Talents from Abroad.
Foreign Managers and Productivity in the United Kingdom.

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Abstract

In this paper, we test the contribution of foreign management to firms' competitiveness. We use a novel dataset on the careers of $165,084$ managers employed by $13,106$ companies in the United Kingdom in 2009-2017. We find that domestic manufacturing firms become on average 4.9% more productive and about 23.3% more capital intensive after hiring foreign managers. In particular, we find that previous industry-specific experience by foreign managers is the primary driver of productivity gains in domestic firms. We do not find any significant impact on foreign-owned firms after hiring foreign managers. Our identification strategy combines matching techniques, difference-in-difference, and pre-recruitment trends to challenge reverse causality. Results are robust across different specifications and to sample composition effects. Eventually, our findings pinpoint how limits to the global mobility of managerial talents risk hampering the competitiveness of domestic industries.

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1   Introduction

Over the last decades, workers' mobility has increased dramatically. There are already about 164 million migrant workers around the world (ILO, 2018) and, according to Baldwin (2016, 2019), we should expect an ever-increasing global mobility of workers in the future years after the adoption of new information technologies and further reduction in travel costs. From this perspective, UK is a compelling case study of a country where foreign employment has risen from 3.54% to 11.33% in the period 1997-2019 (ONS, 2019). Indeed, the United Kingdom has been a desirable destination in the last decades, and a boost in immigration rates has been at the core of the referendum campaign that supported exit from the European Union. Crucially, workers' international mobility facilitates transfer of knowledge among firms (Bahar and Rapoport, 2018), possibly reducing transaction costs after they bring valuable information on their origin countries (Gould, 1994; Parsons and Vézina, 2018). The diversity brought by migrant workers can contribute to firms' relational capital and ability to market products internationally (Parrotta et al., 2014). In the long run, host countries are better off thanks to greater product variety available in consumption and intermediate inputs (di Giovanni et al., 2015). Nationality diversity among managers has also shown to be positively associated with firm performance (Nielsen and Nielsen, 2013).

In this study, we specifically test how firms' competitiveness is affected by the mobility of a peculiar category of high-skilled workers, the managers, as vital contributors to any firm's organization. From our point of view, a (domestic or foreign) manager's ability to transfer knowledge from previous positions is revealed when she implements better managerial practices[1] that determine the way other workers organize their productive activities. Yet, scholars have been rather silent on the relationship between foreign management and productivity while prioritizing the impact on export performance (Meinen et al., 2018; ?). From our perspective, the nexus between organization and productivity is of primary order: foreign managers can have an impact (or not) on firms' productive capabilities, which in turn may lead (or not) to better export performance. Eventually, talents from abroad may bring tacit knowledge that is beneficial to a firm whatever its strategy on domestic or foreign markets.

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[1]Our reference is to seminal works that show how good managerial practices explain differences in productivities across firms and countries (Bloom et al., 2016, 2014; Bloom and Van Reenen, 2010, 2007; Bertrand and Schoar, 2003). See more details in Section 2.

We find that the recruitment of foreign managers has a positive and significant impact (4.9%) on the Total Factor Productivity (TFP) of domestic firms. In contrast, we detect no statistically significant impact of foreign managers' recruitment on foreign-owned companies' productivity, possibly because alignments on managerial practices already occurred at the moment of a takeover by foreign headquarters. We find that productivity gains in domestic firms are mostly due to industry-specific experience gathered by foreign managers in previous positions. We argue that market-specific knowledge allows recruiting firms to increase both efficiency and volume of activity since we observe *ex-post* increases in revenues, usage of intermediate inputs, and investment in fixed assets.

For our analyses, we take advantage of a novel dataset that matches the individual careers of 165,084 managers and the financial accounts of 13,106 firms in the United Kingdom in the period 2009-2017. From our perspective, the UK is a compelling case study of a country that is revising migration policies after exiting from the European Union. We assess firms' competitiveness by estimating Total Factor Productivity (TFP) *à la* Ackerberg et al. (2015), and we make our findings robust to alternative methods by Wooldridge (2009) and Levinsohn and Petrin (2003). Our identification strategy encompasses difference-in-difference estimates controlling for pre-recruitment trends after implementing a propensity score matching that pairs treated firms with nearest untreated neighbors along with different firm-level characteristics (Abadie and Imbens, 2006; Imbens et al., 2004; Rubin, 2001). In our empirical setup, we build on previous scholars' experience that tested productivity gains as a consequence of foreign acquisitions (Bircan, 2019; Arnold and Javorcik, 2009; Javorcik and Poelhekke, 2017). Our findings are robust to challenges on reverse causality, sample composition effects, and alternative TFP methodologies.

The remainder of the paper is organized as follows. Section 2 discusses our framework by nesting in previous literature. Section 3 describes the data set and draws attention to preliminary evidence. Section 4 introduces results on the relationship between foreign management, market experience, and firms' competitiveness. Section 5 discusses sensitivity and robustness checks. Section 6 concludes.

2 Related literature

The fundamental idea that good management correlates with efficient usage of inputs is an old one that we date back to Walker (1887). However, empirical studies had to wait for good microdata on managers and managerial practices (Syverson, 2011). In the last decade, a fruitful research line highlights how different managerial practices can explain part of the productivity gap across both firms and countries (Bloom et al., 2019; Bruhn et al., 2018; Bloom et al., 2016, 2012; Bloom and Van Reenen, 2010, 2007; Bertrand and Schoar, 2003). Recently, a study by Giorcelli (2019) shows how specific management training can have an enduring impact on firms' performances, up to fifteen years after the end of the program.

We relate to the above strand of research because we look at the role of foreign talents after we assume that the main channel through which any (domestic or foreign) manager can impact productivity is by setting good managerial practices. Our primary intuition is that foreign managers are a peculiar category of high-skilled migrants like engineers, researchers, and other professionals (Nathan, 2014), whose occupation often requires a combination of advanced training and soft skills. Since we already know from previous works that migrant workers increase the TFP of firms in a region or a country (Beerli et al., 2018; Mitaritonna et al., 2017), we reasonably expect that foreign managers have no lesser impact given their crucial role in any firm's organization. In a general equilibrium model, Fadinger and Mayr (2014) show how an increase in the share of skilled migrants can reduce unemployment rates and brain drain in a country, with a magnitude that depends on the elasticity of substitution between skilled and unskilled workers. In the end, the international geography of skills can have aggregate and distributional impacts with significant consequences from a global perspective (Burzynski et al., 2020).

Our contribution also relates to previous works that test the causality direction from recruitment managers to better export performance (Meinen et al., 2018; Mion et al., 2016; Mion and Opromolla, 2014). From our viewpoint, we argue that the study of the impact on productivity is of primary importance. An evaluation of firms' productivity gains should logically precede any increase in exporting activity. Indeed, recruited talents can be beneficial to firms whatever their strategies on foreign markets. Thus, a company can benefit (or not) from changes in managerial practices implemented by recruits, first improve competitiveness, and then propose better on international markets. We believe our approach is in line with previous scholarly efforts to predict

firms' self-selection by productivity into an international status when trade is costly (Melitz, 2003; Helpman et al., 2004; Melitz and Ottaviano, 2008; Conconi et al., 2016). Against this background, our stand is not in contradiction with the possibility that some workers, including managers, are indeed poached to reduce transaction costs and trade with specific destinations (Gould, 1994; Parsons and Vézina, 2018). In this case, one would still observe an improvement in productivity due to lower trade costs, and then a boost in either imports or exports, as demonstrated in the case of foreign workers in UK services firms by Ottaviano et al. (2018).

