The University of Nottingham

research paper series

Globalisation, Productivity and Technology

Research Paper 2009/24

The Effects at Home of Initiating Production Abroad: Evidence from Matched French Firms

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The Centre acknowledges financial support from The Leverhulme Trust under Programme Grant F/00 114/AM

Leverhulme Centre for Research on Globalisation and Economic Policy

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Acknowledgements
We like to thank Richard Upward as well as participants of the ISIT conference (Stockholm, 2005) for very helpful comments and suggestions on an earlier draft. The opinions expressed in this paper are those of the authors and do not necessarily reflect those of the OECD or its member states. All remaining errors are our own.

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Abstract

Based on matching techniques in combination with a difference-in-difference estimator, this paper estimates the effects at home of initiating production abroad through the establishment of a foreign production affiliate. The analysis covers manufacturing and service firms active in France during the period 1987-1999. We show that the motivation to start producing abroad is an important determinant of its impact at home. Market-seeking FDI in manufacturing is associated with significant scale effects, resulting in job creation. By contrast, factor-seeking FDI in manufacturing has no significant effect on employment. FDI in the services sector is associated with significant positive employment effects, which may reflect the possibility that FDI in this sector is predominantly motivated by market access.

JEL classification: F14, F21, F23

Keywords: FDI, multinationals, propensity score matching, services, delocalisation

Outline

Non-Technical Summary

For years, concerns have repeatedly been expressed about the potential negative employment impact of the relocation of production abroad, often referred to as offshoring. Fears have been heightened further by the feeling that service activities, often considered to be relatively skilled, are no longer invulnerable to the offshoring phenomenon.

Assessing the real impact of outward foreign direct investment upon domestic employment is difficult, because firms that invest abroad differ strongly from the typical firm. Assessing the effects of going global on a firm's domestic activities therefore requires separating out cause and effect. Ideally, the outcomes of firms investing abroad for the first time should be compared to their counterfactual outcome had those firms not decided to become a multinational. While this counterfactual outcome is unobservable, a substitute is to compare foreign investors to firms with ex-ante the same probability to invest abroad, but did not do so. This is done here using matching techniques. This involves using all observable information available to create statistical twins that only differ in terms of their foreign investment decisions. To take account of unobservable differences between our statistical twins, these techniques are combined with a difference-in-difference estimator.

As the domestic effects of investing abroad are likely to depend on the motives of firms to go global, we propose a simple typology of international investment strategies based on sector affiliation and location choice. Our premise is that investment in high-income countries in comparative-advantage sectors reflect market-seeking strategies ("horizontal" investments), while the polar case of investment in low-income locations by firms in comparative-disadvantage sectors reflects factor-seeking motives ("vertical" investments). Hybrid cases are assumed to reflect mixed investment strategies.

This typology proves useful in identifying the impact of the decision to invest abroad for manufacturing firms. Market-seeking investments abroad are found to be associated with a significant positive impact on domestic employment in the parent firm, by 16% on average after three years, without a significant impact on exports, TFP or the input mix. In contrast, no significant impact is found on employment at home as a result of factor-seeking investments. This may suggest that vertical FDI is an efficient strategy to withstand competitive pressures. As the typology above is explicitly designed for manufacturing firms, this is not used in the case of services. FDI in the services sector is associated with significant positive employment effects, which may reflect the possibility that FDI in this sector is predominantly motivated by market access. Service FDI is also found to lower capital-labour ratios in the parent firm, perhaps due to new management and co-ordination needs arising from production complementarities between the parent firm and its affiliate.

1. Introduction

In recent decades, concerns have repeatedly been expressed about the potential negative employment impact of the relocation of production abroad often referred to as offshoring (see Mankiw and Swagel, 2006, for a discussion). Fears have been heightened further by the feeling that services activities, often considered to be relatively skilled, are no longer invulnerable to the offshoring phenomenon (Blinder, 2006). These fears of relocation as expressed in the public debate stand in contrast to the empirical evidence. For example, Aubert and Sillard (2005) for France and Brown and Spletzer (2005) for the US find that the employment effects of relocation are rather limited. Amiti and Wei (2005) show that while service offshoring may have become more prevalent during the nineties in the US, its importance is still limited relative to that in manufacturing.[1]

In order to evaluate the effects of going global on its domestic activities it is imperative to separate out cause and effect. Helpman *et al.* (2004) have shown that the choice between investing or not investing for a firm in a certain industry results from a process of self-selection. Consequently, comparing firms that invest abroad to the average firm that does not do so would be misleading. Ideally, one would like to compare the outcome of firms that decided to become multinationals with the counterfactual outcome had those firms not decided to become a multinational. This counterfactual outcome is unobservable, though. We adopt matching techniques in combination with a difference-in-difference (DID) estimator to evaluate the causal effect of establishing a foreign affiliate on a set of domestic firm-specific outcomes.

