset covers a much wider universe of investing companies with a total of more than 4000 unique investing companies located in over virtually all EAs of the USA. Third, as discussed when presenting the methodology, the combined use of time and area-level FEs, together with the inclusion of spatial lags of the outward FDI variables, further mitigate any potential headquarter bias in our regional estimates.

We collected a large set of additional data series: QCEW data on wages (US Bureau of Labor Statistics); population, drawn from the *American Community Survey* (US Census Bureau); unemployment rate (US Bureau of Labor Statistics); personal income (US Bureau of Economic Analysis); and patents filed under the Patent Cooperation Treaty of the OECD. Online Appendix Table A2 summarizes the scale, period covered and source of the data series.

3.2. Empirical analysis

Let $r = 1, \ldots, 179$ denote the US EA, let $s = 1, \ldots, 8$ denote the industry and let $t = 2005, \ldots, 2015$ denote the temporal dimension. Then, US region- and industry-specific domestic employment levels are specified as a function $f(\cdot)$ of region- and industry-specific outward FDI as follows:

$$\text{Employment}_{r,s,t} = f\big(\text{Outward FDI}_{r,s,t-1}, \text{Outward FDI}_{r,(-s),t-1}, \text{Outward FDI}_{(-r),s,t-1},$$

$$\text{Outward FDI}_{(-r),(-s),t-1}, X^p_{r,s,t-1}, X^q_{r,t-1}, \text{Innovation}_{r,t-2}\big), \quad (1)$$

where region- and industry-specific variables for outward 'greenfield' FDI are defined in terms of number of jobs created abroad by US multinational companies. The choice of considering the number of jobs created abroad through outward FDI reflects our main goal, which is to assess the potential trade-off between domestic employment and international expansion of companies through FDI.

First, Equation (1) includes the two explanatory variables of interest for the intra-regional employment effects of outward FDI, namely Outward FDI$_{r,s,t-1}$ and Outward FDI$_{r,(-s),t-1}$. The first variable captures the intra-regional and intra-industry dimension of outward 'greenfield' FDI (i.e., the effect of outward FDI on domestic employment in the same industry as the investing firm) and is defined by the number of jobs created abroad in industry s at time $t-1$ by investments originating from EA r.[3] The

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3 Our choice of the lag structure (i.e., 1-year lag) follows a consolidated practice in the existing literature on the regional impact of outward FDI—see, for example, Castellani and Pieri (2013) and D'Agostino et al. (2013). The rationale behind this choice is based on the fundamental difference between inward and outward FDI with respect to the temporal dimension of their effects. While inward FDI can influence the foreign host economy only after operations have started (although the construction phase of a new establishment can also produce local effects), outward FDI influences the domestic home economy through changes and shifts in existing activities and operations of the investing company. Once the decision to invest abroad/offshore certain activities has been made, the process of internal adjustment in the investing company starts immediately in preparation and

second variable captures inter-industry effects mediated through the supply chain. It is the number of jobs created abroad in all other industries but s at time $t-1$ by investments originating from EA r. This variable is computed from the input–output linkages among pairs of industries, such that:

$$\text{Outward FDI}_{r,(-s),t-1} = \sum_{\substack{g=1 \\ g \neq s}}^{G} (\text{Outward FDI}_{r,g,t-1} \times \omega_{s,g}), \quad (2)$$

where the term Outward $\text{FDI}_{r,g,t-1}$ denotes the number of FDI-related jobs realized in industry $g = 1, \ldots, G$, with $g \neq s$. The term $\omega_{s,g}$ is the weighting that captures the intensity of market relationships between industry s and each industry g; it is the arithmetic mean of the share of inputs bought by industry s from industry g over the total value of the purchased inputs (backward linkages), and the share of inputs sold by industry s to industry g over the total value of sold inputs (forward linkages).[4]

Outward FDI could also influence employment in another region from the one where the investing firm is located, and this would be manifested as an effect across EAs. We investigate the inter-regional dimension of the relationship between outward FDI and domestic employment by including two control variables, namely Outward $\text{FDI}_{(-r),s,t-1}$ and Outward $\text{FDI}_{(-r),(-s),t-1}$. The first variable controls for the inter-regional and intra-industry effects of outward FDI via the spatial lag of the variable Outward $\text{FDI}_{r,s,t-1}$, using a row-standardized inverse distance spatial weights matrix with squared distance decay parameter. The second variable captures the possible employment spillovers or transmission effects between different industries across EAs as the spatial lag of the variable Outward $\text{FDI}_{r,(-s),t-1}$, using the same spatial weights matrix.[5] In particular, the inclusion of spatial lags of the outward FDI variables has two key advantages. First, it allows us to minimize any potential headquarter bias because we can explicitly model the domestic employment returns of outward FDI flows in regions other than the one from which the same outward flow originated. Second, it also makes it possible to estimate the own-region employment returns of outward FDI conditional on the employment returns of outward FDI in other neighboring regions where investing companies may have located their production activities.

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anticipation for the new internal geography of production. For example, when an investing company decides to serve foreign demand through foreign production (rather than through trade with an expansion of the domestic production capacity), it reduces domestic employment in comparison with what would have happened otherwise. As a result, a short-run effect of outward FDI in the home economy emerges already as a consequence of the strategic decision taken by the company, that fundamentally alters investment patterns at home. As a result, it seems reasonable to expect that a reduction in local employment in the host economy can take place in a significantly shorter time-frame vis-à-vis inward FDI, thus justifying the use of 1-year lags as customary in the literature. Robustness checks, that will be presented in the remainder of the paper, support this choice empirically.

4 Input–output linkages are derived from the 2007 input–output table provided by the US Bureau of Economic Analysis.

5 The inclusion of spatial lags of the two outward FDI variables of interest—that is, those capturing intra-regional outward FDI effects—is aimed at controlling for local spatial spillover effects, that is, for employment spillovers induced by outward FDI occurring among neighbor regions. This is done through a Spatially Lagged X specification. The choice of modeling local rather than global spillover effects (e.g., through a spatial lag of the dependent variable) is motivated by the fact that adjustment mechanisms in the labor market induced by outward FDI are more likely to occur among neighbor regions only, while it would be hard to expect outward FDI producing global spillovers influencing the entire US territory. Indeed, it seems unlikely that outward FDI originating in distant regions exerts a global spillover impact on employment of far-away regions. This also justifies our choice to model spatial spillovers through a spatial matrix defined using a squared distance decay parameter, such that greater weight is attached to closer regions.