Interestingly, in our contribution, we find that foreign managers' recruitment has a significant impact on domestic firms' productivity, thanks to the experience that recruits previously gathered in the same sector of the recruiting firms. Thus, our findings could not exclude that firms poach managers to reduce transaction costs on foreign markets. We find that recruiting events pave the way for a rise in domestic firms' activity (i.e., higher revenues, expenses on intermediate inputs, and investment in fixed assets) and increased domestic firms' capital intensity.

Please note, however, that we do not find any significant productivity gains by foreign-owned firms after recruiting foreign managers. Nor do they increase their volumes of activity after recruiting events. In this case, we argue that earlier alignment of managerial practices with foreign headquarters could have already occurred at the moment of the ownership takeover.

For our identification strategy, we build on previous scholars' experience on testing the relationship between productivity and foreign acquisitions (Bircan, 2019; Arnold and Javorcik, 2009). As in the case of foreign takeovers, we aim to challenge reverse causality. Best (domestic or foreign) managers are attracted by firms, locations, and industries with a higher potential. Thus, following previous literature, we explicitly check for firms' pre-recruiting trends and managers' cherry-picking firms and regions. In particular, regional heterogeneous attractivity is a crucial confounding element once we acknowledge that most productive firms locate in denser and urban areas (Combes et al., 2012). Against previous evidence, we recognize that supply-driven changes in immigrant workers' endowments can increase local benefits from assortative matching (Orefice and Peri, 2020; Dauth et al., 2018), hence having an indirect impact on firm-level productivities.

Eventually, we provide evidence that domestic manufacturing firms with foreign managers in their team are not significantly different in productivity from foreign-owned firms with or without foreign managers. We argue that the recruitment of talents from

abroad is a strategy that may allow domestic firms to catch-up with foreign competitors. In this respect, we believe that the workforce's international composition is a further dimension that deserves more room by scholars interested in firms' global outreach, for example, in Bernard et al. (2018).

Finally, we relate our work to recent literature that explores the impact of the Brexit event (Ortiz Valverde and Latorre, 2020; Cappariello et al., 2020; Dhingra et al., 2017), as our results imply that any upcoming limit to the mobility of global talents depress domestic productivity, on top of losses from new frictions in international markets for inputs and outputs.

3   Data and preliminary evidence

3.1   Managers and firms

We source data on managers' careers and firms' financial accounts in the United Kingdom from Orbis, a commercial database compiled by the Bureau Van Dijk[2], which is a consultancy firm controlled by Moody's Analytics. The database collects original information on management based on individual companies' filings, including their roles, dates of recruitment, nationality, gender, and age. Unfortunately, only scant information is present about managers' education and wages. For our purpose, we select managers working at least one year for manufacturing firms active in the United Kingdom in the period 2009-2017 while retaining information on their previous workplaces.

Interestingly, the UK has good coverage of management information thanks to specific filing requirements asked by compilers of the UK national registry, the Companies House, following the Companies Act in 2006[3].

In this context, we consider a manager as any individual that participates in a company's board, committee, or executive department. Therefore, we exclude from our analysis advisors and shareholders as they do not participate in the daily administration of the company. We end up with a sample of 165,084 managers working for 13,106

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[2]The Orbis database collects and standardizes firms' financial statements from around the globe. Orbis data are increasingly used for firm-level studies on multinational enterprises. See for example Alviarez et al. (2017), Cravino and Levchenko (2016), and Del Prete and Rungi (2017).

[3]In particular, the primary legal concern is that a company cannot appoint managers that are undischarged bankrupts or that were previously disqualified by the court from acting as company directors. In recent past, risk and compliance companies systematically scrutinized the ensemble of directors from the Companies House registry to unearth how many were included on international watchlists of individuals considered at high risk of crime. See, for example, O'Neill (2008)

manufacturing companies located in the United Kingdom. Please note, however, that any manager in our sample can cover more than one role in the same company, or she can participate in the management of more than one company at the same time. Since we have recruitment dates differentiated by both role and company for each manager, we can follow a manager's career within and across companies. In Appendix Table A1, we present a snapshot of managers' levels of responsibility as included in our sample. In the following analyses, we consider the date of recruitment the earliest date a manager covered any role in that company. In the end, the nationality of managers is a crucial variable in our analysis. In our sample, we find that 16.43 % of managers have a foreign nationality.

Table 1: Top 10 nationalities of foreign managers

| Nationality	No. of managers
United States	7,557
Germany	3,160
Japan	2,751
France	2,383
Ireland	1,425
Netherlands	1,273
Italy	1,068
Sweden	996
South Africa	941
Denmark	782
Others	7,439
Total	29,775

Note: A foreign manager is a manager with a nationality different from UK. In case of multiple nationalities, including UK, the individual is considered a domestic manager.

Table 1 presents the top 10 most common nationalities we detect in our sample. Please note how we adopt here a conservative definition of a foreign manager. For instance, a manager that has dual citizenship, including the UK's, is still considered domestic. In this case, we want to exclude as much as possible from the set of foreign managers individuals that are UK citizens raised by foreign individuals that migrated relatively earlier in their age. As largely expected, managers landing in UK companies come from around the globe. We find in our sample 27,117 foreign managers with 114 different foreign nationalities. Out of them, 2,260 are citizens with multiple passports

different from UK's. The most represented country is the US, followed by Germany, Japan, and France. Overall, we find that 48.26% of foreign managers are citizens of the European Union, and they represent about 7.93% of the total managers.

