Papers in Evolutionary Economic Geography

17.24

Multinational enterprises, service outsourcing and regional structural change

Andrea Ascani, Simona Iammarino

Utrecht University
Urban & Regional research centre Utrecht

Multinational enterprises, service outsourcing and regional structural change

Andrea Ascani[ab] and Simona Iammarino[b]

[a] Department of Human Geography and Spatial Planning, Utrecht University
[b] Department of Geography and Environment, London School of Economics

Abstract

This paper offers a joint analysis of two phenomena characterizing most advanced economies in recent decades: the rise of foreign ownership in manufacturing activities and the pervasiveness of the service economy. The aim of the study is to examine the structural transformation of regional economic systems within the UK by focusing on the role played by foreign multinational enterprises (MNEs) in manufacturing in facilitating the development of services. From a conceptual perspective, this research relies on different strands of literature on the impact of foreign direct investment (FDI) on recipient economies, on outsourcing and regional structural transformation, and on the identification of local multipliers. The empirical analysis focuses on a specific demand-side channel for structural change: the forward linkage established by foreign manufacturing MNEs with local service providers through outsourcing. Descriptive evidence shows that service outsourcing by foreign plants operating in manufacturing is pervasive compared to outsourcing by their domestic counterparts. On this basic premise, we estimate the multiplicative effects that foreign manufacturing activity has on the creation of service jobs in local labour markets. In order to produce reliable estimates of a local multiplier, the methodology adopts an instrumental variable approach. Our findings suggest that foreign presence in manufacturing can be a catalyst of regional structural change by stimulating the generation of new jobs in the tertiary sector via demand linkages.

Keywords: multinational enterprises, service outsourcing, regional structural change, local labour markets, multiplier
JEL: F6, R1, O3

Acknowledgements: The authors gratefully acknowledge financial support from the Economic and Social Research Council/Joint Programming Initiative Urban Europe [Grant Agreement no. ES/M008436/1]. We would also like to thank for their helpful comments and suggestions the participants to the North American Regional Science Association Conference (NARSC), November 2016, Minneapolis USA; the Urban Futures seminar series, February 2017, Utrecht University; the Regional Studies Association (RSA) Conference, Trinity College Dublin, 4-7 June 2017; Academy of International Business (AIB) Conference, Dubai, 1-4 July 2017. The authors remain solely responsible for any errors contained in the paper.

1. Introduction

This paper develops a joint analysis of two ubiquitous phenomena characterizing most advanced economies in recent decades: the increased foreign ownership in manufacturing and the rise of the service economy. Specifically, the aim of this study is to examine the structural transformation of regional economic systems by focussing on how the activities of foreign multinational enterprises (MNEs) operating in manufacturing industries favour the development of the service sector within regional economies. The economic impact of FDI are largely researched in the academic literature and wide attention is devoted to the estimation of FDI-induced spillovers benefitting domestic firms' productivity and innovation within and across industries (see, for example, Haskel et al., 2007; Ascani and Gagliardi, 2015; Crescenzi et al., 2015). However, with few recent exceptions – for example Castellani and co-authors' (2016) contribution on the role of manufacturing in attracting FDI in regional business services – the issue of inter-macro sector dynamics, that is whether and how foreign MNEs in manufacturing stimulate tertiary activities through local outsourcing, thus causing regional structural change, has remained largely overlooked and represents a fundamental and open area of enquiry.

Existing studies document that employment in UK business services has exponentially grown in recent decades (Abreu et al., 2010), also as a result of outsourcing (e.g. Abramovsky et al., 2004; O'Farrell, 1995). On the basis of an analysis of contracts completed in 2014, Arvato UK, a customer support service firm, reported that the UK manufacturing industry as a whole spent £130 million to purchase services in the first half of 2014, thus attaining a 132% year-on-year increase in service outsourcing expenditure.[1,2]

[1] http://www.computerweekly.com/news/2240233825/2014-one-of-strongest-years-for-UK-IT-outsourcing

[2] https://www.arvato.com/uk/insights/outsourcing-index/q2-2014.html

However, the extent of the contribution of foreign-owned manufacturing firms in this process remains surprisingly underexplored. Service outsourcing is an important part of the organisation of MNEs: as they are on average more productive, specialised and characterised by larger scales of manufacturing operations as compared to domestic companies, outsourcing ancillary activities, such as services, can be a strategy to decrease in-house operational costs, to gain access to resources and technologies not available internally via external specialised suppliers, as well as to strengthen specialisation in core businesses.

Filling this gap in the literature represents the main novel aspect of this paper, which extends the examination of the effects of foreign investment on recipient economies to the analysis of inter-macro sector market-mediated dynamics. We make use of business-level data in the UK for the period 1997-2007, taken from the Annual Census of Production Respondents Database (ARD). By examining different service categories, we provide evidence that MNE manufacturing plants purchase about 16.4% more services than their domestic counterparts. Furthermore, we study the contribution of foreign manufacturing to service employment growth within UK Travel to Work Areas (TTWA) by estimating a multiplier effect similar to Moretti (2010) and Faggio and Overman (2014). Our results suggest that foreign presence in manufacturing may act as a catalyst of regional structural change by stimulating the generation of jobs in the tertiary sector via demand linkages, although such changes may result uneven across space.

This paper is structured as follows: the next Section 2 provides a conceptual background in which we first discuss and integrate different strands of literature related to our purpose and, second, we develop our hypotheses. Section 3 presents the data employed in the empirical analysis and some descriptive statistics on the phenomena here examined. Section 4 investigates the respective engagement of foreign and domestic firms in establishing forward linkages with local service producers, whilst Section 5 focuses on the analysis of the multiplicative effects of foreign

ownership on service employment growth. Section 6 offers some concluding remarks and preliminary implications.

2. Background of the study

2.1 Foreign multinationals, service outsourcing and regional structural change

From a conceptual standpoint, this paper relies on different strands of literature: these include works on the impact of foreign MNE on host regions, on outsourcing and structural transformation, and on local multipliers and regional resilience.

Notwithstanding the ample and established academic debate on the effects of foreign MNEs on recipient economies, inter-macro sector dynamics emerging from corporate operations remain, to the best of our knowledge, an underexplored object of enquiry. To a large extent, existing empirical contributions focus on the relevance of vertical (or inter-industry) and horizontal (or intra-industry) transmission mechanisms of FDI-induced effects within the manufacturing sector, mainly motivated by the identification of knowledge or pecuniary externalities arising from foreign activities to the benefit of domestic firms and workers (e.g. Javorcik, 2004; Haskel et al., 2007; Poole, 2013). These studies show that inward foreign investment can trigger both beneficial and detrimental effects on domestic firms either intra-industry via channels such as labour mobility, demonstration effects or greater competitive pressure (e.g. Wang and Blostrom, 1992; Driffield and Taylor, 2000; Girma et al., 2001; Gorg and Greenaway, 2004; Crescenzi et al., 2015), or inter-industry through backward and forward linkages with other manufacturing suppliers or customers (Ernst and Kim, 2002; Crespo and Fontoura, 2007; Javorcik and Spatareanu, 2008; Blalock and Gertler, 2008).

Nevertheless, foreign investment can generate additional effects beyond the boundaries of the two macro-aggregates of manufacturing and service industries. MNEs operating in manufacturing can

establish demand linkages with local service producers, thus generating inter-macro sector effects spanning from secondary to tertiary economic activities. Manufacturing demand for business services is, in fact, a relevant source of growth of employment and output in the UK tertiary sector (O'Farrell, 1995), although the contribution of foreign MNEs to this transformative process of advanced economies has not yet been thoroughly investigated.

Outsourcing is generally considered as a means to access external specialised skills whenever it is deemed not suitable to invest in the in-house generation of such competencies due to the lack of scale economies and/or the presence of high amortization costs (e.g. Abraham and Taylor, 1996). While still broadly valid, the classical view that the optimal scale of a firm is found in the balance between the costs associated to market transactions and the organisational costs of coordinating activities within the firm (Penrose, 1959; Buckley and Casson, 1976) has been seriously challenged in the last decades. The growth of global alliance capitalism, strategic partnerships, outsourcing and offshoring, production, innovation and distribution networks, and asset-augmenting investment, has radically transformed the nature and scope of MNE internalization processes (Cantwell and Narula, 2001). With the geographical fragmentation of global manufacturing production, make-or-buy decisions becomes a fundamental organisational choice for MNEs investing in foreign locations, as part of their mutually interdependent and co-evolving internalisation and location advantages (e.g. Contractor et al., 2010; Iammarino and McCann, 2013). Larger and more complex firms, such as MNEs, find advantageous to outsource peripheral business activities to external actors since they can reconfigure their resources around core activities across locations, thus minimising the inefficiencies associated with additional coordination costs (Quinn and Hilmer, 1994).