The causal effect of firm's global engagement strategies has received ample attention in the literature on exporting,[2] but so far has received limited attention in the context of multinationals. Egger and Pfaffermayr (2003) use several different endogenous treatment approaches to analyse the impact of investing abroad on the domestic investment behaviour of Austrian manufacturing firms. Barba Navaretti and Castellani

[1] The apparent difference between actual and perceived employment losses due to relocation of production may reflect growing worker anxiety that is fed by frequent media reports on mass layoffs. So far the empirical evidence suggests that these media reports tend to concentrate on the exception rather than the rule.

[2] The main concern is to evaluate whether exporters are more important because of self-selection into export market or whereas this reflects learning-by-exporting (see amongst others Clerides *et al.*, 1998; Girma *et al.*, 2004)

(2003) use propensity score matching to estimate the causal effect of investing abroad on the performance of Italian firms, as do Kleinert and Toubal (2007) for Germany. Barba Navaretti *et al.* (2009) for France and Italy, and Debeare *et al.* (2009) for Korea analyse the causal effects of becoming a multinational whilst distinguishing between high- and low-income investment locations.[3]

In the present paper, we approach the issue of relocation by focusing on the causal effects of decisions by firms to globalise their production (i.e. to become multinational) on the parent firm at home. For this purpose, we use rich firm-level data for France that cover the period 1987-1999. France is an interesting case given the intensity of globalisation debate: concerns over "*délocalisations*" (the French term referring to relocation abroad of production units) were according to the Eurobarometer the main reason for the no-vote in the referendum on the EU Constitution in 2005.

The contribution of this paper to the literature is twofold. First, we do not restrict our analysis to manufacturing, but separately analyse the effects of becoming a multinational for manufacturing and services firms. The relocation of services activities has become more important in recent years and it is sometimes feared that the employment consequences in the home country might be even more widespread than in the case of manufacturing. Second, we analyse the causal effect of becoming multinational whilst differentiating between horizontal, vertical or complex investment strategies on the basis of the location of investment (high or low income) and the industry affiliation (with comparative advantage or comparative disadvantage) of the investing firm.

Our main conclusion is that differentiating between investment strategies is crucial if one wants to grasp the effects of outward investment in the home country. In manufacturing, market-seeking investment have positive employment effects, whilst vertical investments mainly transform the investing firm's production function. FDI in the services sector is also associated with significant positive employment effects, which may reflect the possibility that FDI in this sector is predominantly motivated by market

[3] A substantial number of papers however has looked at the related but different issue of the effects of foreign takeovers on local plants. See for example Arnold and Smarzynska (2009) and Girma and Görg (2005).

access considerations. These results contradict popular fears about the potential negative employment impact of FDI abroad.

2. Set-Up

Traditionally, the literature on foreign direct investment (FDI) has identified two leading motives for establishing an affiliate abroad: the market-seeking (or 'horizontal') motive and the factor-seeking (or 'vertical') motive. Recently, interest has been directed to so-called complex FDI strategies, where foreign affiliates may be established because of a combination of horizontal and vertical motives, or where multinationals may consist of several foreign affiliates, some of which horizontal and others vertical.

Acknowledging these different motives is important in the context of the present paper because the impact of foreign direct investment on domestic firm outcomes is likely to depend upon the underlying strategy.