The vector $X_{r,s,t-1}^p$ includes two further region- and industry-specific control variables at time $t - 1$: the first is the number of jobs created in EA r within industry s through inward 'greenfield' FDI realized by foreign companies (Inward FDI$_{r,s,t-1}$), and the second is wages per employee—as a proxy for average earnings—in EA r and industry s (Wages Per Employee$_{r,s,t-1}$). The vector $X_{r,t-1}^q$ includes a series of region-specific control variables: personal income per inhabitant (Personal Income Per Capita$_{r,t-1}$), to proxy for the overall wealth of a region; population density, defined as population per square kilometer, to capture agglomeration forces (Population Density$_{r,t-1}$); and the unemployment rate to proxy for labor market conditions (Unemployment Rate$_{r,t-1}$). Finally, the term Innovation$_{r,t-2}$ denotes the number of patents per million inhabitants in EA r at time $t - 2$.[6] For these variables, Online Appendix Table A3 presents descriptive statistics and Online Appendix Table A4 reports the correlation matrix.

Equation (1) has been operationalized by specifying a log–log functional form for $f(\cdot)$, and by adopting a three-way FE estimation approach—which includes sets of dummy variables for EAs, industries and years. In addition, the empirical equation has been enriched by a series of interaction terms between industry dummies and each of the four explanatory variables for outward 'greenfield' FDI, as well as by considering regional differences in terms of 'lagging' versus 'leading' EAs. The aim of these exercises is to evaluate whether and how the short-run industry-specific link between outward FDI and US domestic local employment is driven by industry specificities and differences among US EAs.

4. Outward FDI and Home Employment Dynamics: Some Stylized Facts

The USA is central to the global networks of investment flows and it has the highest amount of FDI-related activities of any economy in the world (UNCTAD, 2017). As Table 2 shows, the USA has been the biggest outward-investor economy over the last decade, accounting for 29.8% of the world's outward FDI stock in 2006, and 24.4% in 2016.

Figure 1 plots the dynamics of US domestic employment, and employment created abroad by US companies through outward 'greenfield' FDI. Both US domestic employment and FDI-related employment abroad registered a steep decline starting in 2008, at the onset of the Great Recession. US domestic employment began to rebound in 2010, but the number of FDI-related jobs created abroad by US multinational companies only began to rebound in 2012.

Figure 2 plots the industry-specific shares of both US domestic employment and outward 'greenfield' FDI in terms of jobs created abroad and monetary value of the investments. High-tech manufacturing industry has witnessed the greatest offshore job creation by US companies. This contrasts to the composition of domestic employment, which is mostly concentrated in low-tech services. In addition, high-tech manufacturing industry ranks first in terms of value of investments, while the two-digit sector '11—Agriculture, Forestry, Fishing, Hunting' has registered the lowest shares with respect to both FDI-related measures.

Finally, Figures 3 and 4 map the spatial distribution of the share of regional domestic employment to US total domestic employment, and the regional share of 'greenfield' FDI-related jobs abroad to total jobs created abroad by US multinational companies,

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6 The variable Innovation$_{r,t-2}$ is lagged two years because the available data series drawn from the *REGPAT* database (OECD) provides information only up to the year 2013.

Table 2. Outward FDI stocks, selected top countries

Outward FDI stock	
2006	2016
USA	USA
(29.79)	(24.40)
UK	People's Republic of China
(9.75)	(10.74)
Germany	UK
(6.57)	(5.52)

Notes: People's Republic of China includes Hong Kong. Percentages on world's total are reported in parentheses. Authors' elaboration on UNCTAD data.
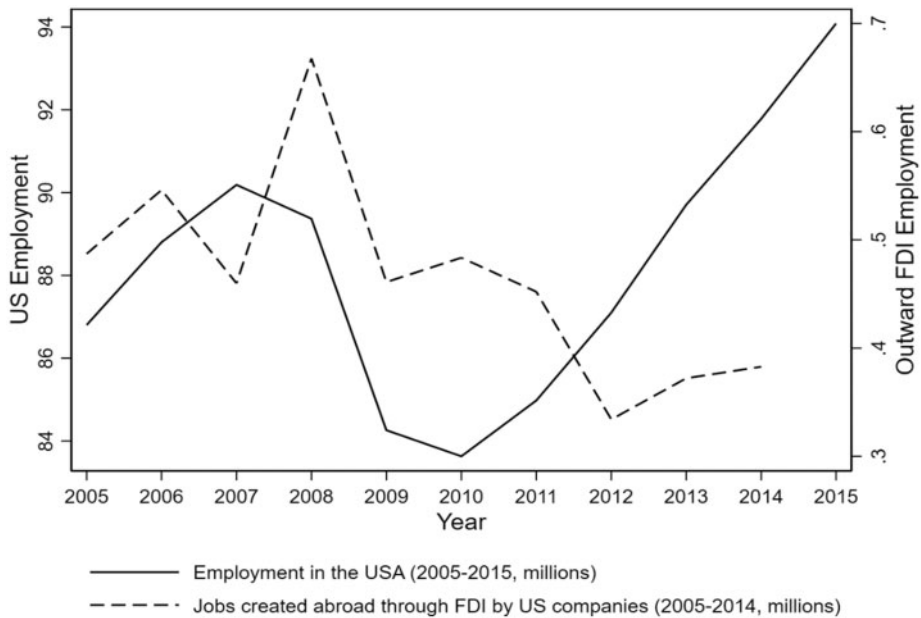

Figure 1. Time dynamics of US employment and employment created abroad through US outward 'greenfield' FDI. Authors' elaboration on US Bureau of Labor Statistics and *Financial Times* data.

respectively.[7] The comparison of the two maps visually suggests some degree of correlation between US domestic employment levels and FDI-related jobs created abroad, with regions showing a high level with respect to the former dimension generally exhibiting a high level with respect to the latter.