Whether or not outsourcing is a relevant mechanism through which economies undergo structural change – i.e. shifting their sectoral composition from manufacturing to services – remains unclear in the academic debate. In fact, outsourcing could merely imply a relabelling of activity across sectors,

rather than entailing a fundamental shift in the composition of economic activity (Herrendorf et al., 2013). On the other hand, some scholars question the view that the tertiarisation of mature OECD economies is only a mere reorganisation of activities across macro-sectors (e.g. Montresor and Vittucci Marzetti, 2011); recent evidence has also suggested that the size of the contribution of service outsourcing to the structural change of the US economy is nontrivial (Berlingieri, 2014). More generally, the debate about the microeconomic mechanisms of the structural transformation of economic systems is still open (e.g. Foster and Rosenzweig, 2008). Existing contributions emphasize the relevance of differences in technological diffusion and industry life-cycle as drivers of employment in manufacturing and services (e.g. Desmet and Rossi-Hansberg, 2009) as well as the intertwined roles of intermediate demand for services and technological change (Pasinetti, 1981; Lorentz and Savona, 2008) and their structure across space (Meliciani and Savona, 2015).

By considering MNEs activities as catalysts for regional structural change, this paper also conceptually relates to the recent literature in economic geography on the notion of regional resilience, focussing on one specific economic mechanism through which regional economies can develop new activities and upgrade the structure of the local labour market. The concept of resilience encompasses the tendency to develop new growth paths based on the existing economic structure of a region (e.g. Boschma, 2015; Martin and Sunley, 2015) In this respect, according to an evolutionary perspective, resilient regions are more prone than others to transform their economic structures and to re-allocate resources across activities in order to avoid stagnation (Saviotti, 1996). Hence, regional resilience is here intended as the ability of regional economies to reconfigure their trajectories over time, as opposed to an engineering-inspired equilibrium concept of resilience according to which resilient regions experiencing shocks have the capacity to move back to a steady state (Christopherson et al., 2010). Importantly, such a reconfiguration of the regional economic structure, which we conjecture in terms of foreign manufacturing MNE demand for local services,

may activate regional multiplicative effects (e.g. Moretti, 2010), which will be explored in the empirical analysis reported below.

2.2 Hypotheses development

On the basis of the gap identified at the intersection of the different literatures shortly outlined above, we formulate and test two hypotheses regarding the impact of foreign presence through service outsourcing on regional structural change. First, we test the following hypothesis:

H1: *Foreign-owned plants operating in manufacturing industries in a region purchase more local services than their domestic counterparts.*

We aim to provide an empirical justification to the importance of the transmission channel through which foreign ownership of manufacturing can impact the local service industry. By suggesting that foreign plants establish more substantial forward linkages with local service producers than domestic firms, we assume that the presence of foreign MNEs in a region can generate positive effects beyond those manufacturing sectors in which they are primarily active. Hence, the second hypothesis that we test regards the intensity of the contribution of foreign employment in manufacturing to service employment within the region:

H2: *The presence of foreign-owned plants operating in manufacturing industries in a region has an overall multiplicative effect on local employment in the service sector via demand linkages (outsourcing).*

We thus conjecture that the local labour market for services responds to foreign presence in manufacturing with more than proportional increases in employment relative to an increase in foreign manufacturing employment. This finding would be consistent with a view of MNEs as catalysts of a gradual reallocation of resources from secondary to tertiary activities, with

implications for both structural change and the resilience of regional economies. In fact, the contribution of foreign MNEs is likely to be highly differentiated across regions also in consideration of the local economic structure. Existing evidence on the UK suggests that the structural transformation of the national economy has a distinctive regional pattern, where old traditional manufacturing areas have been the most penalised by the long-term national shift of jobs from manufacturing production to services (Coutts et al., 2007; McCann, 2016). The pace and intensity of regional structural change largely depends on the production and competence base of the local economy, both of manufacturing – which can be more or less attractive to foreign investment and internationalized – and of services – which can be intermediate or for final demand, locally produced or simply imported from other areas nationally and internationally (Meliciani and Savona, 2015). Thus, exploring whether and to what extent foreign MNEs' service outsourcing contributes to regional transformation is key to understand the opportunities and constraints faced by diverse regional economies in terms of their capacity to leap towards more dynamic and fast growing activities.

3. Data

3.1 Data and regional trends

Our dataset includes information on UK firms as reported in the Annual Census of Production Respondents Database (ARD), a business-level database collected by the UK Office of National Statistics (ONS). The ARD is a census of large businesses (i.e. those with more than 250 employees) and a stratified sample of smaller businesses. It is constructed on the basis of a mandatory survey requesting detailed information on a number of firm characteristics including employment, sales, purchases, stocks, capital expenditure, investment, retail, industry, ownership, among others. This rich set of information goes back to 1973 for the large majority of businesses in

production and construction activities. However, data for the service sector, crucial for the present study, is only available from 1997. Therefore, we employ data for the period 1997-2007, for which it is possible to generate a panel of both manufacturing and service businesses for a time period not affected by the 2008 financial crisis. The ONS questionnaire is responded by the so-called 'reporting units', which may or may not coincide with firm individual establishments or plants. Therefore, the ARD files on reporting units provide the balance sheet of firms that in some cases are only administrative entities that fill tin he ONS questionnaire by including information also for other plants that are part of the same firm. These multi-plant firms represent about 20% of cases (Criscuolo et al., 2012). Other files in the ARD, instead, contain the list of plants and the reporting units they belong to, as well as data on their employment and detailed geographical information at the level of local labour market areas (Travel to Work Areas - TTWAs).[3] In order to link balance sheet data provided by reporting units to plant-level information, we apportion reporting units' balance sheets to plants by adopting employment-based weights by year (Criscuolo et al., 2012).[4]

A fundamental feature of the ARD for the purposes of the present study is the inclusion of information on firms' domestic or foreign ownership, defined as the nationality of the ultimate owner of a business firm. This allows us to disentangle foreign MNE affiliates from domestic firms. Table 1 presents a breakdown of our data reporting descriptive information on domestic and foreign manufacturing plants in different NUTS1 regions for the period under analysis. Overall, we can access information for 164,146 plant-level observations in the UK.[5] In terms of ownership, foreign-owned plants represent 12.4% of the sample, with a peak of foreign presence in the North East of

[3] TTWAs are defined as self-contained labour markets, minimizing the potential bias coming from commuting flows. TTWAs (245 overall) are groups of wards, including both urban and non-urban areas, for which at least 75% of the resident economically active population works in the area, and for which at least 75% of individuals working in the area live there.

[4] More extensive information on how the ARD is constructed can be found in Oulton (1997) and Haskel et al. (2007).

[5] Our final dataset is an unbalanced panel with an average of 14,922 manufacturing plants per year. Plants (in ARD 'establishments') are defined as enterprises or part thereof situated in a spatially identified location where economic activity is carried out.

England (15% of total manufacturing plants). Not surprisingly, the largest number of businesses, both domestic and foreign-owned, is located in the North West, traditionally a strongly manufacturing-oriented region, followed by South East and West Midlands.

[Table 1 around here]

The importance of foreign affiliates in terms of employment shares notably increased in the UK manufacturing industries over the sample period. Table 2 shows the incidence of foreign employment by region for the years 1997 and 2007. It is evident that the weight of foreign presence in manufacturing is far more relevant in employment terms than in number of plants: the share of the workforce employed in foreign-owned plants in 1997 ranges between 10.5% in Yorkshire and the Humber, and 20.9% in Wales and Northern Ireland.[6] Similarly, the share of foreign employment in 2007 varies between 16.1% in the North West of England and 28.7% of Wales and Northern Ireland. Hence, a comparison of the figures reported in Tables 1 and 2 indicates that the share of employment in foreign-owned plants is higher than the incidence of their number in each region, indirectly providing evidence that foreign plants are larger in size than domestically-owned businesses. This reflects a well-known regularity in the literature comparing the attributes of foreign and domestic enterprises. Interestingly for our purposes, foreign employment in manufacturing strongly increased in all regions over the sample period. This descriptive evidence supports the notion that FDI in manufacturing represents a growing phenomenon in an advanced economy such as the UK, thus corroborating one of the conceptual justifications of this study, which considers FDI as a catalyst of regional structural change.

[Table 2 around here]

[6] Wales and Northern Ireland are considered together in Tables 2 and 3 for data confidentiality reasons dictated by ONS, preventing the provision of figures for Northern Ireland alone.

When considering the incidence of service activities in regional employment regions, figures become drastically high, confirming the well-known post-industrial profile of the UK economy.[7] Table 3 reports the share of the workforce employed in the service sector by region for 1997 and 2007: tertiary activities steadily increased their share in every region. The figures support the second presumption of this study, which is the huge importance of the tertiary sector in terms of employment. Taken together, Tables 2 and 3 represent the illustrative basis that justifies the exploration of possible inter-macro sector linkages between manufacturing and services associated with the activities of foreign MNEs in manufacturing.