- The impact of FDI on domestic **employment** is likely to be more negative for vertical FDI than for horizontal FDI: whereas "pure" horizontal FDI is only intended for production sold on foreign markets, vertical FDI may lead to the relocation of all activities that can be produced more cheaply under the host country's factor prices. However, its impact on domestic employment is not necessarily negative. The direct negative impact of relocation on employment may be offset by positive indirect employment effects associated with relocation in the form of: i) production complementarities due to greater co-ordination and management needs; ii) scale effects that follow from the impact of relocation on average costs.[4]

- The impact of FDI on **skill-intensity** is expected to be either positive or insignificant. Vertical FDI is effectively a form of skill-biased technological change in which the production process is geographically fragmented. To the extent that low-skilled intensive activities are relocated abroad, this will increase

[4] Another reason why vertical FDI usually raises more important social concerns than horizontal FDI is that the jobs destroyed as a result of relocation tend to be very different from those created as a result of indirect effects.

the average skill-intensity for the investing firm at home. However, horizontal FDI may also have a positive impact on skill-intensity when relatively skill-intensive headquarter services are retained at home.

- The impact of FDI on the **productivity** of domestic inputs is likely to be positive, but especially so for vertical FDI. Horizontal FDI may engender productivity improvements through firm-level economies of scale based on shared sunk costs (for instance, in R&D), information sharing across affiliates, or learning-by-doing. *A priori*, more significant productivity gains are expected from vertical FDI: the perspective of a deeper division of labour that motivates such investments allows the parent firm to specialise in those production activities in which it is most efficient.

- Horizontal FDI is expected to reduce **exports** as it arises from the trade-off between concentrating production in one location and increasing market proximity through local production. Vertical FDI is expected to increase exports as intermediate inputs are shipped to foreign production sites for further processing.

As one cannot observe in the data whether investments are driven by factor-seeking, market-seeking or more complex considerations, we posit that the underlying investment strategy can be characterised by a combination of industry affiliation and location choice: investments by firms from comparative-advantage industries in high-income locations are assumed to reflect pure horizontal strategies; investments by firms from comparative-disadvantage industries in low-income countries are considered to follow vertical strategies. All strategies that are not fully consistent with these two stylised cases are classified as complex. The resulting typology of foreign investment strategies in terms of industry affiliation and location choice is represented in Table 1.

We attempt to evaluate the causal effect of becoming a multinational via each of these different foreign investment strategies.[5] In order to allow for the possibility that the

[5] As we are only interested in firms that establish a first foreign affiliate, complex forms of foreign direct investment necessarily reflect establishments which are likely to be motivated by both horizontal and vertical motives. While theoretically the effects of complex forms, as defined here, on observable

impact differs according to the location of the newly established affiliate, we extend the standard single treatment analysis to a multiple treatment setting (see Section 3 for more details on the methodology).[6] It is assumed that each firm can only invest in one location at a time so that each firm only receives one single treatment or no treatment at all.[7] When the expected outcomes of becoming a multinational further depend on a firm's individual characteristics, treatment effects are said to be 'heterogeneous'. While our methodology takes account of this, it may still be interesting to analyse how the average treatment effect changes over different segments of the population: this is done here by assessing separately the impact for firms in comparative-advantage and comparative-disadvantage industries.

Table 1:
Matrix of Foreign Investment Strategies

		Location	
		High-Income	Low-Income
Industry	Comparative Advantage	Horizontal	Complex
	Comparative Disadvantage	Complex	Vertical

3. Methodology

We borrow from the evaluation literature to evaluate the causal effect of initiating production in foreign location j (treatment j) on a range of outcomes relative to that of remaining national. The observed outcome of an individual firm i, y_i can be written as:

$$y_i = y_i^0 + \sum_{j=1}^{J} (y_i^j - y_i^0) D_{ij} \qquad (1)$$

where superscript 0 refers to the case of non-treatment, and j to treatment j. D_{ij} is a dummy equal to one is firm i follows treatment j. The crucial problem in the evaluation literature is the missing data problem, i.e. the fact that the outcome of individual i had it

outcomes at home simply present a linear combination of the two pure investment strategies, failure to disentangle those different forms empirically does not allow one to grasp their implications appropriately.

[6] See Lechner (2001) and Blundell, Dearden and Sianesi (2005) for more details on multiple treatment effects.