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7 Online Appendix Figure A1 maps the cumulated number of outward FDI over the period 2005–2014 by EA, while Online Appendix Figure A2 maps the cumulated number of jobs created abroad through outward FDI over the period 2005–2014 by EA. The EA-specific yearly dynamics of the number of outward FDI and of the number of jobs created abroad through outward FDI are depicted in Online Appendix Figures A3 and A4, respectively, from which New York–Newark–Bridgeport and San Jose–San Francisco–Oakland emerge as top-performing EAs in absolute terms.
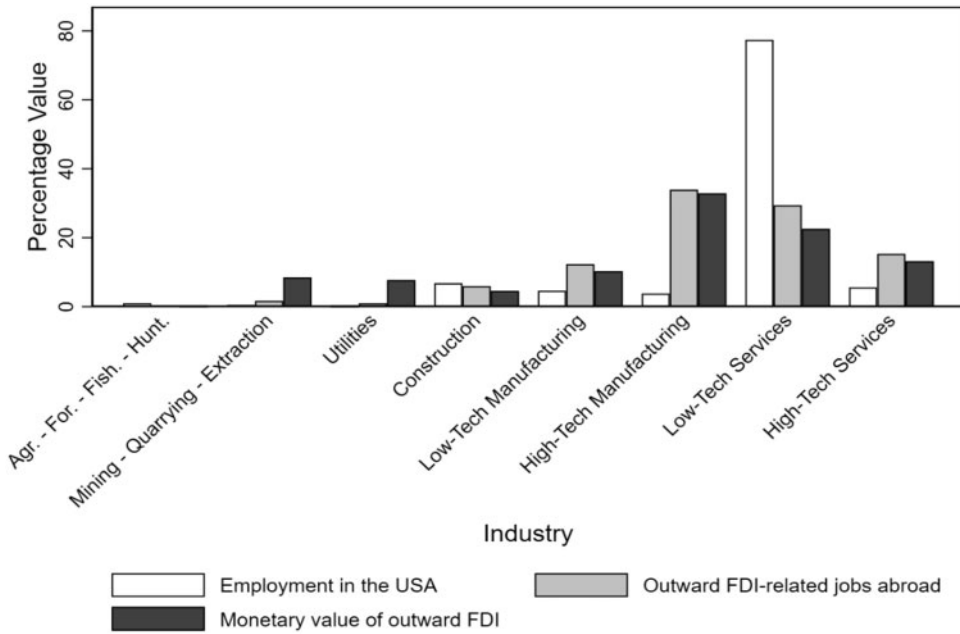
Figure 2. Industrial distribution of US employment, employment abroad through US outward 'greenfield' FDI and monetary value of US outward 'greenfield' FDI. Authors' elaboration on US Bureau of Labor Statistics and *Financial Times* data. US employment shares are calculated on values averaged over the period 2005–2014, while FDI-related shares are calculated on values cumulated over the period 2005–2014.
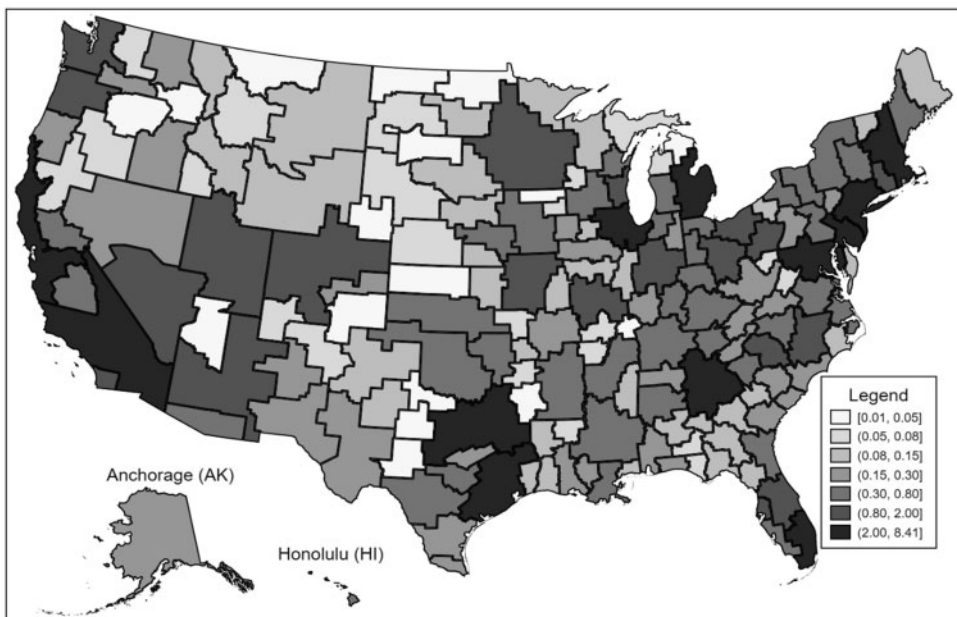

Figure 3. Regional share of total US employment. Authors' elaboration on US Bureau of Labor Statistics data. Regional employment figures are averaged over the period 2005–2014. Regional shares are defined (as a percentage value) with respect to the US total.
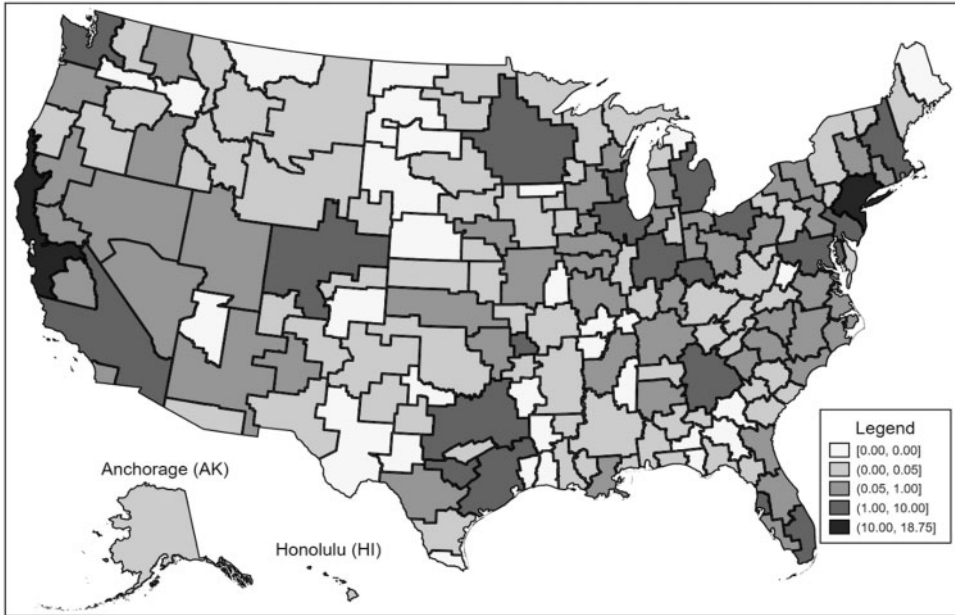
Figure 4. Regional share of total US outward 'greenfield' FDI creating jobs abroad. Authors' elaboration on *Financial Times* data. The number of FDI-related jobs abroad is cumulated over the period 2005–2014. Regional shares are defined (as a percentage value) with respect to the US total.