In Figures 1 and 2, we report the geographic coverage by NUTS 3-digit regions of our sample firms and firms that have at least one foreign manager, respectively. *Prima facie*, we do not observe any specific pattern of geographic selection in our data, as we can spot foreign teams of managers on the entire UK territory. In general, we find that most populated urban regions are also denser in terms of manufacturing activities, with the exclusion of London, where we expect a specialization in services. In the last year of our sample, about 13.5% of companies with foreign managers locate in the Greater London area, where the share of foreign managers on the total is 13.9%. Notably, we observe how the recruitment of talents from abroad seems to be a widespread practice of many firms across all UK regions.
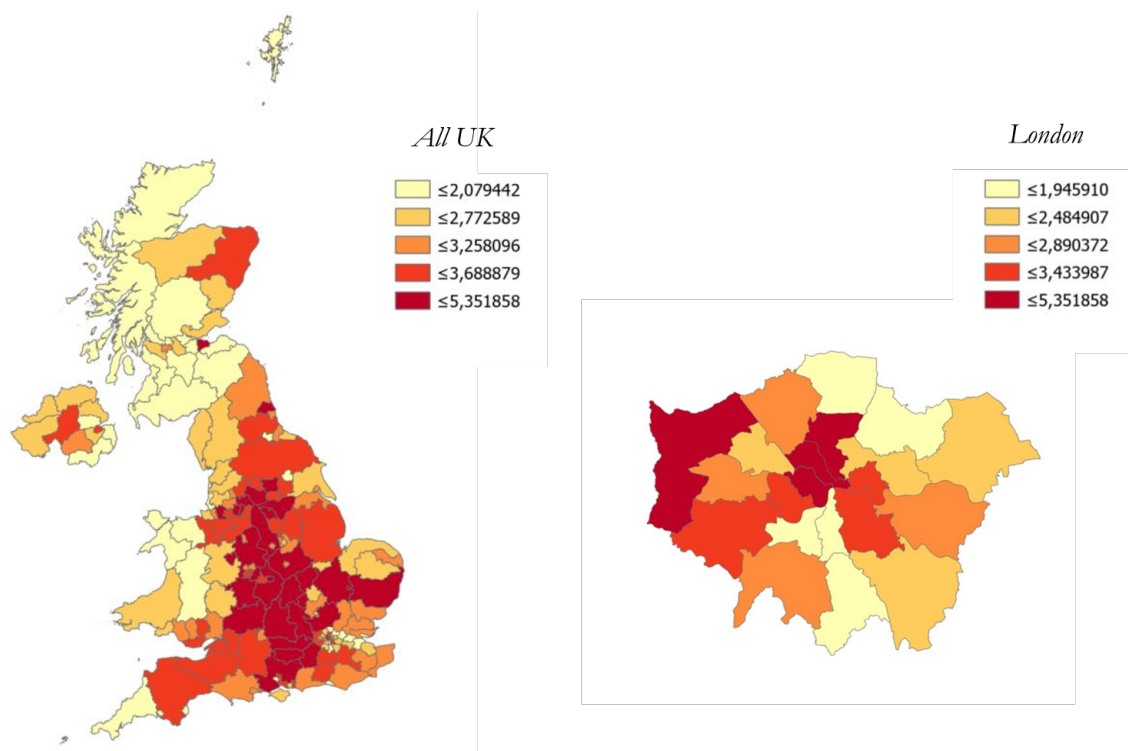
Figure 1: Geographic coverage: all firms
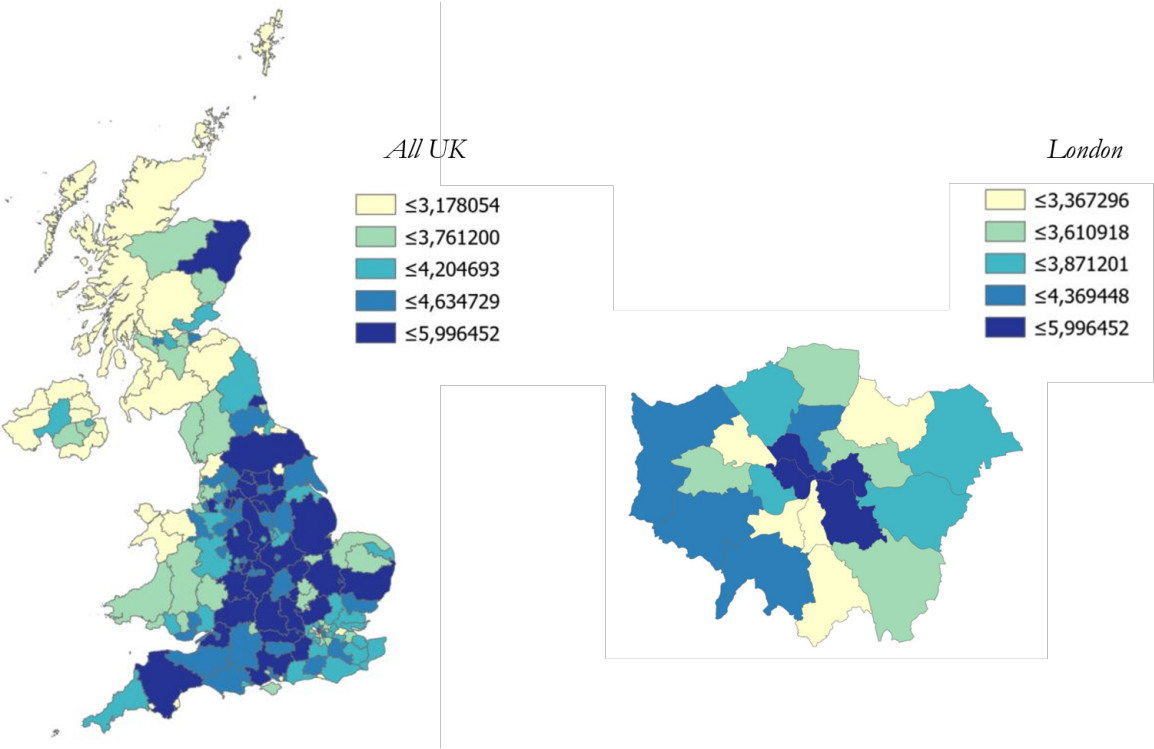
Note: The total number of sample firms in UK (on the left) and a focus on London (on the right) are reported in logarithmic scale. Different shades correspond to quintiles by NUTS 3-digit regions.

Figure 2: Geographic coverage: firms with foreign managers

Note: The number of sample firms with at least one foreign manager (on the left) and a focus on London (on the right) are reported in logarithmic scale. Different shades correspond to quintiles by NUTS 3-digit regions.

For the sake of completeness, in Appendix Table A2, we show the top 10 origin countries of foreign-owned firms. The identification of foreign-owned companies follows international standards (OECD, 2005; UNCTAD, 2009, 2016), according to which a subsidiary is controlled after a (direct or indirect) concentration of voting rights ($>50\%$). We observe that a majority of foreign-owned subsidiaries (1,321) is controlled by US parent companies, whereas the second origin country is Germany (394), followed by Japan (279) and France (262). If we cumulate foreign subsidiaries held by parent companies located in EU members, we find they represent that the latter represent 40.1% (1,663) of the total number of foreign subsidiaries (4,150).

3.2 Productivity, foreign managers, and ownership

For our baseline analyses, we estimate firm-level total factor productivities (TFPs) following the technique by Ackerberg et al. (2015). TFP is traditionally interpreted as the portion of output growth not explained by growth in observed inputs. The major identification problem in estimating a firm-level production function is that input choices can depend on shocks unobserved by the econometrician at the end of the period, when firms' financial accounts typically become available. Therefore, an endogeneity problem can arise such that the observed combination of production factors is simultaneous to the possibly unobserved shocks, hence OLS estimates are inconsistent. In this context, Ackerberg et al. (2015) improve on previous efforts by Levinsohn and Petrin (2003), and Wooldridge (2009), which we however include as alternative estimators for robustness checks. To estimate TFPs, we source data on operating revenues, materials, number of employees, and fixed assets. We further control for firm age and entry-exit dynamics. All variables are properly deflated using producer price indices that are specific for each 2-digit manufacturing industry.

Therefore, at this stage, we can present preliminary evidence extracted from a sequence of least-squares binary regressions that catch the correlations between the presence of foreign managers in a team and the productivity of the firm, in the form:

$$y_{ijt} = \beta_0 + \beta_1 D_i + \beta_2 X_{it} + \gamma_j + \delta_t + \varepsilon_{ijt} \tag{1}$$

where y_{ijt} is the (log of) TFP of a firm i active in a sector j at time t. D_i is a dummy that identifies the presence of at least one foreign manager in a team without regard to her tenure in the firm. A set X_{it} of firm-level regressors (size, age, capital intensity, the share of managers on total employees, and wage bill), industry (γ_j), and year (δ_t) fixed effects are included. Only point estimates of the coefficients of interest on D_i are reported in Table 2.

As largely expected, foreign firms are on average more productive than domestic firms (last line, Table 2). More interesting, we detect a slightly smaller TFP premium for firms that have foreign managers in their team (first line, Table 2). The latter is a novelty of our study. The advantage is particularly evident in the case of domestic firms (second line). Even more interestingly, we do not find a significant difference in competitiveness when we compare domestic firms with foreign managers and foreign-owned firms (line 4). Preliminary results from Table 2 are further corroborated by

t-tests performed in Appendix Table A3, where we also compare across firms that recruited only during our period of analysis.