[7] A few cases are present in our dataset where a firm simultaneously invests in both a rich and a poor country. We classify such cases as investors in a high-income location.

not been treated, y_i^0, is unobserved. The main challenge therefore is to construct an appropriate counterfactual that can be used instead of y_i^0. Several methodologies have been proposed that attempt to do this. However, none strictly dominates the others. The ultimate choice of methodology therefore rests on the specific problem at hand.[8]

We adopt matching techniques in combination with a difference-in-difference (DID) estimator to evaluate the causal effect of establishing a foreign affiliate on a set of domestic outcome variables of interest. Matching is an essentially non-parametric method which focuses on the mean difference in outcomes between the treated and the untreated over the common support, appropriately weighted by the distribution of participants.[9] Matching involves re-constructing the missing data ex-post for the treated outcomes had they not been treated when a randomised control group is not available. It does so by 'matching' firms from the group of untreated firms that are very similar in their pre-treatment observable characteristics to the treated. Once matched the only observable difference between treated and untreated individuals is their treatment status. Using our matched control group, we analyse the average effect of the treatment on the treated (ATT):

$$\hat{\alpha}_{ATT}^{j} = E\left(y_i^j - y_i^0 \middle| D_{ij} = 1\right) = E\left(y_i^j \middle| D_{ij} = 1\right) - E\left(y_i^0 \middle| D_{ij} = 1\right) \qquad (2)$$

The matching method relies on two assumptions: the conditional mean independence assumption (CIA) and the common support assumption (CS). First, CIA requires that conditional on observables the non-treated outcomes are independent of treatment status:

$$E\left(y_i^0 \middle| X, D_{ij} = 0\right) = E\left(y_i^0 \middle| X, D_{ij} = 1\right) \text{ for } X \in S \qquad (3)$$

The violation of this assumption results in selection bias, the crux of the evaluation problem. Heckman *et al.* (1997) list three sources of selection bias, that would correspond to the following situations, in our case: i) the outcome variables are measured differently for treated and untreated, ii) differences arise in average outcomes across different markets, and iii) firms self-select into multinationals on the basis of

[8] See Blundell and Costa Dias (2002) for a survey of the alternative approaches to evaluation problems.
[9] Consequently, in contrast to OLS, matching does not rely on assumptions regarding functional form (i.e. linearity) and homogenous treatment effects (that the treatment effect is identical across individuals).

unobservable characteristics. Consequently, the effectiveness of matching in re-constructing the unobserved counterfactual depends on three conditions: i) the data used to characterise the treated and the untreated come from a single source, ii) treated and untreated individuals reside in the same market, iii) the data contain a rich set of variables that affect participation and performance. In the present case those three conditions are met. Data on firm characteristics all come from a single source.[10] In order to satisfy the second requirement, matching is applied sector by sector. Finally, the present study uses administrative data for France which contains a wealth of information on almost the entire population of firms.

Second, the common support assumption requires that all treated firms have a counterpart in the untreated population and all firms have a positive probability of investing abroad:

$$0 < P\left(D_{ij} = 1 \middle| X\right) < 1 \qquad (4)$$

We therefore impose this condition in our matching procedure. In practice, there may exist a trade-off between both assumptions. While more detailed information allows one to construct a 'better' counterfactual which is important for justifying the CIA, at the same time this may make it more difficult to find appropriate controls thereby restricting the common support (i.e. the generality of the results).

In order to implement matching one has to overcome the curse of dimensionality which complicates finding an appropriate counterfactual when firms differ along several dimensions. Rosenbaum and Rubin (1983, 1984) propose to match on the propensity score and show that CIA remains valid once this is done appropriately.[11] In our case, this score is defined as the propensity to establish an affiliate abroad as a function of observable characteristics:

$$E\left(D_{ij} \middle| y, X\right) = P\left(D_{ij} = 1 \middle| X\right) \qquad (5)$$

[10] More specifically, the *Enquête DREE* is used to sort out the treated from the untreated, while the *EAE* is used to analyse why firms decide to establish a foreign affiliate abroad and how this affects their performance. See below for details on data sources.

[11] More recently, Hahn (1998) has shown that using the propensity score may also improve the efficiency of ATT by reducing the number of dimensions.

In what follows, we will use the logit and the multinomial logit models to estimate the propensity score for the single and multiple treatment case respectively. Firms are matched using nearest neighbour (one-to-one) matching with replacement. Firms are matched separately for each year, each two-digit industry, for exporters and non-exporters. Throughout a condition is imposed that firms cannot be matched to firms belonging to the same business group.