5. Empirical results

5.1. Baseline model

Table 3 reports the results of various specifications of the baseline model estimated using a three-way FE approach. The key variables specified in Equation (1) are introduced with a step-wise procedure. The key variable of interest (i.e., Outward $FDI_{r,s,t-1}$) is introduced first—specification (1)—and the addition of three-way FEs follows—specification (2). Other control variables are included in specification (3), followed by the additional FDI variables to capture the full set of intra- and inter-industry and intra- and inter-regional effects—specifications (4)–(6). All baseline coefficients have the expected sign. This confirms that the model is robust and well-specified.[8] Looking at specification (6), which reports the results of the complete model, the short-run regional link between outward FDI and US domestic local employment is positive and statistically significant, both within and between industries. This result suggests that the active international expansion of US multinational companies through outward 'greenfield' FDI is associated with a higher level of employment in the investing company's home region and industry. The same result, although smaller in terms of magnitude of the estimated coefficient, holds true across input–output connected industries within the same region.

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8 The variance inflation factor (VIF) has been used to check for potential multicollinearity problems. The minimum, mean and maximum values of the VIF calculated for specifications (1)–(6) in Table 3 are all lower than the conservative cut-off value of 10, thus suggesting the absence of multicollinearity problems (Neter et al., 1985).

Table 3. The short-run link between outward 'greenfield' FDI and employment—FE estimates

Dependent variable	Employment$_{r,s,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Outward FDI$_{r,s,t-1}$	0.540****	0.121****	0.109****	0.092****	0.102****	0.090****
	(0.018)	(0.012)	(0.010)	(0.011)	(0.014)	(0.011)
Outward FDI$_{r,(-s),t-1}$	...	...	...	0.025*	0.019	0.023*
				(0.013)	(0.015)	(0.013)
Outward FDI$_{(-r)s,t-1}$	...	...	...	...	0.198****	0.152****
					(0.030)	(0.023)
Outward FDI$_{(-r),(-s),t-1}$	...	...	...	...	−0.032	−0.039*
					(0.026)	(0.022)
Inward FDI$_{r,s,t-1}$	...	...	0.084****	0.083****	...	0.080****
			(0.008)	(0.008)		(0.008)
Wages per employee$_{r,s,t-1}$	...	...	0.380****	0.380****	...	0.378****
			(0.012)	(0.012)		(0.012)
Personal income per capita$_{r,t-1}$	...	...	0.586***	0.580***	...	0.544***
			(0.205)	(0.205)		(0.209)
Population density$_{r,t-1}$	...	...	0.667**	0.673**	...	0.672**
			(0.301)	(0.302)		(0.309)
Unemployment rate$_{r,t-1}$	...	...	−0.098	−0.100*	...	−0.103*
			(0.060)	(0.060)		(0.060)
Innovation$_{r,t-2}$	...	...	0.004	0.004	...	0.005
			(0.020)	(0.020)		(0.020)
EA dummies	No	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	Yes	Yes	Yes	Yes	Yes
Year dummies	No	Yes	Yes	Yes	Yes	Yes
Number of observations	14,320	14,320	14,320	14,320	14,320	14,320
Number of EAs	179	179	179	179	179	179
Number of industries	8	8	8	8	8	8
Number of years	10	10	10	10	10	10
R^2	0.20	0.80	0.86	0.86	0.80	0.87
Adjusted R^2	0.20	0.80	0.86	0.86	0.80	0.86
Model F-statistic [p-value]	896.75	98.14	161.86	142.08	33.79	117.75
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Notes: Standard errors are reported in parentheses and are clustered at the EA-industry level. All variables are log-transformed, except for the fractional explanatory variable capturing unemployment rate, which is defined according to a logistic transformation of the form $[X/(1-X)]$. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

These results support Hypothesis #1 and suggest that outward 'greenfield' FDI does not generate a net aggregate regional-scale substitution effect between domestic and foreign employment. The local labor market in the average home region appears to benefit from outward FDI of its local companies. As discussed in Section 2, multinational companies use FDI as a channel to grow both in the international market—for example, by gaining from location advantages related to inputs, proximity to final markets or new knowledge—and domestically—for example, by deploying new knowledge and technologies acquired abroad, and possibly thereby increasing scale. These advantages seem to outweigh possible employment losses due to offshoring of supply chains. This can help to

explain also the positive—although very small—coefficient of intra-regional but inter-industry outward FDI. If neighbor companies operating in industries with linkages to the investing firm also offshore their domestic activities through FDI, then home region inter-industry output and employment could grow. But we need more in-depth understanding of the potential mechanisms behind these results than we can provide from this evidence.

Additional insights emerge from the FDI variables capturing inter-regional effects—specification (6) (Table 3). First, the spatially lagged variables for outward FDI suggest that US domestic local employment is in a positive and statistically significant relationship with inter-regional and intra-industry outward FDI. The positive employment effect from outward FDI may be spilling over into neighboring regions due to intra-industry learning effects similar to those recognized in the existing literature on inward FDI. The positive inter-regional and intra-regional effects are mutually reinforcing, supporting Hypothesis #1. Conversely, inter-regional and inter-industry effects of outward FDI seem to be negative, although very marginally significant. The positive effects mediated by the supply-chain of the firms that invest abroad remain within the functional boundaries of the sending region. Similar firms in neighboring regions suffer from a shadow-effect whereby resources and employment are sucked into the focal region to reinforce localized input–output linkages at the expenses of potential suppliers located in more distant regions. Overall, inter-industry effects seem to be leading to a spatial re-allocation of employment in favor of the region that hosts the outward investing company, while intra-industry effects are unequivocally positive.[9]

We also tested the robustness of the baseline model by relying on an instrumental variable (IV) approach in order to deal with endogeneity issues concerning the variables for intra-regional intra- and inter-industry outward FDI. First, reverse causality may arise in this context if the most internationalized firms, that is, highly involved in outward FDI activities, tend to locate (or relocate) in those EAs that are already the most dynamic in terms of employment. Second, there can also be omitted variables issues. Though omitted variables bias is reduced by the inclusion of EA, industry and year FEs, our empirical

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9 A series of tests has been performed to check the robustness of the main results reported in Table 3. First, we have considered deeper time lags of the outward FDI variables, as employment returns of outward FDI could take more than 1 year to materialize. We have replicated the baseline model presented in specification (6) in Table 3 by including lags of order $t - 2$ to $t - 6$ of the outward FDI variables—as well as of the inward FDI variable, for the sake of completeness. The results remain qualitatively unchanged irrespective of the lag structure considered. Second, we have replicated specification (6) in Table 3 by considering the yearly growth rate of employment as dependent variable, rather than employment levels. Employment growth is defined as the log-difference of employment between times t and $t - 1$, and Equation (1) is modified by including the employment level variable at time $t - 1$ as additional control. The results generally confirm the main ones obtained when using employment levels as dependent variable. Third, we have tested for the presence of residual spatial autocorrelation in our FE estimates by replicating specifications (4) and (6) in Table 3 through a Spatial Error Model and a Spatial Durbin Error Model specification, respectively, that have been estimated through a maximum-likelihood (ML) approach to accommodate the endogeneity of the error structure. The ML results fully confirm the FE ones, as point estimates (and related standard errors) are identical between our baseline specifications and those accounting for residual spatial autocorrelation. Furthermore, the estimated spatial error parameter is statistically non-significant, thus suggesting that residual spatial autocorrelation is not present in our model. Fourth, we have tested the robustness of the results reported in specification (6) in Table 3 by considering a linear—rather than a squared—distance decay parameter in defining the spatial matrix used to model outward FDI-related local spatial spillovers. The results generally confirm our main findings. Furthermore, comparison of the F-statistic between specification (6) in Table 3 and that considering the alternative spatial matrix suggests that our baseline model using a spatial matrix defined through a squared distance decay parameter provides a better fit, as the F-statistic is slightly higher. All the results concerning these robustness exercises are available from the authors upon request.