Table 2: Productivity premia, foreign managers, and ownership

	TFP premia	N. obs.
Firms with vs. without foreign managers	.045**(.020)	51,900
Domestic-owned with vs. without foreign managers	.045* (.023)	31,874
Foreign-owned with vs. without foreign managers	.003 (.019)	20,026
Foreign- vs. domestic-owned with foreign managers	.021 (.022)	23,801
Foreign- vs. domestic-owned firms	.054**(.019)	51,900

Note: TFP premia are estimated after OLS binary regressions where the dependent variable is the (log of) TFP, including firm-level controls (size, age, capital intensity, average wage bill, the share of managers over total employees), industry and year fixed effects. Errors are clustered by 2-digit industries in parentheses. * and ** stand for $p < 0.1$ and $p < 0.05$, respectively.

Previous preliminary evidence motivates our following analyses, where we will explicitly challenge the hypothesis that foreign managers can transfer knowledge to a domestic firm in the form of generic or specific skills in production and, thus, allow them to catch up with foreign or domestic competitors. To this end, we want to rule out any phenomenon of cherry-picking, such that more productive firms are also the ones that are more likely to hire better talents and pay their expensive bills.

4   Empirical strategy and results

We assess the impact of hiring foreign managers on the productivity of a firm. We consider firms as receiving treatment when they recruit a foreign manager in the period 2009-2017. Clearly, we need to control the endogenous choice of a manager that accepts a position in any workplace, industry, and geographic region that allows changing her career for the better. To this end, we proceed in four stages.

In Section 4.1, we perform an exercise to determine the average benefit of a firm that hires a foreign manager (Average Treatment Effects on the Treated - ATT) while controlling as much as possible for endogenous firms' characteristics and pre-recruitment

trends. The event studies reported in Figures 3 and 4 for domestic and foreign firms, respectively, will show the evolution of TFP benefits along the timeline we observe.

Then, in Section 4.2, we control for the selection of more productive firms into treatment, i.e., the endogenous better ability of actual recruiters to participate in the international market for talents if compared with non-recruiters. To this end, we put together a control group made of firms that never hired foreign managers after a propensity score matching exercise. In this case, we challenge our identification strategy to simulate a counterfactual with firms that are otherwise similar along with all the characteristics that make them an attractive destination for a talented worker, including their observed productivity, except for their recruiting strategy in the observed period.

After that, in Section 4.3, we check that foreign talents' previous industry experience is the primary channel through which domestic firms can reap productivity gains.

Eventually, in Section 4.4, we provide additional results that qualify the impact of foreign managers when we look at alternative firm-level indicators, including sales, usage of inputs, capital intensity, and investment.

Robustness and sensitivity exercises are offered in 5, where we check for: i) a placebo test after treating firms with local managers; ii) different TFP estimators; iii) sample composition in terms of both firms' locations and managers' passports.

4.1 Foreign managers and recruiting firms

We start by estimating the following equation considering exclusively the group of companies that hired foreign managers for the first time in our period of analysis:

$$(log)TFP_{ijrt} = \beta_0 + \beta_1 T_{ijr} \times Post_t + \beta_2 X_{ijrt} + \gamma_j + \delta_t + \zeta_r + \sum_k \eta_k \times \delta_t + \varepsilon_{ijrt} \quad (2)$$

where the dependent variable TFP_{ijrt} is the Total Factor Productivity of a firm i active in a sector j and region r at time t. TFP is calculated following the semiparametric methodology by Ackerberg et al. (2015). T_{ijr} is the treatment, i.e., it indicates that a firm recruited the first foreign manager, whereas $Post_t$ is a binary variable equal to one for observations following the recruitment. In this case, $(1 - e^{\beta_1})$ is our main quantity of interest and it catches the average productivity gains by recruiting firms expressed in percentage units. X_{ijrt} includes firm-level controls (size, age, capital intensity, wage bill, the ratio of managers over employees, foreign ownership) and regional employment

density as a proxy of local attractiveness. Additionally, we include γ_j, δ_t and ζ_r as 2-digit industry, year, and NUTS-3 regional fixed effects, respectively. Crucially, at this stage, we control for self-selection of talented managers into companies and industries with better prospects. As in Bircan (2019), the term $\sum_k \eta_k \times \delta_t$ represents a full set of pre-recruitment features[4] (age, size and 2-digit industry) interacted with a time trend δ_t. We repeat the same exercise first for all firms, and then for domestic and foreign-owned firms, separately.

In columns 1-3, Panel B of Table 3, we find a significant increase in TFP for domestic firms ranging in an interval from 4.39% to 7.36% (log units: from .043 to .071) after they hire foreign managers. Interestingly, the impact is relatively higher when we control for pre-treatment trends in column 3. Apparently, domestic firms entirely explain the significance of coefficients in Panel A, when we do not separate firms by ownership status.

When we look at foreign-owned firms in Panel C of Table 3, we never find any statistically significant impact on TFP after hiring foreign managers. As far as we know, there is no previous record of a similar finding in previous literature. Our guess is that foreign headquarters already had the opportunity to realign managerial practices in subsidiaries at the time of the takeovers. Previous findings seem to be systematic in the following analyses.

Eventually, the albeit weakly positive and significant results for all firms reported on columns 1-3 of Panel A are entirely driven by the impact that foreign managers have on domestic firms.

In Figures 3 and 4, we also visualize the coefficients on separate event studies performed for domestic and foreign firms, respectively. We follow the trend of (log of) TFP in the three years following the recruitment of foreign managers while controlling for what happened two years before. In a nutshell, the plots represent the coefficients of a modified version of Eq. 2, where the productivity trends are visualized over an interval of six years centered around the moment that any recruiting firms decided to hire a foreign manager.

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[4]We categorize firm age in the following classes: $[0, 4]$, $[5, 9]$, $[10, 14]$, and 15+ years. We categorize firm size in the following classes: $[0, 9]$, $[10, 19]$, $[20, 49]$, $[50, 249]$, and 250+ employees.

Table 3: TFP and foreign managers - ATT

	(1)	(2)	(3)
Dep. variable:	(log) TFP	(log) TFP	(log) TFP
Panel A: All firms			
Hired × Post-recruitment	.023*	.022*	.021*
	(.012)	(.012)	(.011)
R^2	.935	.936	.946
No. of obs.	23,932	23,932	23,932
Panel B: Domestic firms			
Hired × Post-recruitment	.043***	.050***	.071***
	(.011)	(.012)	(.025)
R^2	.925	.928	.943
No. of obs.	4,562	4,562	4,562
Panel C: Foreign firms			
Hired × Post-recruitment	.011	.010	.009
	(.013)	(.014)	(.013)
R^2	.942	.943	.954
No. of obs.	19,370	19,370	19,370
Panels A, B and C:			
Firm controls	Yes	Yes	Yes
Industry effects	Yes	Yes	
Year effects	Yes	Yes	
Region effects	Yes	Yes	Yes
Industry × Year effects		Yes	Yes
2-digit Industry & age & size trends			Yes

Note: The table reports the average treatment effect on the treated firms (ATT) after controlling for confounders. Coefficients are in log units. Errors are clustered by 2-digit industries in parentheses. Controls include firm size, firm age, capital intensity, average wage bill, the share of managers on total employees, regional employment density and, for Panel A, foreign subsidiary status. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

Interestingly enough, the positive productivity gains by domestic firms (Figure 3 already occur the first year after the foreign talent arrives and stay there for the following three years, whereas no significant benefits are registered by foreign-owned firms (Figure 4 where a slightly albeit non-significant negative trend in productivity shows up.