[Table 3 around here]

3.2 Plant-level variables

The relationship between manufacturing and the growth of services at the centre of the present investigation rests on the assumption that foreign MNEs outsource service activities more than domestic firms. We thus employ data for individual plants to detect differences between domestically- and foreign-owned plants as far as the external purchase of services is concerned. Table 4 presents plant-level descriptive statistics of the variables used later in the econometric estimation. The top panel of the table reports data for domestic businesses while the bottom panel regards foreign MNE affiliates. Within these panels, the variables are divided between purchases of different categories of services and other relevant plant-level attributes. For the former, the ARD database contains information on the purchase of a set of services, including transport, telecommunication, computer, advertisement and others. Plant-level controls include size (i.e. employment), capital stocks, and turnover as a measure of economic performance. Descriptive

[7] The figures in Table 3 are in line with the 2011 Census, according to which manufacturing accounts for only 9% of the total workforce, and service industries (including construction) employ about 90% of total workers. Table 3 considers construction as part of the service sector, given that the purpose of the paper is to study the linkages between manufacturing and non-manufacturing industries.

statistics suggest that foreign-owned plants in the UK effectively purchase more services than domestic plants across different service categories. This provides a first descriptive insight in line with our hypothesis 1; in addition, they are also larger, and possess higher capital stocks and turnover. While Table 4 reports interesting information on the mean differences between domestic and foreign ownership, a more systematic investigation is required to support further our hypotheses about different outsourcing behaviours. Table A.1 in Appendix contains the list of variables with definitions.

[Table 4 around here]

4. Foreign MNEs and service outsourcing in local labour markets

4.1 Estimation strategy: plant-level OLS

Here we present the empirical strategy adopted to investigate whether foreign affiliates in manufacturing outsource more services than domestic firms across regions. We study the relationship between plant ownership and service outsourcing by means of a linear OLS regression model. This approach follows existing contributions analysing differences between exporting and non-exporting firms, as well as foreign premiums in labour market outcomes (e.g. Almeida, 2007; Bernard et al., 2007). Variations of the following equation are estimated:

$$SP_{it} = \alpha + \beta_1 Foreign_{it} + X'_{it}\beta_2 + \delta_t + \sigma_j + \rho_r + \varepsilon_{it} \qquad (1)$$

where subscripts *i*, *t*, *j* and *r* stand for plant, year, SIC-92 industry and travel-to-work-area respectively; *SP* represents the purchase of domestic services (expressed in log) by considering different service categories, as described in the previous section; *Foreign* is a dummy variable equal to 1 when a plant is foreign-owned, 0 otherwise; *X'* is a vector of controls. The latter includes a set of covariates that can be correlated with our dependent variable and the measure of ownership.

First, the size of plants measured with the log of employment: it is well documented in the literature that MNEs affiliates are larger than domestic firms (e.g. Barba Navaretti and Venables, 2004; Frenz and Gillies, 2007), implying that outsourcing may be associated with the larger set of activities of a plant rather than its ownership. Hence, controlling for size is relevant to avoid that our measure of ownership captures an effect related to the larger scale of operations of MNE affiliates. Second, the log of capital stock is included to control for whether outsourcing decisions are associated with different levels of fixed assets within firms. In fact, in-house production and intra-firm trade, rather than outsourcing, are acknowledged to be more systematically associated with labour-intensive firms (Marin, 2006), thus implying that capital-intensive firm can be more prone to outsourcing the production of intermediates goods, including services. Third, the economic performance of plants is proxied by a measure of turnover, also in log form. Better performing plants can purchase larger quantities of services from external providers, thus concentrating internal resources on core businesses. As shown in Table 4, foreign-owned plants are characterised by higher turnover: therefore, not controlling for a measure of economic performance can introduce a correlation between the error term and our measure of foreign ownership. In addition, we include (i) a set of year dummies δ in order to capture specific time effects shaping the propensity of firms to purchase services, (ii) manufacturing industry (SIC 4-digit) dummies σ to consider sector-specific differentials across plants that can affect service outsourcing and (iii) geographical dummies ρ to account for territorial trends at the TTWA level that may affect manufacturing plants' purchase of services. Importantly, by including the latter term we are able to investigate whether foreign affiliates purchase more services than domestic firms within a specific labour market area. Finally, ε is an idiosyncratic error component. The main aim of the analysis lies in the estimation of

coefficient β_1, which represents the mean difference in outcome *SP* between foreign- and domestically-owned plants.[8]

4.2 Foreign premium in local service outsourcing

Before discussing the results of the empirical analysis, we graphically explore the patterns of service outsourcing in our data by comparing domestic and foreign-owned plants. Figure 1 plots kernel density estimates of various categories of services purchased by different groups of plants, including also information on domestic firms that will be acquired by foreign MNEs at some point during the sample period. This further distinction allows us to understand whether and to what extent plants that experience a change in ownership outsource more before being taken over relative to those that remain domestic over the observed period. A concern, in fact, could be that the larger outsourcing by foreign-owned plants hypothesised above and described in Table 4 can precede the actual engagement of a foreign MNE. In fact, recent empirical evidence on a large set of European firms suggest that acquisition decisions of MNEs are far from being random choices and follow specific patterns (Ascani, 2017). For our purposes here, this might imply that foreign MNEs systematically acquire domestic firms that engage more in service outsourcing. This is supported by the graphs in Figure 1, showing not only that service purchases by foreign-owned plants (dashed line) exhibit larger estimates as compared to those purchases by domestic firms (red solid line), but also that estimates for domestic plants that will be acquired by foreign MNEs (green line) are also larger than those for plants that remain domestic over the period, thus comforting the idea that MNEs systematically target domestic firms that are ex-ante more engaged in service outsourcing. A reasonable explanation for this could be that these plants are larger and more productive, thus representing a more appealing target for foreign acquisition. Nevertheless, foreign-owned plants

[8] A study by Girma and Görg (2004) explores a similar question, but it focuses on three sectors only.

exhibit larger estimates than future take-overs: this can be suggestive of the fact that once a domestic plant becomes foreign, its propensity towards outsourcing increases.

[Figure 1 about here]

4.3 Results of plant level estimates

In order to analyse these patters more systematically and to establish the statistical significance of the mean differences, equation (1) is estimated by OLS. Table 5 reports the results for a set of regressions where the dependent variable in each column is the purchase of a different category of services. We add a measure of future foreign takeover to our control variables, defined as a dummy equal to 1 in year 1997 for firms that experienced a change in ownership from domestic to foreign over the sample period. The first column of Table 5 reports results where the dependent variable is the log of total purchases of services by plants in the UK. The positive and statistically significant coefficient of our main regressor (Foreign) suggests that, other characteristics being equal, foreign manufacturing plants buy 16.4% more services locally as compared to domestic firms in the same industry. Domestic plants that are acquired by foreign MNEs also purchase more services than domestic firms that remain so, but the coefficient is weaker in terms of both significance and magnitude. In line with our hypotheses, control variables enter the equation with the expected sign and they are strongly significant. When considering different categories of services (columns 2-6), foreign affiliates outsource more than domestic plants across all typologies. In other words, as compared to the their domestic counterparts within a manufacturing sector and a local market area, MNE plants spend 14% more for the purchase of transportation services, 13.8% more for telecommunication services, 14% more for computer services, 6.6% more for advertisement and 15.8% more for other services. These results are clearly in line with the idea that manufacturing MNEs establish stronger forward linkages with local service producers than domestic companies,

thus providing a sound empirical justification for the investigation of potential multiplicative effects of foreign investment in manufacturing to the benefit of the local service sector. With respect to the purchase of advertisement services, domestic plants acquired by foreign MNEs engage more in outsourcing before the take-over: this is probably explained by the fact that once a plant is acquired it is able to access global intra-firm networks, thus becoming less dependent on local advertisement services.

[Table 5 around here]

5. Multiplicative effects of foreign ownership

5.1 Estimation strategy: regional level panel regression

Having established that foreign MNEs in manufacturing differ from domestic firms with respect to the volume of services purchased locally, thus supporting our hypothesis 1, we now turn to test hypothesis 2, stating that foreign presence in manufacturing is beneficial, with a multiplicative effect, for the expansion of the local service sector. From the empirical standpoint, we analyse the relationship between the growth in foreign manufacturing employment and that in service employment (Moretti, 2010; Faggio and Overman, 2014). Thus, we aggregate plant-level information on employment at TTWA level and we exploit the panel structure of our data to estimate the following equation:

$$SE_{rt}^{tot} = \gamma_1 M_{rt-1}^{foreign} + \gamma_2 M_{rt-1}^{domestic} + \gamma_3 X'_{rt-1} + \rho_r + \delta_t + u_{rt} \qquad (2)$$

where SE_{rt}^{tot} refers to total service employment in region r in year t; $M_{rt-1}^{foreign}$ is the lagged manufacturing employment in foreign plants within TTWA r, and $M_r^{domestic}$ stands for the lagged domestic manufacturing employment in the same TTWA; X is a vector of regional control variables; ρ represents regional fixed effects capturing unobserved travel to work area specific

characteristics affecting service employment that also possibly correlate with foreign manufacturing employment: thus, ρ allows us to control for all time invariant regional characteristics that can determine service employment. Finally, u is the error term, which accounts for time varying characteristics of regions that can affect local service employment. All variables are measured in logs.