model does not control for several factors that could influence the relationship between outward FDI and employment, such as non-foreign investments occurring in the home region of outward FDI, for which data are not available.

In contrast, the spatially lagged control variables for inter-regional intra- and inter-industry outward FDI are considered explicitly as exogenous, because their association with the dependent variable is defined through pure geographical distance.

The identification strategy exploits two-year lagged industry-specific variations in the number of outward FDI projects set up by non-US companies headquartered outside the USA and carried out in countries other than the USA. The idea is to distinguish the effect of intra- and inter-industry outward FDI realized by US companies from the dynamics of outward FDI in the world as a whole. The strategy relies on the similarity between investment patterns for US and non-US multinational companies, and the absence of correlation between the dynamics of US domestic employment and outward FDI in countries other than the USA.[10]

The IVs are defined using a 'shift-share' approach *à la* Bartik (1991). A first IV captures intra-regional and intra-industry outward FDI. Industry-specific growth rates in the number of non-US outward FDI are assigned to each US EA on the basis of its industry-specific share of outward FDI in the year 2003, that is, two years before the starting point of the observation period in the analysis. The IV is as follows:

$$IV_{r,s,t} = \left(\frac{OFDI^N_{r,s,2003}}{\sum_{s=1}^{S} OFDI^N_{r,s,2003}} \right) \times \left(\frac{OFDI^N_{W,s,t} - OFDI^N_{W,s,t-2}}{OFDI^N_{W,s,t-2}} \right), \quad (3)$$

where the term $OFDI^N_{r,s,2003}$ denotes the number of outward investment projects in industry s originating from EA r in 2003, and the term $OFDI^N_{W,s,t}$ is the number of non-US outward investment projects in industry s undertaken in countries other than the USA at time $t = 2003, \ldots, 2014$. A second IV is defined, using the same rationale, for intra-regional and inter-industry outward FDI, as follows:

$$IV_{r,(-s),t} = \sum_{\substack{g=1 \\ g \neq s}}^{G} \left[\left(\frac{OFDI^N_{r,g,2003} \times \omega_{s,g}}{OFDI^N_{r,s,2003} + \sum_{\substack{g=1 \\ g \neq s}}^{G} OFDI^N_{r,g,2003}} \right) \times \left(\frac{OFDI^N_{W,g,t} - OFDI^N_{W,g,t-2}}{OFDI^N_{W,g,t-2}} \right) \right], \quad (4)$$

where $OFDI^N_{r,g,2003}$ denotes the number of outward investment projects in industry $g \neq s$ originating from EA r in 2003, $OFDI^N_{W,g,t}$ denotes the number of non-US outward investment projects in industry $g \neq s$ realized in countries other than the USA at time $t = 2003, \ldots, 2014$, while all other terms are defined as before.

The results of the IV three-way FE estimation of various versions of the baseline model are reported in Online Appendix Table A5. The first-stage *F*-statistics on the excluded IVs are higher than the conservative cut-off value of 10 in all the estimated specifications. In addition, the under-identification test suggests that the excluded IVs are relevant predictors of the potentially endogenous variables capturing intra-regional intra- and inter-industry outward FDI. Finally, the null hypothesis of exogeneity is rejected in only two out of

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10 Similar approaches have been employed by Ellison et al. (2010) and Diodato et al. (2018), who use non-US data to instrument variables defined for the USA in analyzing industrial co-agglomeration patterns, and by Crescenzi et al. (2015), who exploit US export and import dynamics to instrument inward FDI in the UK.

seven specifications, and, in particular, it is not rejected in the complete specification (7), when the regression model includes all the control variables and the full set of EA, industry and year dummies. The inclusion of time-lagged explanatory variables, together with a broad set of control variables and FEs reduces endogeneity issues concerning the two variables for intra-regional outward FDI, thus making the simple three-way FE estimation stronger than that based on the external IVs.

The results reported in Online Appendix Table A5 generally confirm those of Table 3. First, intra-regional and intra-industry outward FDI is positive and statistically significant, as is its spatially lagged term. The control for inter-regional and inter-industry outward FDI remains negative and marginally significant. Intra-regional and inter-industry outward FDI is negative and non-statistically significant. All the other control variables present the same signs and similar significance levels as in specification (6) of Table 3.

5.2. The channels of outward FDI effects on domestic employment

In this section, we consider possible sources of variation in the relationship between outward FDI and US domestic local employment in order to test Hypotheses #2 and #3 by better unpacking estimated effects along sectoral and (subsequently) spatial lines—see Table 1 in the conceptual section of the paper. To begin with, we augmented the baseline model with a series of interaction terms between the set of industry dummies and the four variables for outward FDI in order to evaluate industry-specific employment effects of FDI.

Table 4 reports the estimated industry-specific marginal effects for the key variables of interest capturing intra-regional intra- and inter-industry outward FDI, testing Hypothesis #2.[11] The key result is that outward FDI-related effects are highly concentrated in high-tech manufacturing and services industries, confirming Hypothesis #2. In line with the previously discussed 'aggregate' evidence, positive returns on US domestic local employment are higher within an industry than between industries. However, inter-industry positive effects are also concentrated in high-tech manufacturing and services, reinforcing intra-industry effects in these industries. This evidence depicts a more nuanced picture on the positive impacts of outward FDI: the link is indeed positive and robust, but highly concentrated in high-tech industries where foreign activities are more likely to be complementary to domestic activities and more receptive to 'import' new complementary non-redundant knowledge from foreign affiliates.