Figure 3: TFP, foreign managers and domestic firms
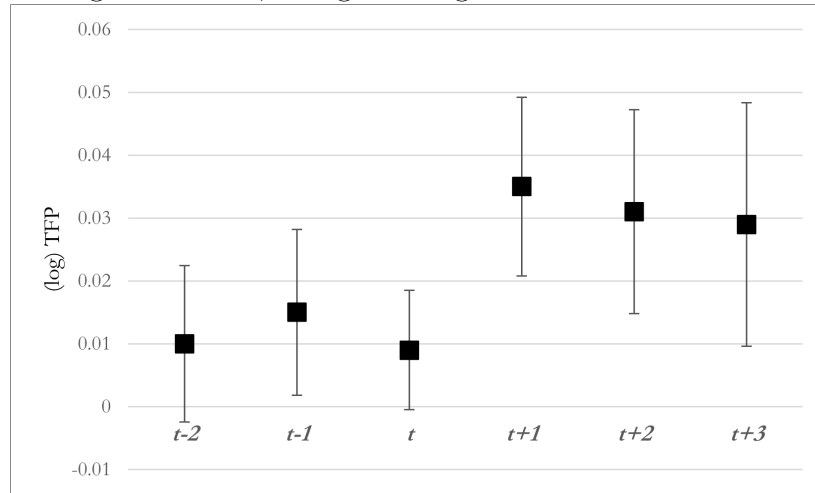
Note: Event study for the productivity impact of recruiting foreign managers at time t by domestic-owned firms. Markers show the magnitude of coefficients and bars indicate a 95% confidence interval of a modified version of Eq. 2. Errors are clustered at the firm-level. Industry-time fixed effects, region fixed effects, firm-level characteristics, and pre-recruiting trends are controlled for.

Figure 4: TFP, foreign managers and foreign firms
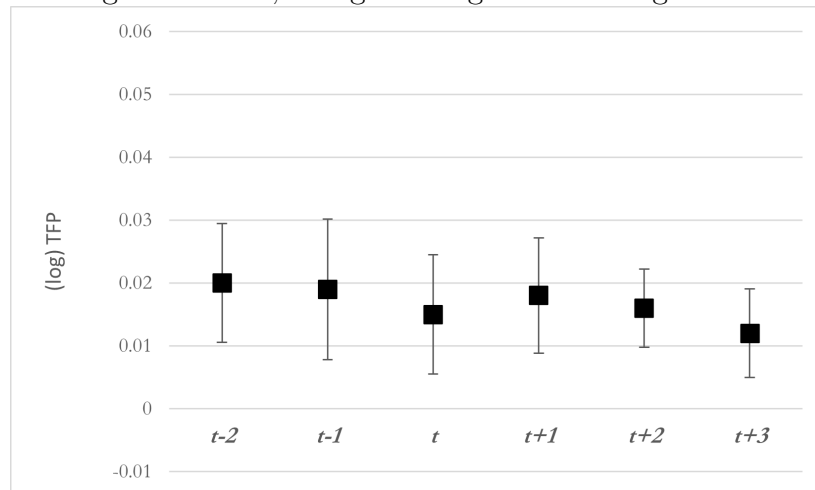
Note: Event study for the productivity impact of recruiting foreign managers at time t by foreign-owned firms. Markers show the magnitude of coefficients and bars indicate a 95% confidence interval of a modified version of Eq. 2. Errors are clustered at the firm-level. Industry-time fixed effects, region fixed effects, firm-level characteristics, and pre-recruiting trends are controlled for.

15

4.2 Recruiting and non-recruiting firms

In this Section, we specifically challenge the selection of some firms into treatment, i.e., the endogenous ability of firms that actually recruited foreign managers in our period of analysis to attract the best (domestic or foreign) talents. Our guess is that part of the productivity premia on domestic firms we observe in Table 3 is explained by an inherently higher potential of the firms that have the ability to go onto international job markets, while proposing better salaries and better prospects for managers' careers. For our purpose, we apply a matching procedure to select a control group made of firms that never hired foreign managers in our period of analysis, although they mirror the characteristics of observed recruiters.

Table 4: Probit estimates for a propensity score matching

Dep variable: Recruiting foreign manager(s) = 1	
(log) TFP_{t-1}	.0337**
	(.0150)
(log) Firm size$_{t-1}$	.0328***
	(.0080)
(log) Average wage$_{t-1}$	.1083***
	(.0168)
(log) Capital Intensity$_{t-1}$	.0171***
	(.005)
(log) Age$_{t-1}$	-.0457***
	(.0079)
(log) Skill Intensity$_{t-1}$	.0580*
	(.0313)
(log) Number of Managers$_{t-1}$	.195***
	(.0152)
(log) Regional Employment Density$_{t-1}$	2.5174***
	(.6014)
Foreign ownership$_{t-1}$	.6074***
	(.0106)
Pseudo R^2	0.364
No. of obs.	47,717
Year and 2-digit industry fe	Yes
Errors clustered by firm	Yes

Note: The table reports marginal effects evaluated at the mean after a probit model. The dependent variable is equal to one if a firm recruited a foreign manager. Errors are clustered by firm in parentheses. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

We run a five-nearest neighbor matching algorithm (Abadie and Imbens, 2006; Im-

bens et al., 2004; Rubin, 2001) that searches for peers within any 2-digit industry-*per*-year cell in which we find treated firms in UK, to make sure that differences in performance coming from different market conditions do not exert influence on our estimated effects. All time-variant explanatory variables are lagged one year to reflect pre-treatment performances. We choose a set of predictors for treatment borrowing from previous literature that studies the impact of foreign ownership (Bircan, 2019; Arnold and Javorcik, 2009; Javorcik and Poelhekke, 2017). In fact, we assume that the recruitment of foreign managers is endogenous to a similar set of observable characteristics that make a company desirable as a target by a foreign company, including technology, firm age, firm size, the average composition of employment, capital intensity. In addition, we include three specific controls that can make a new position in a company desirable for talented newcomers: the share of managers on total employees, as a proxy for the skill composition of the workforce, the total number of managers, and the regional employment density of firms' locations as a proxy for local agglomeration economies. The latter is particularly useful since we acknowledge that local assortative matching between workers and firms exert an indirect impact on firm-level productivity, as acknowledged by Orefice and Peri (2020) and Dauth et al. (2018).

Table 4 presents the marginal effects of the first-stage probit model. Notably, all main predictors correlate with selection into treatment as expected. Firms that are more productive, bigger, and offering a higher wage are more likely to recruit foreign managers in our sample. Relatively younger firms, with an already high number of managers and higher skill intensity attract foreign recruits. The firm is also relatively more attractive for a foreign talent when it is foreign-owned and locates in a populated region. In Table 5, we also evaluate the quality of the matching procedure by implementing a balancing test. There, we compare the sample averages of all covariates of both the treatment and the control groups. Eventually, we find that there is no *ex-post* statistically significant difference along the set of variables that we include for the matching, because null hypotheses of equal mean are always rejected in the matched sample. In the last column of Table 5, we report the variance ratio, $V_e(T)/V_e(C)$, of the residuals of the covariates of the treated over the control group. Following Rubin (2001), a perfect match implies a ratio equal to one, whereas a ratio between 0.5 and 2 indicates an acceptable quality. In our case, we do have many variance ratios that fall in a range close to one. Moreover, the standardized biases we report in column 5 of Table 5 are less than 10% in absolute value for all variables after matching.