We further improve the performance of propensity score matching by combining it with the difference-in-differences (DID) estimator following Heckman *et al.* (1997) and Blundell *et al.* (2004). The CIA is a strong assumption once it is realised that firms base their investment decisions on future expected profits, which are unobserved by the econometrician. The DID-estimator allows one to control to some extent for selection on unobservable characteristics by focusing on the difference in the trend before and after treatment instead of that of the difference in levels. The CIA now requires that conditional on observables treatment status is independent of unobserved temporary individual-specific effects:[12]

$$E\left(\Delta y_i^0 \middle| X, D_{ij}=0\right) = E\left(\Delta y_i^0 \middle| X, D_{ij}=1\right) \quad \text{for } X \in S \qquad (3')$$

The DID-estimator assumes that unobserved macro-economic developments affect the treatment and the control in the same way ('common trends assumption'). However, there may be unobserved differences that cause both groups to react differently in response to any observed shocks. We attempt to control for this by including observable characteristics that explain the propensity to invest abroad both in levels and first-differences.

4. Data sources and descriptive statistics

Data on individual firms are obtained from the *Enquete Annuelle des Entreprises* (EAE) which covers all industries and is available for the years 1984-2002. The survey comprises all firms with more than 20 employees in manufacturing; in services, it includes all firms with more than 30 employees (more than 20 before 1997), as well as a

[12] In practical terms, implementing the DID estimator involves estimating a fixed effects model on the difference in the means between treated and untreated firms.

sample of firms under this threshold.[13] Participation of firms to this survey is compulsory by law.

We combine the EAE using the firm identifiers with the survey *Direction des Relations Economiques Extérieures* (DREE, French Ministry of Economics and Finance) which documents information on French affiliates abroad. We only use information on the year in which a firm establishes its first *production* establishment abroad, while disregarding *distribution* affiliates. Firms that have according to DREE at least one foreign affiliate are classified as multinational firms. Firms that do not have any foreign affiliate are considered purely national firms. The main focus here is on firms that switch from being national to multinational by establishing an affiliate abroad.

A third dataset with information on business groups, LIFI (*Liaisons Financières*), is used to ensure that we do not match firms that are part of the same enterprise group. This is an important issue as it may be quite likely that we link firms within the same business groups due to the similarity of their observable characteristics. This, however, would give us a misleading picture of the causal effect of becoming a multinational as firms within the same business groups have strong financial linkages. As a result, any effect due to investing abroad by one firm in a business group may be spread through the entire business group, thus mitigating the difference between the treatment firm and its control.

In order to follow individual firms through time we organise the data around cohorts. Cohorts are defined as six-year windows centred around year t* in which domestic firms may establish a foreign presence. We impose the condition that within a six-year window the panel is balanced.[14] After having defined the cohorts we stack them together in order to create a 'panel of cohorts' running from 1987-1999 for manufacturing. Bender and Von Wachter (2006) observe that this effectively gives a system of seemingly unrelated regressions with cross-equation restrictions. They

[13] The sampling method used in services since 1997 is based upon a threshold. This threshold is generally set at 30 employees or a turnover of at least 5 million euros. All firms beyond the threshold are systematically surveyed each year, while only a sample of other firms below the threshold are surveyed each year.

[14] Strictly speaking, a sufficient condition would have been to require the panel to be balanced up to t-star, the year in which firms switch. However, having a completely balanced panel facilitates the interpretation of the results as it removes any effects which are due to changes in the composition of firms after t-star. Barba Navaretti *et al.* (2009) also use a balanced panel but do not define cohorts.

suggest that standard errors should be clustered within individuals to take account of the resulting correlation in the error structure.[15]

Not only do we need to construct an unobserved counterfactual but we also have to decide what the counterfactual is supposed to represent, an issue that not usually arises in the traditional evaluation literature. In contrast to most policy evaluation programmes that are administered at a certain point in time the choice to invest abroad can be taken at any point in time and may even be repeated. It is therefore not straightforward whether we should compare firms that invest abroad in year *t* with firms that never invest abroad, or with firms that never invest abroad up to year *t*. Sianesi (2004) argues in the context of active labour market programmes in Sweden that the latter gives the relevant parameter "for it mirrors the relevant decision open to the job-seeker and the program administrator: to join a program at a given time or to wait at a bit longer, in the hope of finding a job and in the knowledge that one can always join later" (p. 133). Barba Navaretti *et al.* (2009) focus on the same parameter in their study of foreign direct investment. The question addressed is then that of becoming a multinational now rather than later instead of that of becoming a multinational now and remaining national forever after. This thus addresses the question of becoming a multinational now rather than later instead of the question of becoming a multinational now and remaining national forever after. We follow this approach in the present paper.