The aim of the analysis is to estimate coefficient γ_1, representing the change in regional total service employment for each additional job generated by foreign plants in manufacturing. Therefore, for $\gamma_1 = 0$, foreign ownership in manufacturing does not add any new job to the service sector within a TTWA, thus rejecting the hypothesis of multiplicative effects. If $\gamma_1 > 0$, instead, for an additional job created in the regional manufacturing sector by MNEs, the total service employment in the region increases by γ_1. In this case, the positive effect associated to foreign ownership in manufacturing indicates a more than proportional increase in employment in services. Conversely, for $\gamma_1 < 0$, foreign presence in manufacturing has displacement effects on total service employment: that is for each new job generated by MNEs in manufacturing within a region, service employment decrease by γ_1. This can be the case where foreign-owned plants decide to stop purchasing services from local producers and to increase their engagement in international service outsourcing. As discussed in Section 2, the literature suggests that FDI in manufacturing should stimulate tertiary activities via a larger demand for services used as intermediate goods for industrial production.

While controlling for regional fixed effects allows us to provide interesting insights on the impact of foreign ownership on service employment in TTWAs, several sources of bias can affect the relationship under analysis. For instance, MNEs may undertake investments particularly in regions where local service producers are thriving in order to access larger markets of intermediate goods. In such a case, the estimated coefficient γ_1 is upward biased because of the attractive pull exerted

by service employment on FDI. On the contrary, γ_1 can be downward biased in presence of a negative correlation between regional service employment and foreign employment in manufacturing: this may occur in regions where foreign manufacturing operations are dismissed and, at the same time, the economy becomes relatively more service-based. In order to alleviate these concerns, we adopt an instrumental variable strategy to estimate γ_1, based on a 'shift-share' methodology (e.g. Bartik, 1991; Moretti, 2010; Faggio and Overman, 2014). This allows to exogenously shifting foreign employment in manufacturing without moving other omitted factors contained in the error term, thus providing a robust interpretation of coefficient γ_1. We construct our instrumental variable as follows:

$$\widehat{M}_{rt-1}^{foreign} = \sum_{rt-1} E_{jr,1997} \times M_{jt-1}^{foreign} \quad (3)$$

where $E_{jr,1997}$ is the share of employment in manufacturing industry j in TTWA r in 1997, considered as the initial period; $M_{jt-1}^{foreign}$ is the lagged national share of foreign employment in industry j on total manufacturing employment. Thus, the instrument captures the initial weight of each manufacturing industry and assigns national foreign presence in a sector to regions. We expect that foreign ownership in a specific sector is directed towards areas that are specialised in that specific industry in terms of their initial employment shares. Alternatively, it is possible that foreign investment in a sector is directed to TTWAs with a different industry specialisation for reasons such as capturing new market opportunities.

5.2 Foreign manufacturing and service employment growth: the regional multiplier

In this section we discuss the estimation results of equation (2), thus testing our second hypothesis. The estimation is performed for the period 1998-2007, excluding 1997 as this is subsequently used

as a base year in the instrumental variable estimation. Table 6 presents the results for the fixed effects estimates.

[Table 6 around here]

Column 1 reports a restricted version of the model: the coefficient of foreign-owned firms' employment is positive and statistically significant, thus suggesting that MNEs in manufacturing benefits local service employment, although the magnitude of the effect remains fairly small. In column 2, we add control variables such as the regional domestic employment in manufacturing, the economic size measured as aggregate local plants' turnover, and the average wage paid by local plants. When including these controls the statistical relevance and the sign of our variable of interest do not change. Interestingly, the impact of local domestic employment in manufacturing on services is more than double that of foreign employment. This is not surprising considering that our dependent variable measures total service employment, while our hypothesis centres on the fact that foreign affiliates contribute to service employment via outsourcing. Indeed, total regional service employment includes activities that can be hardly interested by outsourcing. Therefore, we split our dependent variable in intermediate services and final demand services by using the Supply and Use Tables for the UK in 1997 (i.e. the first year in our sample), based on a SIC 2-digits industrial classification, and we calculate what percentage of output of each service sector is sold to other industries or to the final demand market. We then classify as intermediate services all the activities that sell more than 50% of their output to other industries, whilst final demand services are those that sell more than 50% of their output to final consumption.[9] Column 3 and 4 in Table 6 consider these two groups of services as dependent variables respectively. While in both cases we estimate positive effects of foreign manufacturing employment on service employment, the statistical significance of the coefficient of foreign employment is stronger for intermediate services, and the

[9] Table A.2 in the Appendix reports this classification.

magnitude of the effect in column 3 is about 6 times larger than that in column 4. In other words, the coefficients imply that for 100 new jobs generated by foreign manufacturing MNEs in a region, 6 new jobs are created in intermediate services and 1 new job in final demand services.

While these results provide initial support to the hypothesis of a regional multiplier, the estimates can be subject to several sources of bias, as mentioned in the previous section. Table 7 reports the results for the IV estimates. We run three different specifications (all, intermediate and final demand services) as indicated in each column. Results indicate that the strongly positive effect of foreign manufacturing employment is displayed on intermediate services only, with no significant impact on aggregated and final demand services. The magnitude of the coefficient of interest in column 2 is also higher than that in the fixed-effects estimates, thus suggesting that previous results are downward biased. This is due to omitted variables in the model, captured by the error component ε, that introduce a negative correlation between service employment and MNEs' manufacturing employment over the sample period. This would be consistent with a comparative advantage shift from manufacturing to services experienced by the UK, as well as other advanced economies, in recent decades, partly as a result of growing wage differentials with developing and emerging countries. The coefficient in column 2 shows that, other things being equal, a 1% increase in foreign manufacturing employment generates a 1.07% increase in intermediate service employment. This is a very relevant effect that supports the idea that outsourcing activities of foreign MNEs can be a notable channel – and act through a multiplier effect – of regional structural transformation. Interestingly, the effect on all services and final demand services remains statistically equal to zero, although the point estimates are positive and higher than that in the fixed-effect analysis. First-stage regressions are reported in the bottom panel of Table 7. F-tests for weak instruments are sufficiently high and the statistical relevance of the instrument is strong. The negative sign in the first stage indicates that actual national foreign presence in manufacturing is

negatively correlated with the initial industry profile of regional economies, thus suggesting that, over the period 1998-2007, foreign MNEs targeted UK regions where there were fewer competitors in the same manufacturing sector, as defined on the basis of each region's 1997 industry mix.

[Table 7 around here]

5.3 Impact on knowledge-intensive services

We also consider an important extension of the above analysis: the differentiated impact of foreign MNEs in manufacturing on services that are characterised by heterogeneous knowledge content. The rise of knowledge-intensive services is acknowledged to be a fundamental feature of the current process of globalisation (see, for an extensive review, Ciarli et al., 2012). Activities characterised by lower knowledge content are more at risk of displacement within advanced economies, leading to rising individual and territorial inequalities (Coutts et al., 2007). Recent evidence emphasises strong co-agglomeration patterns between MNEs and knowledge-intensive business services (Jacobs et al., 2014), but the impact of MNEs on the growth of different types of services has received scant attention. Table 8 presents the results of a set of estimates for intermediate and final demand tertiary activities by distinguishing knowledge-intensive (KIS) and less-knowledge-intensive services (LKIS).

[Table 8 around here]

The table shows that the impact of foreign manufacturing MNEs is positive and significant for both KIS and LKIS for intermediate tertiary activities (columns 1 and 2), indicating that the latter as a whole tend to benefit from the greater outsourcing propensity of foreign companies operating in manufacturing industries. In other words, we do not detect any relevant differential effect for intermediate services characterised by diverse knowledge intensity: 1% increase in foreign

manufacturing employment in a region is associated with 0.49% and a 0.53% increases in service employment in KIS and LKIS respectively. Attracting foreign investment can thus produce multiplicative labour market effects that benefit a large pool of local workers employed in intermediate service occupations; these effects are much larger than those associated with domestic manufacturing activities, further corroborating the notion that outsourcing by MNEs is substantial. However, consistently with previous results, we detect no statistical significance of the effect of foreign presence on KIS and LKIS in final demand. Interestingly, column 4 indicates a potential crowding out effect on local LKIS employment (coefficient negative and insignificant). This might be explained by the fact that LKIS workers leave the final demand service sector to work in intermediate services because of higher job opportunities. Overall, the IV estimates reported in Table 8 do not allow us to infer that MNE-induced multiplicative effects on local labour markets are differentiated by the knowledge-intensity of tertiary activities: the main discriminant remains associated with the use of the services produced, that is, intermediate or final demand.