17

Table 5: Balancing test on the nearest-neighbour matching procedure

Variable	Sample	Average treated	Average untreated	% Bias	t-test	p-value	$V_e(T)/V_e(C)$
(log) TFP_{t-1}	Unmatched	2.66	2.45	11.3	13.28	0.001	1.16
	Matched	2.67	2.66	0.50	0.52	0.601	1.05
(log) Size_{t-1}	Unmatched	4.49	3.97	36.7	44.80	0.001	1.40
	Matched	4.64	4.62	1.3	1.48	0.138	1.15
(log) Avg wage_{t-1}	Unmatched	5.98	5.73	52.7	61.97	0.001	1.02
	Matched	5.98	5.95	6.5	7.56	0.001	0.99
(log) Age_{t-1}	Unmatched	8.83	8.75	8.4	12.15	0.001	1.16
	Matched	9.03	9.01	1.6	1.95	0.051	1.05
(log) N. Managers $_{t-1}$	Unmatched	1.51	1.24	55.5	74.90	0.001	0.90
	Matched	1.57	1.53	9.5	10.82	0.001	0.96
(log) Capital intensity$_{t-1}$	Unmatched	5.55	4.98	35.8	42.94	0.001	1.25
	Matched	5.56	5.50	3.6	3.78	0.001	1.11
(Log) Skill intensity$_{t-1}$	Unmatched	0.15	0.12	6.8	8.37	0.001	0.80
	Matched	0.10	0.10	1.9	2.71	0.007	0.72
(log) Employment density$_{t-1}$	Unmatched	0.03	0.03	13.0	19.44	0.001	1.23
	Matched	0.03	.03	5.7	5.77	0.001	1.11
Foreign subsidiary	Unmatched	0.78	0.13	172.4	277.76	0.001	1.11
	Matched	0.81	0.81	1.7	1.61	0.107	0.96

Note: The table reports sample averages and t-tests for the original unmatched sample and after the application of a nearest-neighbor matching technique. See Rubin (2001), Rosenbaum and Rubin (1983), and Rosenbaum and Rubin (1985) for more details.

Having ensured that there is a good match among 472 pairs of observations, we proceed with diff-in-diff estimates proposed in Eq.(2), and we report nested results in Table 6. Interestingly, TFP premia on domestic firms become slightly lower after implementing the matching procedure, if we compare with Table 3. Our baseline results are on column 3, where we report the most challenging specification, complete with firm controls, region effects, industry-*per*-year fixed effects, and a term that catches previous trends possibly making a firm or an industry already desirable as a successful destination to pursue a career before a talent is hired. In this case, a foreign recruit makes on average a domestic firm about 4.9% more productive (log units 0.048, $e^{0.048} = 1.049$). As in previous results of Table 3, we confirm that there are no statistically significant productivity gains among foreign-owned firms.

Table 6: TFP and foreign managers - ATE

	(1)	(2)	(3)
Dep. variable:	(log) TFP	(log) TFP	(log) TFP
Panel A: Domestic firms			
Hired × Post-recruitment	.047***	.048***	.048**
	(.012)	(.013)	(.023)
R^2	.950	.951	.950
No. of obs.	16,696	16,696	16,696
Panel B: Foreign firms			
Hired × Post-recruitment	.008	.010	.009
	(.019)	(.019)	(.019)
R^2	.967	.968	.968
No. of obs.	8,060	8,060	8,060
Panels A, and B:			
Firm controls	Yes	Yes	Yes
Industry effects	Yes	Yes	
Year effects	Yes	Yes	
Region effects	Yes	Yes	Yes
Industry × Year effects		Yes	Yes
4-digit Industry & age & size trends			Yes

Note: The table reports estimates for a sample matched after a propensity score. Errors are clustered by 2-digit industries in parentheses. Coefficients are in log units. Firm-level controls include age, employment, capital intensity, average wage bill, skill intensity, regional employment density and, for Panel A, foreign subsidiary status. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

4.3 The role of industry experience

In general, there are many potential skills that foreign talented workers can provide to increase the productivity when in a new management team. They can teach to native workers what the latter could otherwise find difficult to learn by themselves (Markusen and Trofimenko, 2009), or they can bring skills that help reducing transaction costs once they bring valuable information on their native countries (Gould, 1994; Parsons and Vézina, 2018). In general, the cultural diversity brought by workers of different origins can contribute to firms' relational capital and their ability to market products internationally (Parrotta et al., 2014).

In the specific case of foreign managers, we argue that all the previous skills or

knowledge imply that (domestic or foreign) managers can intervene to change managerial practices. See also the framework we sketch from related literature in Section 2. The tacit knowledge that managers bring in the new company is usefully transferred into the implementation of better management. Unfortunately, we are not able in our data to track whether managerial practices actually change after recruitment. Neither we have much to tell about the intangible skills of newly-hired manager from our data. What we can do is to understand from previous stages of their career what recruits did, as we have information on the companies where managers worked before taking the new UK positions.

Briefly, in this Section, we explicitly challenge the hypothesis that market-specific experience can explain productivity gains in domestic firms observed in previous paragraphs. For our purpose, we repeat the baseline exercise of Eq.(2), this time separating firms that recruit:

- foreign managers that previously worked in a company whose core economic activity (NACE 2-digit) is the same of the latest recruiting firm in UK;

- foreign managers that worked in a company whose core activity (NACE 2-digit) is different from the one of the latest recruiting firm in UK.

As in latest results, we rely on a control group that is derived after a propensity score matching exercise described and validated in Section 4.2. We report results for domestic and foreign firms, separately, in Table 7.

Interestingly, we do find that TFP gains in domestic firms are mainly explained by previous market-specific experience, and the related coefficient is relatively higher than previous estimates (8.3%; log units: 0.080), although on average also managers with no market-specific experience have a positive albeit weakly significant impact (2.1%; log units: 0.021). In column 2 of Table 7, we still do not find a significant impact on the productivity of foreign-owned firms.

In the case of domestic firms, we argue, we are able to catch the nature of the managerial knowledge that is passed to the firm. Previous market experience entails an on-field training that may be particularly appealing to recruiters. We think our findings relate to earlier works testing the impact of recruitment events on export performance (Mion and Opromolla, 2014; Mion et al., 2016). There, as well, a market-specific experience is most beneficial for firms that poach managers to have better access to foreign markets, hence reducing the beachhead costs. Given our data, we cannot

exclude that firms can also take advantage from reducing frictions when proposing on export destinations. In fact, checks on alternative outcomes reported in the following paragraphs allow us showing how foreign managers pave the way for a generalized increase in the volume of activity by domestic firms that could be associated (or not) to rising export shares.