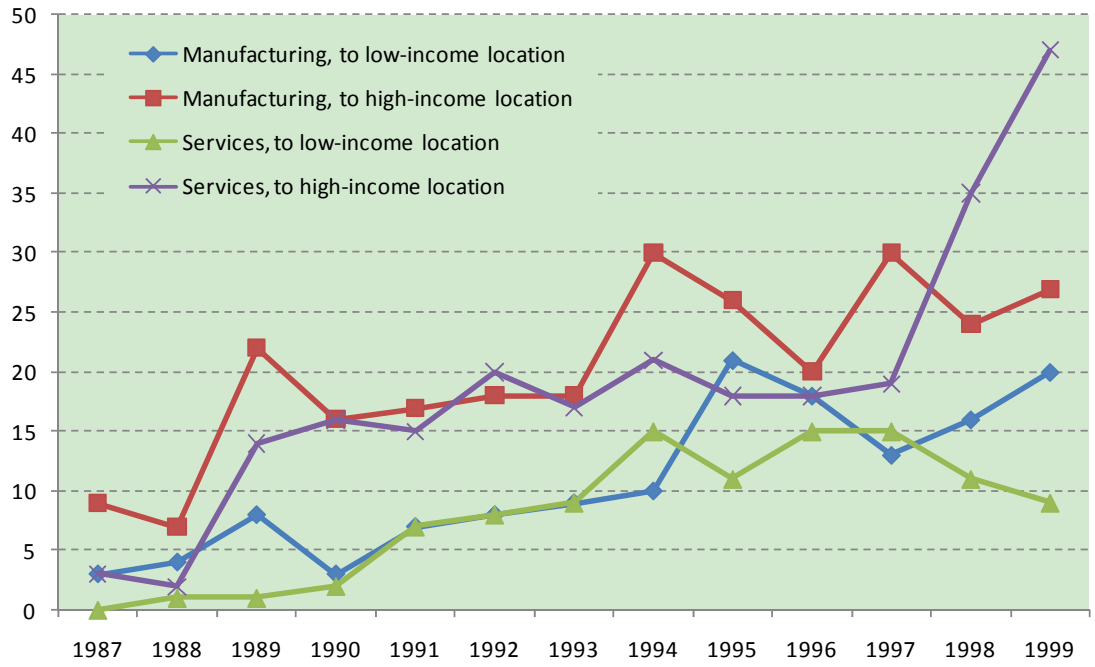
When distinguishing investment by location, we will consider high income OECD countries ('high income') and the rest of the world ('low income'). Given the relatively high skill level in France, we will identify comparative-advantage industries as those with above-average skill intensity. We only apply this distinction to manufacturing, though, both because the link between skill intensity and comparative advantage is less clear for services than for manufacturing, and because of the more limited number of observations for services. In any case, the horizontal-vertical investment typology was developed for manufacturing industries and it is unclear to what extent it is suitable to characterise foreign investment strategies in services.

Figure 1 reports the total number of "switchers", i.e. the total number of national firms becoming multinationals by initiating production in either a high-income or a low-

[15] A similar methodology is used in Jacobson *et al.* (1993) and Hijzen *et al.* (2009).

income location, in our data for each year during the period 1987-1999. First-time foreign investments are about equally important in manufacturing and services. In both sectors, they are headed predominantly towards high-income countries and follow an increasing trend. Our dataset includes a total of 404 switchers in manufacturing and 349 in services. Due to the requirements that all variables are non-missing for the whole time-window [t-2;t+3] the actual estimation sample for the propensity score consists of 309 switchers in manufacturing and 185 in services.[16]

Figure 1: Number of new French multinationals considered by year, sector and investment location



Note: The figure plots, for each year, the number of firms investing abroad for the first time, respectively in a high- and in a low-income location. Firms are classified in manufacturing or services according to the activity of the parent firm.