To give texture to the results reported in Table 4, Figure 5 plots the kernel density estimates of the observed and predicted employment values defined at the EA level, that is, by averaging over industry and year. Predicted employment values are obtained from the three-way FE estimation of the augmented version of Equation (1), which includes the interaction terms between the set of industry dummies and the four variables for outward FDI. Stated a bit differently, this is a counterfactual exercise aimed at showing what employment levels would be with 'expected' FDI behavior using the marginal effects we have detected in our model via the observed values in each EA. The comparison of the two kernels suggests that, overall, US regions would have significant improvement in their employment levels with an 'optimal' response to outward FDI, that is, would rightward

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11 Online Appendix Table A6 reports the full set of estimated coefficients and Online Appendix Table A7 reports the estimated industry-specific marginal effects of all the four outward FDI variables.

Table 4. Testing for heterogeneity across industries—marginal effects of FE estimates

Dependent variable	Employment$_{r,s,t}$	
Marginal effect of:	Outward FDI$_{r,s,t-1}$	Outward FDI$_{r,(-s),t-1}$
Industry		
Agriculture, forestry, fishing, hunting	−0.114**	0.126***
	(0.057)	(0.045)
Mining, quarrying, oil and gas extraction	0.302****	−0.219****
	(0.079)	(0.058)
Utilities	−0.045	0.081*
	(0.066)	(0.047)
Construction	−0.000	0.031
	(0.022)	(0.022)
Low-tech manufacturing	0.060***	0.040*
	(0.020)	(0.024)
High-tech manufacturing	0.128****	0.075***
	(0.022)	(0.029)
Low-tech services	0.042***	−0.006
	(0.014)	(0.020)
High-tech services	0.088****	0.067****
	(0.020)	(0.020)

Notes: Standard errors are reported in parentheses and are clustered at the EA-industry level. Marginal effects refer to the estimated specification reported in Online Appendix Table A6. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

shift in terms of employment levels under the expected marginal effects of the parameters. All the EAs with observed values below predicted values, and with an observed employment level lower than the average, are punching below their weight in terms of benefits from outward FDI and would gain more than the other EAs from a generalized increase in outward investment conditions. Figure 5 thus depicts the potential gain from outward FDI for US EAs, showing just how much it improves employment in regional labor markets. It also shows that EAs situated on the left tail of the employment distribution would gain the most from a stronger internationalization of their local companies with the marginal effects we have documented. The combination of intra- and inter-industry effects combined with the heterogeneous sectoral composition of FDI activities in different EAs gives rise to spatially diversified effects, where less developed regions seem to be benefiting less than they potentially could from active internationalization.

There are obviously many different interacting regional economic conditions that shape the employment returns of outward FDI. To test Hypothesis #3 and probe these in more detail, we re-estimated the empirical model by splitting the sample of 179 EAs into two groups of 'less developed' and 'leading' regions. We did this with a *k*-means clustering approach based on a series of region-specific characteristics: (i) local labor market conditions, proxied by the amount of wages per employee and the unemployment rate averaged over the period 2005–2014; (ii) personal income per capita, averaged over the period 2005–2014; (iii) urbanization, defined as average population per square kilometer over the period 2005–2014; (iv) innovation capacity, proxied by the average number of patents per
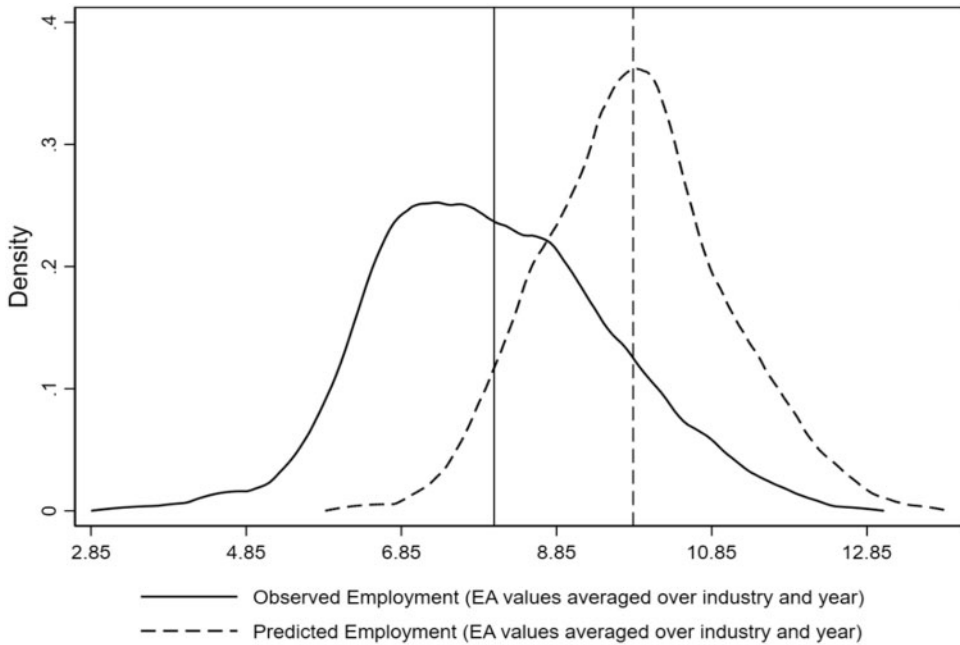
Figure 5. Kernel density estimates of observed and predicted US employment values. Predicted employment is calculated from the three-way FE estimation of the augmented version of Equation (1) which includes the set of interaction terms between the industry dummy variables and the four variables for outward 'greenfield' FDI—see Online Appendix Table A6 for the full set of estimated coefficients. Observed and predicted employment values are averaged over industry and year to obtain EA-specific mean values. The vertical solid line refers to the mean value of EA-specific observed employment, while the vertical dashed line refers to the mean value of EA-specific predicted employment.

million inhabitants over the period 2005–2013 and (v) long-run population dynamics, represented by the growth rate of population from 1969 to 2014.

This approach yields a group of 122 less developed EAs, and a second group of 57 leading EAs. Online Appendix Table A8 reports the mean value of each region-specific characteristic for the two clusters of EAs, as well as the *p*-value of the *t*-tests of comparison of the mean values. The *p*-values are statistically significant with respect to all dimensions, except for the unemployment rate. Online Appendix Figure A5 maps the identified 'lagging' and 'leading' EAs and Online Appendix Table A9 lists the EAs by cluster, rank and a synthetic index of performance standardized in the interval [0, 1].