Table 7: TFP, foreign managers, and market experience - ATE

	Domestic	Foreign
Dep. variable:	(log) TFP	(log) TFP
Hired × Post	.021*	.004
	(.010)	(.023)
Hired × Market × Post	.080***	.021
	(.034)	(.023)
R^2	.951	.968
No. of obs.	16,696	8,060
Firm controls	Yes	Yes
Region effects	Yes	Yes
Industry × Year effects	Yes	Yes
Industry & age & size trends	Yes	Yes

Note: The table reports estimates on a matched sample when the treatment is split considering companies that recruited foreign managers with and without specific market experience. Coefficients are in log units. Errors are clustered by 2-digit industries in parentheses. Firm-level controls include age, employment, capital intensity, average wage bill, skill intensity, regional employment density. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

4.4 Alternative outcomes

In this Section, we go beyond TFP to check which other dimensions of the production process are mainly affected by the recruitment of foreign managers. Firm-level TFP is a much useful measure that catches technology and efficiency as the portion of output growth of a firm that is not explained by growth in inputs (Syverson, 2011). It helps to reconcile firms' microeconomic performance with aggregate welfare since higher aggregate productivity is a source of economic growth. Yet, we believe that looking at

other indicators of firm-level productive performance can help complete our picture of the changes induced by recruits.

In Table 8, we focus on alternative outcomes including firms' revenues, costs of materials, number of employees, fixed assets, and capital intensity. The exercise we perform is similar to the one proposed in Table 6 with a control group build after a propensity score matching, while keeping the most challenging specification with firm controls, region effects, industry-time effects, and pre-recruitment trends as from Eq. 2.

Interestingly, we observe that domestic firms start having a higher volume of activity after recruiting foreign managers. On average, they sell about 19.6% (log units: .179) more of their products, and they consume about 22.9% more intermediate inputs, thus pointing to expansion plans that entail also additional investment. Our hypothesis seems corroborated by an albeit weakly significant average increase in the amount of fixed assets (21.2%; log units: .192), which implies a higher capital intensity (23.4%; log units: .210). Notably, no significant change is observed in number of employees by domestic firms.

In line with previous results on TFP, foreign-owned firms do not register any significant change in either of the alternative firm-level outcomes that we test in Table 8. We believe latter results strengthen our previous guess that foreign-owned firms do not see foreign managers as crucial for their productive strategy since any alignment in managerial practices or expansion plans may have occurred as a consequence of the takeover by foreign headquarters.

Table 8: Alternative outcomes - ATE

Dep. variable:	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
	(log) Sales	(log) Sales	(log) Materials	(log) Materials	(log) Employees	(log) Employees	(log) Fixed Assets	(log) Fixed Assets	(log) Capital Intensity	(log) Capital Intensity
Hired × Post	.179***	.039	.207***	.018	-.011	.002	.192*	-.007	.210***	-.019
	(.072)	(.074)	(.075)	(.079)	(.063)	(.070)	(-105)	(.120)	(.074)	(.081)
R^2	.167	.220	.180	.230	.152	.247	.198	.233	.190	.230
No. of obs.	17,215	8,258	17,215	8,258	17,215	8,258	17,215	8,258	17,215	8,258
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & age & size trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports estimates after a propensity score matching. The treatment is split considering companies that recruited foreign managers with and without specific industry experience. Coefficients are in log units. Errors are clustered by 2-digit industries in parentheses. Firm-level controls include age, employment, capital intensity, average wage bill, skill intensity, regional employment density and, for the first column, the foreign subsidiary status. *, ** and *** stand for p < 0.1, p < 0.05 and p < 0.01, respectively.

5 Sensitivity and robustness checks

In this Section, we introduce four primary checks on the robustness and sensitivity of our results. Our first concern is that a specific TFP methodology does not drive our findings. In Table 9, we report results after following three alternatives from related literature: i) the Levinsohn and Petrin (2003) algorithm was the first to propose intermediate inputs in a two-stage procedure that proxies unobserved shocks that possibly introduce a simultaneity bias due to unobserved adjustments in the combination of factors of production; ii) Wooldridge (2009) proposed to solve the same simultaneity bias by implementing a generalized method of moments (GMM) procedure; iii) Ackerberg et al. (2015) suggest another variant of our baseline, where we switch from a Cobb-Douglas to a trans-logarithmic production equation to catch different functional forms. Our central tenets are robust across different TFP methodologies. However, magnitudes can vary depending on underlying dispersions. TFP premia are smaller than previous baseline estimates in Levinsohn and Petrin (2003), and bigger in Wooldridge (2009).

Table 9: Alternative TFP methods - Average Treatment Effects

	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
Dep. variable:	(log) TFP	(log) TFP	(log) TFP	(log) TFP	(log) TFP	(log) TFP
Hired $\times$ Post	.025***	.011	.043***	.017	.098***	-.002
	(.005)	(.008)	(.007)	(.019)	(.023)	(.190)
R^2	.945	.851	.953	.887	.956	.821
No. of obs.	16,696	8,060	16,696	8,060	16,969	8,060
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Region effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry $\times$ Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry & age & size trends	Yes	Yes	Yes	Yes	Yes	Yes
Method	LevPet	LevPet	WRDG	WRDG	ACF-T	ACF-T

Note: The table reports estimates on a matched sample for alternative measures of TFP: Levinsohn and Petrin (2003) (LevPet); Wooldridge (2009) (WRDG); a translog variant of Ackerberg et al. (2015) (ACF-T). Coefficients are in log units. Errors are clustered by firms in parentheses. Firm-level controls include age, employment, capital intensity, average wage bill, skill intensity, and regional employment density. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

In a second check, our concern is that our previous findings could catch productivity gains by firms that are just more active on labor markets and hire the best managers, whatever their nationality. As a matter of fact, there is a majority of firms in our sample that hire both foreign and domestic managers in our period of analysis. As we

can assume that a higher managerial mobility allows some proactive firms to a faster reallocation of productive resources, we challenge our findings by proposing a specific placebo test in Table 10. In this case, we consider as treated those firms that recruited British managers only. Thus, we reset our control group by performing a propensity score matching that looks for nearest neighbors in the set of firms that did not recruit any manager in our period of analysis. Results in Table 10 show that there is a weakly significant impact on domestic firms, which is however three times smaller than previous baseline estimates.

Table 10: A placebo test: TFP and British managers

	Domestic	Foreign
Dep. variable:	(log) TFP	(log) TFP
Hired × Post	.014*	.004
	(.008)	(.023)
R^2	.914	.868
No. of obs.	1,586	987
Firm controls	Yes	Yes
Region effects	Yes	Yes
Industry × Year effects	Yes	Yes
Industry & age & size trends	Yes	Yes

Note: The table reports placebo estimates after treating firms with British managers only. The control group is made by firms that never hired any manager in the period of analysis. Coefficients are in log units. Errors are clustered by firms in parentheses. Firm-level controls include age, employment, capital intensity, average wage bill, the share of managers on employees and, for the first column, the foreign subsidiary status. *, ** and *** stand for p < 0.1, p < 0.05 and p < 0.01, respectively.

A third check that we perform pertains to firms' locations. Please note how we previously controlled for idiosyncratic local shocks after including regional fixed effects in baseline estimates. We also checked how regions could be differently attractive for talents, as proxied by local employment density, when matching recruiting firms with peers in the propensity score exercise in Section 4.2. Yet, we still may find that estimates are sensitive to recruiting events' heterogeneous distribution across different regions. For this reason, in Table 11, we first show estimates considering the entire sample excluding Greater London, and then separating urban and non-urban areas. The classification in urban and non-urban NUTS-2 regions follows Eurostat definitions

based on relative employment densities. Findings are still significant on domestic firms, although magnitudes vary. Excluding London from the sample raises the TFP gains by domestic firms. Eventually, recruiters in non-urban areas register higher productivity gains, whereas urban areas report a relatively lower magnitude of coefficients. Following latter evidence, we argue that the magnitude of TFP gains by domestic firms is higher at the margin where productivity is *ex ante* on average lower. Indeed, as largely expected, TFP levels in our sample are significantly correlated with the employment density in a firm's location (coefficient .715), even after controlling for local industrial specialization and different firm characteristics.