5.4 Geographical concentration of services

Finally, we extend our empirical analysis to study the impact of foreign MNEs in manufacturing on local service employment by considering the extent to which tertiary activities are geographically distributed. Indeed, the spatial distribution of service activities is fundamental to have a sense of the degree of tradability of specific services (e.g. Ciarli et al. 2012; Meliciani and Savona, 2015): highly geographically concentrated services are very likely to be more tradable (both domestically and internationally), while spatially-dispersed service activities tend to show lower levels of tradability. Following Faggio and Overman (2014), we apply a further categorisation of service

activities into three groups by degree of spatial concentration: high, medium and low.[10] The geographical distribution of services is an important aspect to be considered in order to examine whether the multiplicative effects of MNE presence benefit dispersed tertiary activities or tends to boosts services that are strongly agglomerated in some regions. In fact, foreign manufacturing MNEs investing in a travel to work area can establish demand linkages both with co-localised producers of non-tradable services and with more distant producers of tradable services. For instance, services such as 'Maintenance and repair of office, accounting and computing machines' show on average rather dispersed geographical patterns, indicating their mostly non-tradable nature. Thus, foreign MNEs purchasing these services are likely to establish business connections with providers in the same region. Conversely, tertiary activities such as 'Research and experimental development on natural science and engineering' are highly concentrated in space and can be easily traded across distance. Hence, foreign MNEs can engage in the purchase of this type of services even if they are located in a different region, thus contributing to the development of the service sector of core regions that serve as 'service hubs'. The latter are seemingly large metropolitan areas where 'the advantages of the inner city' make it convenient for producers of tradable services to locate (e.g. Porter, 1995; Kox and Rubalcaba, 2007).

[Table 9 around here]

Table 9 reports the results of a set of IV regressions for different groups of services by degree of geographical concentration, while Figure 2 reports graphically the findings by including examples of service activities for each group considered. In this analysis the separation between final demand and intermediate services is maintained, thus allowing taking into account the interaction between the spatial distribution of services and their market purpose. Columns 1 and 2 in Table 9 show the results for highly spatially concentrated services: the coefficient of foreign manufacturing

[10] Table A.3 in the Appendix reports this classification based on SIC 3-digits codes.

employment – albeit small and not significant – is negative for intermediate services, indicating that MNEs may displace local intermediate service producers. This might be explained by the fact that foreign MNEs outsource these highly tradable services through global production networks (Ernst and Kim, 2002; Yeung and Coe, 2015). In Figure 2, the insignificant negative effect just commented applies to 'Architectural and engineering activities and related technical consultancy' as well as 'Activities of investment trusts', that is, services that are simultaneously characterised by a high intermediate demand and spatial concentration. Conversely, foreign manufacturing MNEs show a positive ad significant impact on employment growth in geographically concentrated final demand services (column 2). This finding can hardly be explained by the outsourcing dynamics discussed so far: we suggest instead that FDI indirectly benefit employment in final demand services via an income effect. In other words, the presence of foreign firms that pay higher wages than domestic counterparts (Almeida, 2007) boosts the total demand for final services; furthermore, this indirect income effect reinforces service employment in areas where these services are clustered. Therefore, this type of final services is traded from a few regions to meet a growing national final demand. For instance, this category includes services such as 'Motion picture and video activities' as well as 'Repair of boots, shoes and other articles of leather', as suggested in Figure 2. Columns 3 and 4 of Table 9 report results for tertiary activities that are characterised by a medium degree of spatial concentration. Here our findings are in line with the outsourcing hypothesis: in fact, foreign MNEs benefit employment in intermediate rather than final demand services, although the sign of the coefficient for the latter remains positive. Therefore, once the extent of service tradability decreases, foreign MNEs establish outsourcing linkages with local service providers, thus contributing to their development: this is the case of 'Data processing' and 'Renting of automobiles, transport equipment and machinery' in Figure 2. Finally, columns 5 and 6 present the results for spatially dispersed tertiary activities. In this group we mainly find non-

tradable services and the IV results are again consistent with the postulated outsourcing idea: that is, foreign operations in manufacturing provide local intermediate service producers with relevant employment opportunities. This effect is statistically strong and significant; Figure 2 suggests that this type of activities include services such as "Accounting, book-keeping and other auditing activities" as well as occupations related to "Industrial cleaning". We also find a negative effect of FDI on final service employment, although this is not significant and very small in magnitude.

6. Concluding remarks

This paper has examined the role of foreign manufacturing MNEs in facilitating regional structural change towards a service-based economy. We conjectured that service outsourcing by foreign MNEs operating in manufacturing industries represents a considerable force stimulating employment in the service sector through the outsourcing of services to specialised firms within the same region, thus providing them with opportunities in terms of employment growth. By using plant-level data in the UK, we first estimated the average difference in service outsourcing between foreign- and domestic-owned plants in manufacturing. Our findings corroborate the hypothesis that foreign MNEs establish stronger demand linkages with regional service providers vis-à-vis their domestic counterparts. Secondly, we estimated the contribution of foreign manufacturing presence to service employment within UK travel-to-work-areas by means of panel fixed effects estimates as well as an IV strategy. Results suggest a notable multiplicative effect, which is however robust only for intermediate services. While the composition of this effect tends to be homogeneous in terms of the knowledge content of services, high heterogeneity is found once the degree of spatial concentration is accounted for.

As such, this evidence provides interesting insights on the inter-macro sector dynamics associated with foreign presence in manufacturing, a rather neglected area of inquiry on MNE impact, but crucial for understanding regional structural change and territorial imbalances. Our results, once validated by further analysis beyond the UK case studied here, are also of considerable policy interest, as they suggest that foreign MNEs in manufacturing can indeed have beneficial employment effects via service outsourcing, although not all categories of tertiary activities benefit from the foreign presence in a region, and not all regions take advantage of their employment multiplier. Different development trajectories are triggered by structural opportunities and constraints, some of which embedded in the characteristics of local production and innovation systems, and others provided by the interaction with the global reconfiguration of value added creation through spatial and a-spatial networks (Andreoni and Scazzieri, 2014). Understanding and managing structural change thus call for modular and multilevel place-sensitive policies tailored for exploiting opportunities and removing constraints at the same time across space (Iammarino et al., 2017). Sustaining prosperity in the core regions, while addressing structural inertia and lack of opportunity in peripheral areas, has become the true policy challenge for sustainable development and territorial resilience, as regional inequality in advanced economies is not only becoming economically inefficient, but also socially and politically dangerous.

References

Abraham K. and Taylor S., 1996. Firms' use of outside contractors: Theory and evidence. *Journal of Labor Economics* **14**(3), 394-424.

Abramovsky L., Griffith R. and Sako M., 2004. Offshoring of business services and its impact on the UK economy. *Briefing Note BN5*, Institute for Fiscal Studies.

Abreu M., Grinevich V., Kitson M., Savona M., 2010. Policies to enhance the 'hidden' innovation in services: evidences and lessons from the UK. *The Service Industries Journal* **30**, 99–118.

Almeida R., 2007. The labor market effects of foreign owned firms. *Journal of International Economics* **72**, 75-96.

Andreoni, A. and Scazzieri A., 2014. Triggers of change: structural trajectories and production dynamics. *Cambridge Journal of Economics* **38**, 1391–1408

Ascani A., 2017. The takeover selection decisions of multinational enterprises: Empirical evidence from European target firms. Mimeo, London School of Economics.

Ascani A. and Gagliardi L., 2015. Inward FDI and local innovative performance: An empirical investigation on Italian provinces. *Review of Regional Research* **35**(1), 29-47.

Barba Navaretti G. and Venables A.J., 2004. *Multinational Firms in the World Economy*. Princeton, NJ: Princeton University Press.

Bartik T., 1991. Who benefits from state and local economic development policies? *Upjohn Institute Press*, Kalamazoo.

Berlingieri G., 2014. Outsourcing and the rise in services. *CEP Discussion Paper* No.1199.

Bernard A., Jensen J.B., Redding S.J. and Schott P.K., 2007. Firms in international trade. *The Journal of Economic Perspectives* **21** (3), 105-130.

Blalock G. and Gertler P. J. 2008. Welfare gains from Foreign Direct Investment through technology transfer to local suppliers. *Journal of International Economics* **74** (2), 402-21.

Boschma R., 2015. Towards an evolutionary perspective on regional resilience. *Regional Studies* **49**(5), 733-751.

Buckley P.J. and Casson M.C. 1976. *The Future of Multinational Enterprise*. London: Macmillan.

Cantwell J.A. and Narula R. 2001. The eclectic paradigm in the global economy. *International Journal of the Economics of Business* **8**(2), 155–172.

Castellani D., Meliciani V. and Mirra L., 2016. The determinants of inward foreign direct investment in business services across European regions. *Regional Studies* **50**, 671-691.

Christopherson S., Michie J and Tyler P., 2010. Regional resilience: Theoretical and empirical perspectives. *Cambridge Journal of Regions, Economy and Society* **3**, 3-10.

Ciarli T., Meliciani V. and Savona M., 2012. Knowledge dynamics, structural change and the geography of business services. *Journal of Economic Surveys* **26**: 445–467

Contractor F., Kumar V., Kundu S. and Pedersen T., 2010. Reconceptualising the firm in a world of outsourcing and offshoring: The organizational and geographical relocation of high-value company functions. *Journal of Management Studies* **47**(8), 1417-1433.

Coutts K., Glyn A. and Rowthorn B., 2007. Structural change under the New Labour. *Cambridge Journal of Economics* **31**, 845-861.

Crescenzi R., Gagliardi L. and Iammarino S., 2015. Foreign Multinationals and domestic innovation: intra-industry effects and firm heterogeneity. *Research Policy*, 44:3, 596–609.

Crespo N. and Fontoura M. P. 2007). Determinant factors of FDI spillovers - What do we really know? *World Development* **35** (3), 410-25.