We next assess how the difference in export and FDI status is correlated with different firm characteristics by estimating regressions over all firms (with more than 20 employees in manufacturing, more than 30 in services) on a set of export and investment dummies along with additional controls. The first set of regressions only includes a set of time dummies (Table 2, Panel A); the second set in addition controls for the region and sector of the firm (Panel B); and finally, the third set of regressions also includes log employment (Panel C).

[16] When imposing the common support, not all treated firms have a control on the common support. Accordingly, 286 matched firm pairs are studied below in manufacturing and 151 in services.

Table 2 shows that exporters are larger and more productive than non-exporters, consistent with the theoretical literature following Mélitz (2003). They are also found to be more skilled and to own more intangible assets. These differences are large in most cases and robust to controlling for sector, region and firm employment. This is also in line with previous empirical evidence as presented for instance by Bernard's *et al.* (2007) for manufacturing firms in the US. We show that this pattern also holds for services where exporters are far less numerous.

Table 2: Exporters, new investors abroad and multinationals, compared to other firms (1987-1999)

	Manufacturing				Services			
	Exporter w/o foreign affiliate	New investor, to low-income location	New investor, to high-income loc.	Multi-national firms	Exporter w/o foreign affiliate	New investor, to low-income location	New investor, to high-income loc.	Multi-national firms
A. Additional controls: time dummies								
Log employment	0.44	1.80	2.05	2.59	0.14	1.14	1.16	1.45
Log value added	0.58	2.10	2.54	3.07	0.75	2.48	2.84	3.22
TFP	0.27	0.66	0.66	0.76	0.22	0.26	0.43	0.48
Average skill	0.10	0.17	0.24	0.29	0.35	0.47	0.53	0.60
Exports/turnover	0.18	0.31	0.32	0.35	0.16	0.12	0.09	0.12
Profit / turnover	0.01	0.02	0.04	0.03	*0.00*	*0.00*	*0.02*	0.02
Intangible assets / VA	1.69	5.29	6.59	6.40	0.75	4.20	4.15	4.33
Corporate taxes	0.55	*1.23*	2.08	1.28	1.16	3.27	4.65	3.91
Nb. plants	0.05	0.46	0.69	0.93	n.a.	n.a.	n.a.	n.a.
B. Additional controls: time, region and sector dummies								
Log employment	0.38	1.68	1.90	2.40	0.10	1.00	1.09	1.36
Log value added	0.48	1.94	2.27	2.73	0.69	2.25	2.62	2.99
TFP	0.27	0.65	0.62	0.72	0.15	0.23	0.32	0.41
Average skill	0.07	0.13	0.14	0.17	0.26	0.40	0.40	0.49
Exports/turnover	0.17	0.28	0.29	0.31	0.17	0.13	0.10	0.11
Profit / turnover	0.01	0.02	0.04	0.02	0.01	*0.00*	*0.02*	0.02
Intangible assets / VA	1.53	4.92	6.13	5.83	0.76	4.03	4.15	4.20
Corporate taxes	0.51	*1.19*	2.01	1.19	0.95	*2.47*	4.44	3.22
Nb. plants	0.04	0.43	0.62	0.83	n.a.	n.a.	n.a.	n.a.
C. Additional controls: time, region and sector dummies + Log employment								
Log value added	0.09	0.19	0.27	0.21	0.33	0.46	0.53	0.70
TFP	0.22	0.44	0.38	0.42	0.15	0.24	0.32	0.42
Average skill	0.06	0.09	0.11	0.12	0.29	0.49	0.48	0.60
Exports/turnover	0.15	0.22	0.22	0.23	0.15	0.13	0.10	0.12
Profit / turnover	0.00	*0.01*	0.04	0.02	0.01	*-0.02*	*0.00*	*-0.01*
Intangible assets / VA	0.60	*0.53*	1.31	*-0.22*	0.60	1.76	*1.23*	1.31
Corporate taxes	0.56	*1.38*	2.24	1.53	0.41	*0.47*	*2.04*	0.91
Nb. plants	-0.05	*0.06*	0.18	0.29	n.a.	n.a.	n.a.	n.a.
Nb. observations	203,639	140	264	4,526	45,678	104	245	2,723

Note: The table reports the estimated coefficients for the dummies on export and investment status in a regression that also includes the additional controls described in panel headings A, B and C. Each row reflects the results from one regression for manufacturing and one for services. Firms are considered new investors the year when they invest abroad for the first time. Multinationals are defined as firms which invested abroad at least three years earlier. All results are significant at the 1 percent level, except those italicized. All enterprises with more than 20 employees are covered in manufacturing (277,350 observations in total or 21,335 per year on average), all enterprises with more than 30 employees are covered in services (312,822 observations in total or 24,063 per year on average).