Table 11: Robustness checks: firms' locations - ATE

	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
Dep. variable:	(log) TFP	(log) TFP	(log) TFP	(log) TFP	(log) TFP	(log) TFP
Hired × Post	.066***	.019	.127***	-.001	.022**	.014
	(.025)	(.019)	(.056)	(.033)	(.012)	(.023)
R^2	.955	.971	.954	.921	.949	.967
No. of obs.	15,146	7,364	4,709	2,347	11,395	5,552
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Region effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry & age & size trends	Yes	Yes	Yes	Yes	Yes	Yes
Firms' locations	w/o London	w/o London	Non-urban	Non-urban	Urban	Urban

Note: The table reports estimates on a matched sample to check for sample composition by firms' locations. Coefficients are in log units. Errors are clustered by firms in parentheses. Firm-level controls include age, employment, capital intensity, average wage bill, skill intensity, and regional employment density. *, ** and *** stand for p < 0.1, p < 0.05 and p < 0.01, respectively.

Finally, in Table 12, we check that our results are valid after recruiting either a foreign manager with a passport from the United States or from any other country in the world. We believe it is important to link this sensitivity check to our preliminary evidence reported in Section 3.1, where we show that the most represented nationality among foreign managers is American. We want to check that our results are not driven by some lower frictions among managers that share English as mother tongue. The impact on TFP is indeed relatively higher after recruiting American managers in domestic firms, whereas we confirm no significant impact on foreign-owned firms in either case.

Table 12: Robustness checks: managers' passports - ATE

	Domestic	Foreign	Domestic	Foreign
Dep. variable:	(log) TFP	(log) TFP	(log) TFP	(log) TFP
Hired × Post	.072***	.020	.039***	.014
	(.034)	(.084)	(.015)	(.024)
R^2	.978	.961	.954	.919
No. of obs.	1,601	977	15,719	6,459
Firm controls	Yes	Yes	Yes	Yes
Region effects	Yes	Yes	Yes	Yes
Industry × Year effects	Yes	Yes	Yes	Yes
Industry & age & size trends	Yes	Yes	Yes	Yes
Foreign manager's passport	US	US	non-US	non-US

Note: The table reports estimates on a matched sample to check for sample composition by managers' passports. Coefficients are in log units. Errors are clustered by firms in parentheses. Firm-level controls include age, employment, capital intensity, average wage bill, skill intensity, and regional employment density. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

6 Conclusion

As far as we know, no previous work has addressed the primary relationship between foreign management and firm-level productivity. From our perspective, foreign managers are highly skilled migrants that contribute to the transmission of knowledge across national borders. Their role in a firm's organisation is peculiar, as they make a combination of specific training experiences and soft skills. They transfer knowledge acquired from previous positions to set the most suitable managerial practices that allow other workers to make the best contribution to the company's mission.

In this contribution, we find that domestic manufacturing firms primarily benefit from hiring foreign managers. We find that their Total Factor Productivity (TFP) increases, on average, 4.9% after recruiting foreign talents. In general, recruiting highly-skilled workers allows firms to have access to a broader pool of skills than those available on the domestic market. In the case of foreign managers, we find that previous industry experience abroad qualifies their contribution to recruiting companies' competitiveness. Interestingly, beyond TFP, we observe that foreign managers' recruiting anticipates an increase in the volume of activity (sales and intermediate inputs) and higher investment in fixed assets, possibly due to newcomers' expansion plans, which increase a domestic firm's capital intensity.

On the other hand, we detect no significant TFP gains by foreign-owned firms after hiring foreign managers. In this case, we argue that productivity spillovers could have occurred already at the moment of takeovers by foreign headquarters when subsidiaries became part of a multinational enterprise. Different specifications confirm the lack of a significant impact on foreign firms throughout our paper. Interestingly, we show no statistical difference in productivity levels between domestic firms with foreign managers and foreign-owned firms.

Our identification strategy encompasses propensity score matching, diff-in-diff analyses, and the inclusion of pre-recruitment trends to challenge reverse causality and the hypothesis of parallel trends. Results are robust to several checks, including a placebo test with local managers, the adoption of different TFP estimators, controls for sample compositions in firms' locations and managers' countries of origin.

Eventually, we support the idea that the international composition of management teams is a dimension that deserves more attention from scholars that study the global outreach of modern firms. From this perspective, we argue that upcoming barriers to the circulation of highly skilled workers, including managerial talents, resulting from the Brexit event and the latest pandemic crisis hampers domestic manufacturing industries' competitiveness.

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Appendix: Tables and Graphs

Table A1: Board, committee or department in which managers' belong

Title	No. of managers-*per*-role
Senior management	113,906
Board of Directors	99,163
Operations & Production & Manufacturing	11,322
Sales & Retail	8,923
Finance & Accounting	6,458
Administration department	4,885
Human Resources (HR)	4,008
Information Technology (IT) & Information Systems (IS)	3,367
Purchasing & Procurement	3,261
Research & Development / Engineering	3,091
Marketing & Advertising	2,816
Health & Safety	680
Branch Office	271
Legal/Compliance department	128
Product/Project/Market Management	126
Executive Committee	119
Audit Committee	61
Nomination Committee	58
Remuneration/Compensation Committee	53
Corporate Governance Committee	35
Supervisory Board	17
Risk Committee	11
Safety Committee	7
Executive Board	5
Environment Committee	4
Public & Government Affairs	4
Quality Assurance	4
Ethics Committee	3
Others & Unspecified	18,811

Note: The table reports roles of managers as present from our sample. Any manager can cover more than one role in the same company, or she can participate to the management of more than one company at the same time. We exclude from original sources only shareholders and advisors without any role in the daily management of the firm. Please note how names of roles are not standard across firms, as they may follow the specific responsibilities attributed to individuals autonomously within firms.

Table A2: Top 10 origin countries of foreign-owned firms

Nationality	No. of companies
United States	1,321
Germany	394
Japan	279
France	262
Sweden	183
Switzerland	157
Ireland	155
Netherlands	146
Italy	105
Luxembourg	96
Others	1,052

Note: We define a foreign-owned firm following international standards ((OECD, 2005; UNCTAD, 2009; UNCTAD, 2016), according to which a subsidiary is controlled after a (direct or indirect) concentration of voting rights ($> 50\%$).

Table A3: T-tests on TFP distributions for firms with and without foreign managers

Average value of TFP	With foreign managers	Without foreign managers	With new foreign managers	Without new foreign managers	Total
All firms	2.638***	2.468***	2.659***	2.516***	2.528
	(0.013)	(0.009)	(0.028)	(0.008)	(0.008)
Domestic firms	2.656***	2.433***	2.607**	2.455**	2.459
	(0.027)	(0.010)	(0.068)	(0.009)	(0.009)
Foreign subsidiaries	2.634	2.670	2.668	2.637	2.643
	(0.015)	(0.025)	(0.031)	(0.014)	(0.013)

Note: Columns (2) and (3) show the TFP averages of firms with and without foreign managers, respectively. Columns (4) and (5) show the TFP averages of firms with and without new foreign recruits in 2009-2017. The last column pools all firms together. Standard deviations in parenthesis. We test the null hypotheses that averages are equal after a t-test. *, ** and *** stand for $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.