Criscuolo C., Martin R., Overman H. And Van Reenen J., 2012. The causal effects of an industrial policy. *NBER Working Paper N.17842*.

Desmet K. and Rossi-Hansberg E., 2009. Spatial growth and industry age. *Journal of Economic Theory* **144**, 2477-2502.

Driffield N. and Taylor K. 2000. FDI and the labour market: A review of the evidence and policy implications. *Oxford Review of Economic Policy* **16** (3), 90-103.

Ernst D. and Kim L., 2002. Global production networks, knowledge diffusion, and local capability formation. *Research Policy* **31**, 1417-1429.

Faggio G. and Overman H., 2014. The effects of public sector employment on local labour markets. *Journal of Urban Economics* **79**, 91-107.

Foster A. and Rosenzweig M., 2008. Economic development and the decline of agricultural employment. *Handbook of Development Economics* **4**, 3051-3083.

Frenz M. and Ietto- Gillies G., 2007. Does multinationality affect the propensity to innovate? An analysis of the third UK Community Innovation Survey. *International Review of Applied Economics* **21**(1), 99-117.

Girma S., Greenaway D., and Wakelin K. 2001. Who benefits from foreign direct investment in the UK? *Scottish Journal of Political Economy* **48** (2), 119-33.

Girma S. and Görg H., 2004. Outsourcing, foreign ownership, and productivity: Evidence from UK establishment-level data. *Review of International Economics* **12**, 817-832.

Görg H. and Greenaway D. 2004. Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *World Bank Research Observer* **19** (2), 171-97.

Haskel J., Pereira S. and Slaughter M., 2007. Does Inward Foreign Direct Investment Boost the Productivity of Domestic Firms? *Review of Economics and Statistics* **89**(3), 482-496.

Herrendorf B., Rogerson R. and Valentinyi A., 2013. Two perspectives on preferences and structural transformation. *American Economic Review* **103**(7), 2752-2789.

Iammarino S. and McCann P., 2013. *Multinationals and Economic Geography. Location Technology and Innovation*. Edward Elgar.

Iammarino S., Rodriguez-Pose A. and Storper, M., 2017. Why regional development matters for Europe's economic future? European Commission WP 07-2017 DG Regional and Urban

Policy, http://ec.europa.eu/regional_policy/en/information/publications/working-papers/2017/why-regional-development-matters-for-europe-s-economic-future

Jacobs W., Koster H. and van Oort F., 2014. Co-agglomeration of knowledge-intensive business services and multinational enterprises. *Journal of Economic Geography* **14**, 443-475.

Javorcik B., 2004. Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review* **94**(3), 605-627.

Javorcik B. S. and Spatareanu M. 2008. To share or not to share: Does local participation matter for spillovers from foreign direct investment? *Journal of Development Economics,* **85** (1-2), 194-217.

Kox, H. L. M., Rubalcaba, L. 2007. Business services and the changing structure of European economic growth. MPRA Paper no. 3750.

Lorentz A. and Savona M., 2008. Evolutionary micro-dynamics and changes in the economic structure. *Journal of Evolutionary Economics* **18**, 389-412.

Marin D., 2006. A new international division of labor in Europe: Outsourcing and Offshoring to Eastern Europe. *Journal of the European Economic Association* **4**, 612-622.

Martin R. and Sunley P., 2015. On the notion of regional economic resilience: Conceptualization and explanation. *Journal of Economic Geography* **15**, 1-42.

McCann P., 2016. *The UK Regional-National Economic Problem*. Routledge: Abington UK, and New York.

Meliciani V. and Savona M., 2015. The determinants of regional specialisation in business services: agglomeration economies, vertical linkages and innovation. J*ournal of Economic Geography* **15**, 387–416.

Montresor S. and Vittucci Marzetti G., 2011. The deindustrialisation/tertiarisation hypothesis reconsidered: a subsystem application to the OECD 7. *Cambridge Journal of Economics* **35**, 401-421.

Moretti E., 2010. Local Multipliers. *American Economic Review Papers and Proceedings* **100**(2), 1–7.

O'Farrell P., 1995. Manufacturing demand for business services. *Cambridge Journal of Economics* **19**, 523-543.

Oulton, 1997. The ABI respondents database: A new resource for industrial economics research. *Economic Trends* **528**, 46-57.

Pasinetti L., 1981. *Structural Change and Economic Growth. A Theoretical Essay on the Dynamics of the Wealth of Nation*. Cambridge University Press, Cambridge.

Penrose E., 1959. *The Theory of the Growth of the Firm*. John Wiley and Sons.

Poole J., 2013. Knowledge transfers from multinational to domestic firms: Evidence from worker mobility. *Review of Economics and Statistics* **95**(2), 393-406.

Porter M., 1995. The competitive advantage of the inner city. *Harvard Business Review*. May-June, 55-71.

Quinn J. B. and Hilmer F. G., 1994. Strategic outsourcing. *Sloan Management Review* **35**(4), 43-55.

Saviotti P., 1996. *Technological Evolution, Variety and the Economy*. Edward Elgar, Cheltenham.

Wang J. Y. and Blomstrom M. 1992. Foreign-Investment and Technology-Transfer - a Simple-Model. *European Economic Review* **36** (1), 137-55.

Yeung H. and Coe N., 2015. Toward a dynamic theory of global production networks. *Economic Geography* **91**, 29-58.

Table 1: Domestic- and foreign-owned manufacturing plants in the UK, 1997-2007

Region	Domestic		Foreign		Total
	n	%	n	%	n
North East	5,837	85.3	1,005	14.7	6,842
North West	18,060	87.4	2,608	12.6	20,668
Yorkshire and the Humber	15,552	89.1	1,905	10.9	17,457
East Midlands	13,129	88.6	1,685	11.4	14,814
West Midlands	16,058	87.3	2,344	12.7	18,402
Eastern	13,208	87.7	1,852	12.3	15,060
London	9,579	88.7	1,218	11.3	10,797
South East	16,958	87.3	2,456	12.7	19,414
South West	11,453	87.5	1,638	12.5	13,091
Wales and Northern Ireland	8,748	86.0	1,420	14.0	10,168
Scotland	15,291	87.7	2,142	12.3	17,433
Total	143,873	87.6	20,273	12.4	164,146

Note: foreign and domestic plants are defined on the nationality of the ultimate owner

Table 2: Share of foreign employment in manufacturing by region

Region	1997	2007
North East	19.4	25.4
North West	13.7	16.1
Yorkshire and the Humber	10.5	17.2
East Midlands	10.6	18.4
West Midlands	13.6	23.5
Eastern	13.8	17.8
London	12.6	18.9
South East	12.5	19.1
South West	13.3	23.6
Wales and Northern Ireland	20.9	28.7
Scotland	19.1	19.9

Note: foreign and domestic plants are defined on the nationality of the ultimate owner

Table 3: Share of total service employment by region

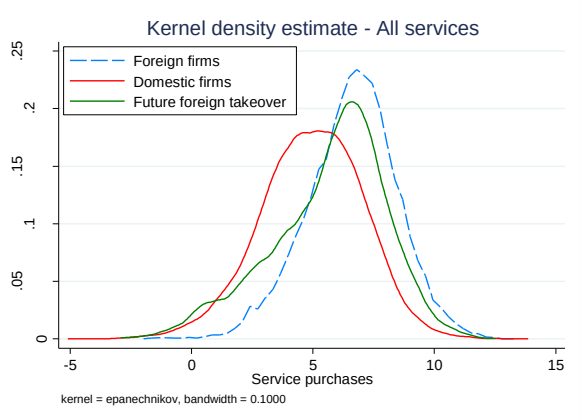
Region	1997	2007
North East	89.7	92.4
North West	89.7	91.2
Yorkshire and the Humber	88.0	91.3
East Midlands	85.8	90.8
West Midlands	85.3	90.6
Eastern	89.2	92.5
London	91.7	95.2
South East	90.7	93.6
South West	89.9	92.6
Wales and Northern Ireland	87.7	90.1
Scotland	91.0	93.1

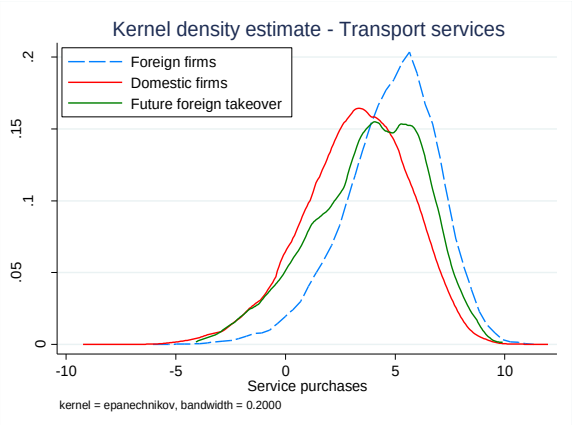
Table 4: Descriptive statistics for domestic-owned and foreign-owned plants