Next, we have estimated the baseline Equation (1) and its augmented version—that includes the interaction terms between the set of industry dummies and the four variables for outward FDI—for the two identified groups of 'leading' and 'lagging' regions. Table 5 reports the key coefficients from the three-way FE estimation of the baseline Equation (1) for the two clusters of 'lagging' and 'leading' EAs—see specifications (1) and (3) in Online Appendix Table A10 for the full set of coefficients. First, the intra-regional and intra-industry link between outward FDI and employment levels is positive and statistically significant for both groups of regions, although the estimated coefficient is slightly larger for less developed than for leading EAs. On the contrary, intra-regional and inter-industry

Table 5. The short-run link between outward 'greenfield' FDI and employment in lagging vs. leading EAs—FE estimates

Dependent variable	Employment$_{r,s,t}$	
Cluster of EAs	Lagging EAs (1)	Leading EAs (2)
Outward FDI$_{r,s,t-1}$	0.093****	0.084****
	(0.016)	(0.015)
Outward FDI$_{r,(-s),t-1}$	0.048**	−0.009
	(0.023)	(0.016)
Control variables	Yes	Yes
EA dummies	Yes	Yes
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
Number of observations	9760	4560
Number of EAs	122	57
Number of industries	8	8
Number of years	10	10
R^2	0.85	0.87
Adjusted R^2	0.85	0.87
Model F-statistic [p-value]	92.93 [0.000]	23.48 [0.000]

Notes: Standard errors are reported in parentheses and are clustered at the EA-industry level. All variables are log-transformed. The full set of estimated coefficients is reported in Online Appendix Table A10—specification (1) for lagging EAs and specification (3) for leading EAs. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

outward FDI seems to be associated positively with employment levels in lagging EAs only. Overall, these results suggest that less developed EAs tend to benefit somewhat more from the international expansion of their domestic companies than leading EAs, as previously anticipated through the graphical analysis, thus confirming Hypothesis #3.

However, a more nuanced picture emerges from Table 6, where sectoral and spatial effects are fully unpacked—see specifications (2) and (4) in Online Appendix Table A10 for the full set of coefficients, and Online Appendix Table A11 for the full set of marginal effects. First, employment levels in lagging regions benefit from both intra- and inter-industry effects from outward FDI more than in leading EAs, where the employment effects are driven mainly by the intra-industry dimension. Second, high-tech manufacturing and services industries have the most positive effects in both lagging and leading EAs. Finally, the positive effects for internationalization of high-tech manufacturing and services industries are greater in lagging than in leading EAs. In other words, in less developed regions, the employment benefits from internationalization materialize mostly through intra- and inter-industry effects in high-tech industries (joint confirmation of Hypotheses #2 and #3). As discussed in Section 2, the employment expansion of high-tech manufacturing and services in less developed regions has two closely associated consequences. On the bright side, it has the potential to foster structural change and upgrading by enabling the expansion of the most dynamic sectors in the comparatively backward sectoral profile of lagging regions. However, the concentration of employment benefits in high-tech sectors might foster intra-regional inequalities in so far as high-skilled workers—relatively scarcer in less developed regions—are the ones benefiting from such expansion.

Table 6. Testing for heterogeneity across industries and regions—marginal effects of FE estimates

Dependent variable	Employment$_{r,s,t}$	
Cluster of EAs	Lagging regions	
Marginal effect of:	Outward FDI$_{r,s,t-1}$	Outward FDI$_{r,(-s),t-1}$
Industry		
Agriculture, forestry, fishing, hunting	−0.158**	0.113
	(0.072)	(0.083)
Mining, quarrying, oil and gas extraction	0.162	−0.039
	(0.115)	(0.108)
Utilities	0.001	−0.146**
	(0.088)	(0.070)
Construction	−0.028	0.067
	(0.033)	(0.042)
Low-tech manufacturing	0.046*	0.104**
	(0.024)	(0.044)
High-tech manufacturing	0.135****	0.083**
	(0.030)	(0.040)
Low-tech services	0.038**	0.006
	(0.018)	(0.035)
High-tech services	0.094****	0.075**
	(0.027)	(0.031)
Cluster of EAs	Leading regions	
Marginal effect of:	Outward FDI$_{r,s,t-1}$	Outward FDI$_{r,(-s),t-1}$
Industry		
Agriculture, forestry, fishing, hunting	−0.068	0.142**
	(0.090)	(0.061)
Mining, quarrying, oil and gas extraction	0.381****	−0.299****
	(0.089)	(0.059)
Utilities	−0.002	0.039
	(0.054)	(0.044)
Construction	−0.002	0.003
	(0.025)	(0.025)
Low-tech manufacturing	0.067**	0.032
	(0.033)	(0.035)
High-tech manufacturing	0.088***	0.072**
	(0.034)	(0.035)
Low-tech services	0.057***	−0.022
	(0.022)	(0.029)
High-tech services	0.082***	0.013
	(0.030)	(0.027)

Notes: Standard errors are reported in parentheses and are clustered at the EA-industry level. Marginal effects for lagging regions refer to specification (2) in Online Appendix Table A10, while marginal effects for leading regions refer to specification (4) in Online Appendix Table A10. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$; ****$p < 0.001$.

Less developed regions are also fundamentally different from leading regions when it comes to the nature of the activities (business functions) that domestic firms pursue abroad. Ceteris paribus, parent companies from leading EAs tend to realize innovation-related activities abroad more than parent companies from lagging EAs, and the opposite occurs when considering production activities. Thus, lagging EAs tend to benefit from outward FDI in high-tech manufacturing and services industries, but these investments involve much more their 'traditional' and production-based business functions, when compared with investments in the same industries from leading EAs, where they are oriented toward innovation activities.[12] This suggests that within global investment flows in high-tech industries, lagging regions are still positioning themselves in the lower value-added sections of the chain, offshoring less sophisticated activities where cost-advantages prevail over learning opportunities.

Further differences between leading and lagging regions emerge when looking at the type of firms that invest abroad. Online Appendix Table A13 shows that active internationalization processes through 'greenfield' FDI in lagging EAs are much more concentrated in a small number of companies than in leading EAs, and this seems to be the case for virtually all industries. Moreover, the top five companies from leading EAs tend to undertake higher value-added activities abroad (e.g., innovation) than their counterparts from lagging EAs. It follows that positive economic—or employment, at least—returns of outward FDI in lagging regions depend on few very large dominant companies. Indeed, simply looking at the top five parent companies investing abroad from lagging and leading EAs over the period 2005–2014, the first investor from lagging EAs concentrates 54.1% of investment projects—out of five parent companies—while its counterpart from leading EAs accounts on average for only 30.7% (see Online Appendix Table A14). This suggests that the underlying micro-level eco-system that leads the process of outward internationalization in less developed regions is fundamentally different from more advanced regions with a significant concentration of 'global connectivity' in the hands of a limited set of large firms pursuing relatively low value-added activities abroad. This evidence sheds light on additional potential threats associated to the opportunities offered by active internationalization in less advanced regions. A strongly concentrated market structure for investing parent companies might limit the circulation of positive spillover effects into the regional economy, explaining why less developed regions are punching below their weight when comparing expected and actual benefits from outward FDI (as shown in Figure 5). The role of large corporations in less developed regions might also bias local policies and facilitate rent-seeking through public policies that support outward FDI as a part of local economic development strategies.