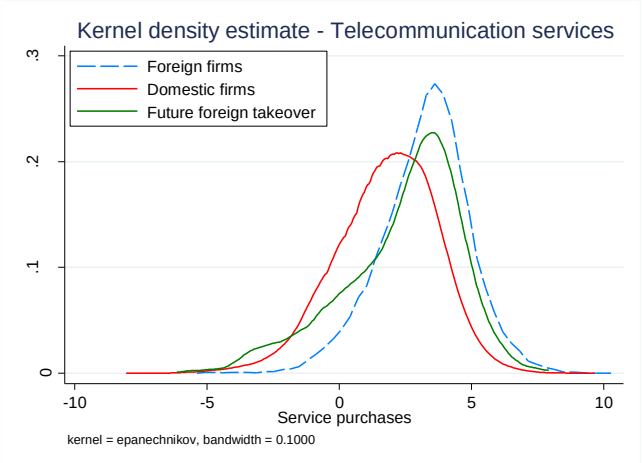
Variable	Obs.	Mean	SD
	Domestic plants		
Purchase of services			
All services	143,873	1181.58	6932.7
Transport	143,873	233.64	1009.69
Telecommunication	143,873	29.54	149.2
Computer	143,873	67.88	829.23
Advertisement	143,873	214.86	2167.02
Other services	143,873	635.66	4676.22
Other variables			
Capital	143,873	479.65	4280.7
Employment	143,873	91.11	256.16
Turnover	143,873	10966.47	57877.60
	Foreign plants		
Purchase of services			
All services	20,273	3550.43	12640.82
Transport	20,273	665.95	2022.36
Telecommunication	20,273	95.6	398.21
Computer	20,273	186.43	1156.65
Advertisement	20,273	725.29	4370.20
Other services	20,273	1877.17	8202.47
Other variables			
Capital	20,273	1477.67	7695.23
Employment	20,273	188.51	389.34
Turnover	20,273	39860.68	185485.00

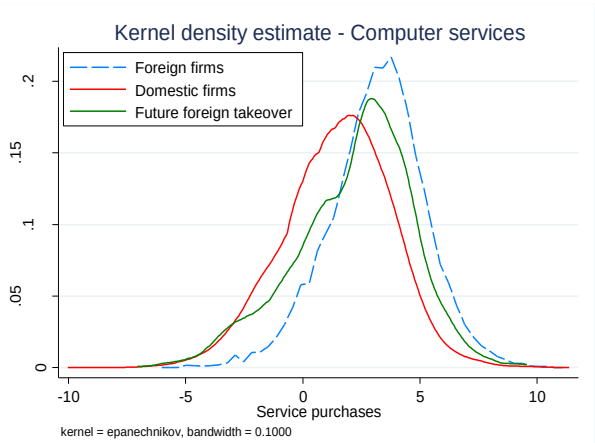
Note: foreign and domestic plants are defined on the nationality of the ultimate owner

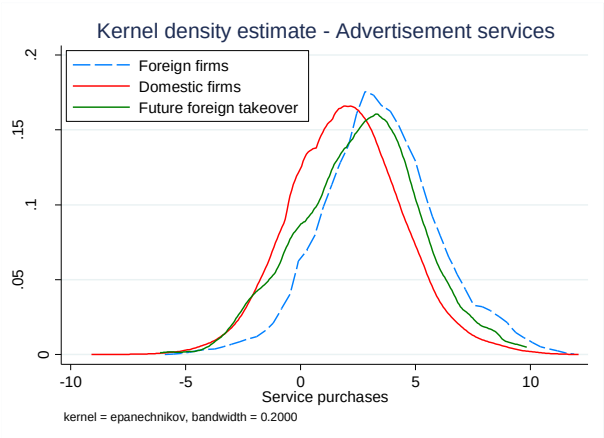
Figure 1: Kernel density estimates of services purchase











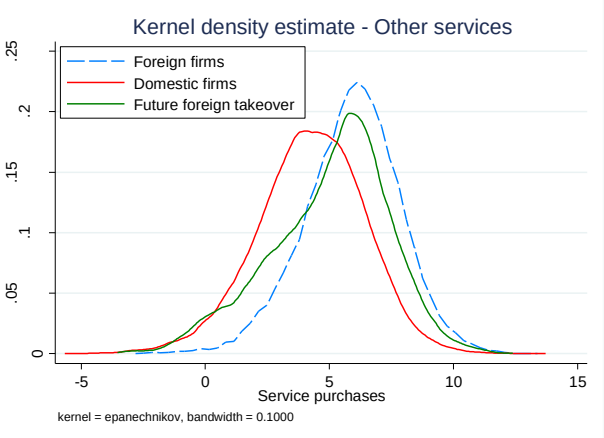


Table 5: Foreign ownership and service outsourcing, plant-level OLS estimates.

	(1) All services	(2) Transport	(3) Telecomm.	(4) Computer	(5) Advert.	(6) Other services
Foreign	0.164***	0.140***	0.138***	0.140***	0.066*	0.158***
	(0.021)	(0.0374)	(0.023)	(0.038)	(0.040)	(0.029)
Future foreign takeovers	0.056**	0.068*	0.026	0.058*	0.109**	0.076**
	(0.025)	(0.037)	(0.025)	(0.035)	(0.044)	(0.034)
Ln capital	0.100***	0.102***	0.087***	0.108***	0.097***	0.096***
	(0.09)	(0.008)	(0.005)	(0.006)	(0.006)	(0.011)
Ln employment	0.275***	0.282***	0.315***	0.349***	0.247***	0.301***
	(0.026)	(0.028)	(0.019)	(0.020)	(0.024)	(0.031)
Ln turnover	0.673***	0.679***	0.571***	0.639***	0.674***	0.622***
	(0.029)	(0.030)	(0.020)	(0.020)	(0.022)	(0.035)
Year FEs	Y	Y	Y	Y	Y	Y
Industry FEs	Y	Y	Y	Y	Y	Y
TTWA FEs	Y	Y	Y	Y	Y	Y
Observations	164,146	164,146	164,146	164,146	164,146	164,146
R^2	0.844	0.763	0.820	0.777	0.700	0.768
Adj-R^2	0.844	0.762	0.819	0.776	0.698	0.767

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at firm level.

Table 6: Impact of foreign employment on service employment, fixed-effects estimates

	(1) All services	(2) All services	(3) Intermediate services	(4) Final demand services
ln foreign employment$_{t-1}$	0.004**	0.006**	0.057***	0.009**
	(0.0019)	(0.0024)	(0.013)	(0.004)
ln domestic employment$_{t-1}$		0.016***	0.275***	0.024***
		(0.005)	(0.028)	(0.009)
ln economic size$_{t-1}$		0.011**	0.074***	0.017**
		(0.005)	(0.019)	(0.0085)
ln average wage$_{t-1}$		-0.023***	0.351***	-0.032***
		(0.006)	(0.017)	(0.011)
TTWA FEs	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y
Observations	2450	2450	2450	2450
R^2	0.27	0.28	0.32	0.13

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Impact of foreign employment on service employment, 2SLS estimates

	(1) All services	(2) Intermediate services	(3) Final demand services
ln foreign employment$_{t-1}$	0.008	1.065***	0.027
	(0.017)	(0.251)	(0.027)
ln domestic employment$_{t-1}$	0.015**	0.382***	0.021**
	(0.006)	(0.048)	(0.011)
ln economic size$_{t-1}$	-0.010	0.219***	-0.013
	(0.006)	(0.051)	(0.010)
ln average wage$_{t-1}$	-0.024**	-0.469**	-0.042**
	(0.011)	(0.192)	(0.018)
TTWA FEs	Y	Y	Y
Time dummies	Y	Y	Y
Observations	2450	2450	2450
	First stage estimates		
Predicted foreign employment$_{t-1}$	-0.336***	-0.185***	-0.335***
	(0.048)	(0.040)	(0.048)
First stage F-stat	13.24	12.24	13.33

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. First stage estimates in the bottom panel include the covariates indicated in each column.

Table 8: Impact of foreign employment on employment in KIS and LKIS, 2SLS estimates

	(1)	(2)	(3)	(4)
	Intermediate services		Final demand services	
	KIS	LKIS	KIS	LKIS
ln foreign employment$_{t-1}$	0.494***	0.531***	0.141	-0.009
	(0.089)	(0.091)	(0.104)	(0.0204)
ln domestic employment$_{t-1}$	0.149***	0.135***	0.006	0.017**
	(0.043)	(0.045)	(0.024)	(0.008)
ln economic size$_{t-1}$	0.351***	0.376***	0.019	-0.010
	(0.060)	(0.062)	(0.025)	(0.008)
ln average wage$_{t-1}$	0.238***	0.249***	-0.099*	-0.011
	(0.026)	(0.027)	(0.057)	(0.013)
TTWA FEs	Y	Y	Y	Y
Time dummies	Y	Y	Y	Y
Observations	2450	2450	2450	2450
	First stage estimates			
Predicted foreign employment$_{t-1}$	-0.411***	-0.410***	-0.154**	-0.336***
	(0.044)	(0.044)	(0.066)	(0.48)
First stage F-stat	10.15	10.13	13.02	13.24

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. First stage estimates in the bottom panel include the covariates indicated in each column.

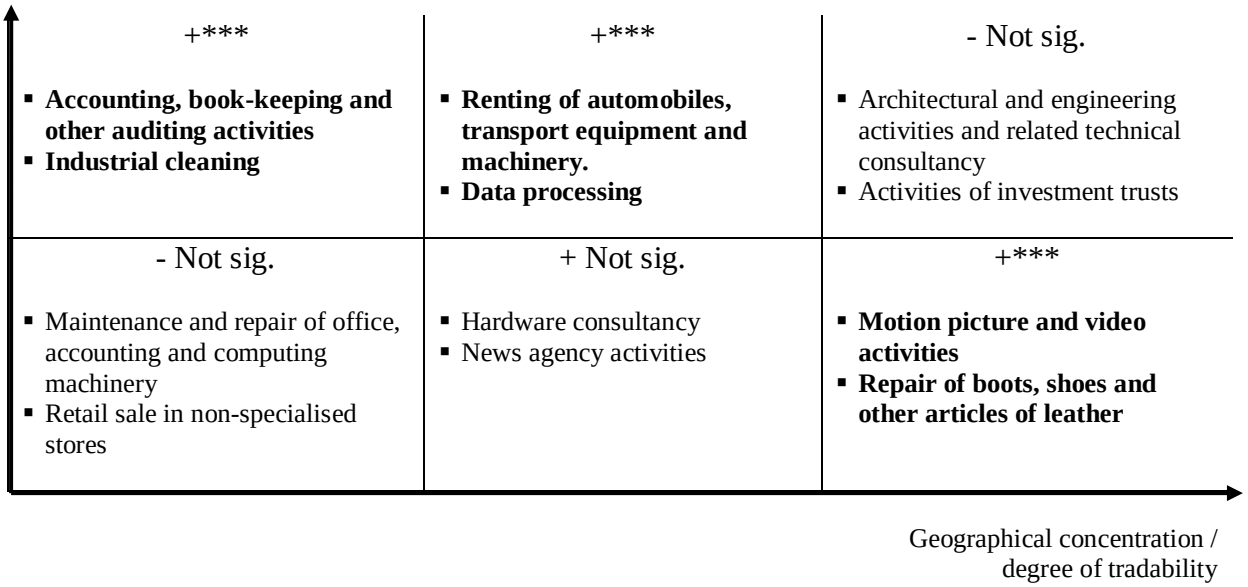
Table 9: Impact of foreign employment on service employment, 2SLS analysis by geographical concentration of services

	(1)	(2)	(3)	(4)	(5)	(6)
	Highly-concentrated		Medium-concentrated		Dispersed	
	Intermediate	Final demand	Intermediate	Final demand	Intermediate	Final demand
ln foreign employment$_{t-1}$	-0.019	0.482***	0.508***	0.016	0.527***	-0.010
	(0.076)	(0.069)	(0.090)	(0.029)	(0.091)	(0.020)
ln domestic employment$_{t-1}$	0.040	0.116***	0.145***	0.036***	0.133***	0.012
	(0.030)	(0.034)	(0.044)	(0.011)	(0.045)	(0.008)
ln economic size$_{t-1}$	-0.0001	0.332***	0.363***	-0.008	0.374***	-0.010
	(0.029)	(0.047)	(0.061)	(0.011)	(0.062)	(0.008)
ln average wage$_{t-1}$	-0.025	0.221***	0.236***	-0.027	0.245***	-0.007
	(0.049)	(0.020)	(0.026)	(0.019)	(0.027)	(0.013)
TTWA FEs	Y	Y	Y	Y	Y	Y
Time dummies	Y	Y	Y	Y	Y	Y
Observations	2450	2450	2450	2450	2450	2450
	First stage estimates					
Predicted foreign employment$_{t-1}$	-0.336***	-0.411***	-0.410***	-0.335***	-0.410***	-0.336***
	(0.048)	(0.044)	(0.045)	(0.048)	(0.045)	(0.048)
First stage F-stat	13.18	10.32	10.15	13.24	10.13	13.24

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. First stage estimates in the bottom panel include the covariates indicated in each column.

Figure 2: Summary of results and examples of services by category

Intermediate intensity



Geographical concentration / degree of tradability

Appendix

Table A.1: Variables list

Variable	Definition
	A. Plant level
Foreign	Dummy equal to 1 if a plant is foreign-owned at time *t*; 0 otherwise
Future foreign takeover	Dummy equal to 1 if a plant is domestic but will be acquired by a foreign MNE during the sample period
All services	Total purchase of services
Transport	Purchase of road transport services
Telecommunication	Purchase of telecommunication services
Computer	Purchase of computer services
Advertisement	Purchase of advertisement services
Other services	Purchase of other services
Capital	Capital stocks
Employment	Number of employees
Turnover	Turnover (excl. VAT)
	B. Regional level (TTWA)
Service employment	Total employment in services
Foreign employment	Total manufacturing employment in foreign-owned plants
Domestic employment	Total manufacturing employment in domestic-owned plants
Economic size	Total turnover
Average wage	Average wage paid by plants in a region

Table A.2: List of SIC 2-digits intermediate and final demand services, based on UK Supply and Use Tables for 1997

Intermediate services (>50% output sold to intermediate demand)
Waste collection, treatment and disposal services; materials recovery services
Telecommunications services
Information services
Financial services, except insurance and pension funding
Legal services
Accounting, bookkeeping and auditing services; tax consulting services
Services of head offices; management consulting services
Architectural and engineering services; technical testing and analysis services
Advertising and market research services
Other professional, scientific and technical services
Rental and leasing services
Employment services
Security and investigation services
Services to buildings and landscape
Office administrative, office support and other business support services
Final demand services (>50% output sold to final demand)
Sewerage services; sewage sludge
Construction
Wholesale and retail trade and repair services of motor vehicles and motorcycles
Wholesale trade services, except of motor vehicles and motorcycles
Retail trade services, except of motor vehicles and motorcycles
Accommodation services
Food and beverage serving services
Publishing services
Motion Picture, Video & TV Production, Sound Recording & Music Publishing & Programming And Broadcasting
Computer programming, consultancy and related services
Insurance and reinsurance, except compulsory social security & Pension funding
Services auxiliary to financial services and insurance services
Real estate services, excluding on a fee or contract basis and imputed rent
Real estate activities on a fee or contract basis
Scientific research and development services
Creative, arts and entertainment services
Gambling and betting services
Sports services and amusement and recreation services

Table A.3: List of SIC 3-digits services by geographical concentration (based on Faggio and Overman, 2014)

Geographically dispersed services
Construction services[a]
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
Retail sale in non-specialised stores; Retail sale of food, beverages and tobacco in specialized stores; Retails sale of pharmaceutical and medical goods, cosmetic and toilet articles; Other retail sale of new goods in specialized stores; Retail sale of second-hand goods in stores; Retail sale not in stores, except other non-store retail sale
Camping sites and other provision of short-stay accommodation; Restaurants; Bars; Canteens and catering
Monetary intermediation, except central banking; Financial leasing[b]
Renting of personal and households goods not elsewhere classified
Maintenance and repair of office, accounting and computing machinery
Accounting, book-keeping, auditing activities, and tax consultancy[b]; Industrial cleaning; Miscellaneous business activities not elsewhere classified
Sewage and refuse disposal, sanitation and similar activities
Library and archive activities[b]; Operation of sports arenas and stadiums[b]; gambling and betting activities[b]; Washing and dry cleaning of textile and fur products[b]
Medium geographically concentrated services
Wholesale on a fee or contract basis; Wholesale of food, beverages and tobacco; Wholesale of household goods; Wholesale of machinery, equipment and supplies; Other wholesale
Other non-store retail sale[b]
Repair of electrical household goods[b]; Repair of watches, clocks and jewellery[b]; Repair not elsewhere classified[b]
Hotels
Central banking[b]; Other credit granting[b]; Insurance and pension funding, except compulsory social security; Activities auxiliary to insurance and pension funding
Real estate activities with own property; Letting own property; Real estate activities on a fee or contract basis; Renting of automobiles; Renting of other transport equipment; Renting of other machinery and equipment; Hardware consultancy; Software consultancy and supply; Data processing; Database activities; Other computer related activities; Legal activities[b]; Market research and public opinion polling[b]; Business and management consultancy[b]; Management activities of holding companies; Technical testing and analysis; Advertising; Labour recruitment and provision of personnel; Investigation and security activities
Activities of business, employers and professional organisations; Activities of political organisations[b]; Other entertainment activities; News agency activities; Museums activities and preservation of historical sites and buildings[b]; Botanical and zoological gardens and nature reserve activities[b]; Other sporting activities[b]; Other services activities, except washing and dry cleaning of textile and fur products
Highly geographically concentrated services
Wholesale of agricultural raw materials and live animals; wholesale of non-agricultural intermediate products, waste and scrap
Repair of boots, shoes and other articles of leather[b]
Other financial intermediation not elsewhere classified[b]; Activities auxiliary to financial intermediation, except insurance and pension funding
Research and experimental development on natural science and engineering; Research and experimental development on social sciences and humanities; Architectural and engineering activities and related technical consultancy
Activities of trade unions; Motion picture and video activities; radio and television activities

Notes: [a]2-digits; [b] 4-digits.