6. Conclusion

The idea of limiting international investments by prominent domestic firms—via jawboning, treaty or regulation—has long been endorsed by skeptics of the effects of FDI and global value chains on regional employment, especially in manufacturing reliant regions such as the Midwest. And there is serious evidence that, under some circumstances, heightened import substitution has recently generated strongly negative effects on income

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12 See Online Appendix Table A12 that reports the distribution of outward FDI in terms of number of jobs created abroad by clustering region, industry and type of economic activity/business function realized.

and employment in some regions, especially in the context of China's growing role as a manufacturing power (Autor et al., 2016). Yet, as we noted in the Section 1, the trade/import substitution literature does not capture outward FDI specifically, while the firm-based literature does not capture regional employment effects of firm expansion or productivity growth. Thus, geographically focused research on the effects of outward FDI on specific firms, sectors and regions sheds new light on this crucial question.

There are three principal findings from our investigation. First, the link between outward FDI and domestic local employment is generally positive. This means that, overall and on average, levels of employment do not diminish in the period subsequent the creation of new jobs abroad through outward 'greenfield' FDI. Second, this link is industry-specific, that is, it varies across different industries. In particular, higher employment creation due to outward FDI occurs in high-tech manufacturing and services industries, rather than in low-tech and traditional ones. Finally, differences in fundamental characteristics of US regions—whether they are 'less developed' or 'leading'—are associated with different employment outcomes. Lagging regions benefit the most from the positive returns of outward FDI, and, particularly, from outward FDI in high-tech manufacturing and services industries. Our results do not necessarily contradict findings of additional negative regional employment effects such as those in Autor et al. (2016). The difference could be due to the fact that we concentrate on 'greenfield' investments, and not on all possible forms of trade substitution and offshoring, and we concentrate on the relatively short run. In addition, our results converge with Autor et al. (2016) in highlighting the (inter-regional and intra-regional) distributional implications of globalization.

In concluding, we can also highlight how this research may inform four related literatures: local economic development policy; strategic management for firms; strategic globalization; and trade and inequalities. First, our findings suggest that active internationalization through outward FDI offers opportunities for structural transformation in less developed regions. This has been a particularly frustrating area of local economic development policy, as lagging regions—especially older manufacturing-based regions that have undergone deindustrialization—have had little success in economic reconversion (Boschma and Lambooy, 1999; OECD, 2014; Pike et al., 2017). In this sense, our result complement recent insights on the positive regional employment impact of inward FDI in less developed regions (Cortinovis et al., 2020), highlighting the transformational potential of internationalization in all its forms. Overall, a growing body of evidence is convergent in showing that local employment impacts are positive in both home (sending) and host (receiving) regional economies, ruling out a trade-off between internationalization-led structural change and employment growth in less developed regions.

Second, our research also suggests that firms may be able to benefit from active strategic management of their foreign investment. The international business literature links the choice between trade and FDI to the effects of economies of scale in the production of outputs. Exporting is preferred at low scale, while FDI occurs when the scale of production is large enough (Buckley and Casson, 1981). Our results are consistent with this, but we identify another potential feedback to scale, which is that outward FDI can generate scale- and productivity-increases in home-country operations, even as offshoring takes advantage of scale potential abroad in other phases of production (e.g., Helpman, 2011). Our results on high-tech and services industries FDI are also relevant to better understand the impacts of 'born global' MNEs (e.g., Zander et al., 2015) on their home eco-systems. For 'born globals', active internationalization seems to be a fundamental strategic enabler for

domestic employment growth from the very initial stages of firm development to the enhancement of the local labor market.

Third, our findings can inform debates about local and national policies that affect internationalization of domestic firms. There is a long-standing literature on how certain countries (mostly in the then-developing world) actively shaped their relationship to global commodity chains (Wade, 1990; Amsden and Chu, 2003). In the South Korean case, strategic firm management, supported by national policy, allowed the country to actively internationalize its firms and to escape the middle-income trap (Amsden, 1989). As many regions in the developed world are now in development traps, national efforts to support local economic development through active internationalization of the firms in lagging regions should receive further consideration (Crescenzi and Harman, 2018; Iammarino et al., 2020), in particular in a context of a global restructuring of global value chains with highly selective re-shoring by key MNEs triggered by Covid-19 (Gereffi, 2020). In this regard, our results highlight the risk of rent-seeking by 'local champions' with quasi-monopolistic power in less developed regions. These firms might not only be more effective than smaller competitors in ring-fencing and limiting knowledge spillovers in their foreign host regions (Crescenzi et al., 2020), but our results show that they also capture most of the benefits from active internationalization and associated policies in less developed home regions.

All of our results relate closely to the active debate over the links between globalization and income inequality. Particularly in lagging regions, increasing outward FDI is likely to increase intra-regional income inequality, between high-skilled and low-skilled workers, a long-standing concern of globalization scholarship (e.g., Helpman et al., 2010). This is because the business functions offshored by parent companies from less developed regions tend to be at the lower range of value-added. Moreover, such regions usually have a small number of large firms that account for most of investment.

Such regions tend to have a high level of concentration of their outward FDI in just a few companies. Thus, more internationalization of these companies in lagging regions, while potentially reinforcing their overall competitiveness, might also enhance local labor market oligopoly effects, which have been shown to be associated with downward local wage pressure (Benmelech et al., 2018; Azar et al., 2019). In addition, deliberately strengthening these firms would have a concentration effect in such regions, tilting the economy toward these firms and away from the performance of others, and could be gamed by rent-seeking strategies of the favored firms and their policy-making supporters. The existing literatures on the relationship of globalization to domestic inequality have mostly investigated national-level labor market effects, or national-level firm-selection effects. Our research adds to them by investigating both of these at the regional–sectoral level in great detail, hence shedding original new light on these important issues.

Our finding of positive average effects of outward FDI will seem counter-intuitive to many in the public and policy arena. This is all the more reason for further research to understand the circumstances under which they occur, and possible countervailing and second-order effects. It follows that constructing a policy that leverages outward FDI to regional advantage is not so straightforward, as the collateral effects are many and complex.

Along these lines, there is broad academic consensus that 'better understanding when and where trade is costly, and how and why it may be beneficial, is a key item on the research agenda for trade and labor economists' (Autor et al., 2016, 208), and we hope that this paper will also contribute to making this topic more central to the research agendas of geographers, who can continue to deepen the geographically differentiated perspective we developed in this research.

Supplementary material

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