Table 2 also confirms that foreign investors differ strikingly from mere exporters, consistent with Helpman *et al.* (2004). This is true in all the above-cited dimensions. In addition, new investors display intermediate characteristics between multinationals[17] and simple exporters in almost all cases (in particular employment, value added and productivity), with firms investing in high-income locations more closely resembling multinationals than those investing in low-income countries. For instance, controlling for time, sector and region, exporters without foreign affiliate employ 47% more workers than non-exporters in manufacturing (exp(0.38)-1), while the differential is 436% and 569% for first-time investors respectively in low- and high-income locations, and 1008% for multinationals (still with respect to domestic non-exporters). This confirms the need to control for the ex-ante specificities of new foreign investors, as well as the interest of distinguishing investors to low- and high-income locations.

5. Constructing the Counterfactual

The propensity scores are estimated based on a multinational logit model of the propensity of a domestic firm to establish an affiliate abroad. Before going on to the estimations, one has to decide on the appropriate number of lags. Most studies looking at either the decision to export or invest abroad use explanatory variables in the last year before investment takes place (or before one starts exporting). This approach may be unsatisfactory when the decision to invest is taken one or two years before the investment takes place *and* when the decision to invest is taken in conjunction with other decisions that affect the observable characteristics of the firm. In this case, part of the causal effect due to the decision to invest abroad may actually occur before the year of the investment.[18] We prefer the specification with two lags as it allows for some anticipatory effects, but does not restrict our ability by too much to follow matched firms after investing abroad.

Table 4 reports the results obtained from the multinomial logit regressions for manufacturing and services respectively. The propensity of domestic firms to become multinational is considered to be a function of the log of employment, log exports over value-added, total factor productivity (TFP), profits over value-added, the log wage bill

[17] The definition of multinationals is restricted here to firms having invested abroad at least three years before.
[18] In a manner similar to the Ashenfelter dip in the labour economics literature.

per worker, log intangible assets over value-added, log corporate taxes over turnover, the log number of production plants (in manufacturing only), the log change in value-added, the change in profits over value-added. The regressions also include a full set of region, sector and time dummies.

The propensity of firms to establish a foreign presence abroad is consistently found to depend upon the parent's scale, whether measured through either value added or employment. Although the corresponding coefficients are not always significant, the propensity to invest abroad also depends positively on the level of exports, TFP, intangible assets, and corporate taxes. These results are in line with the descriptive statistics above and the theoretical predictions in Helpman *et al.* (2004).

Table 4:
Propensity to Switch

	Manufacturing			Services		
	All	RICH	POOR	All	RICH	POOR
Ln VA $_{t*-2}$	3.04 ***	2.56	3.51 ***	1.06	2.77 **	-0.23
	(2.66)	(1.60)	(2.66)	(1.51)	(2.49)	(-0.23)
Squared ln VA $_{t*-2}$	-0.13 ***	-0.13 **	-0.11 *	-0.05 *	-0.11 **	-0.03
	(-2.68)	(-2.06)	(-1.94)	(-1.77)	(-2.44)	(-0.66)
Ln Employment $_{t*-2}$	0.52	1.12 **	-0.18	0.82 **	0.52	1.48 *
	(1.08)	(2.05)	(-0.32)	(2.48)	(1.59)	(1.89)
Ln Exports $_{t*-2}$	0.10 ***	0.12 ***	0.07 **	0.02 **	0.01	0.04 ***
	(4.12)	(3.51)	(2.09)	(2.06)	(0.97)	(2.61)
TFP_{t*-2}	0.40 **	0.43 **	0.45	0.43	0.20	1.07
	(2.23)	(2.08)	(1.55)	(1.26)	(0.58)	(1.41)
Ln Average Wage $_{t*-2}$	-0.46	0.34	-1.59 **	1.03 ***	0.76 **	1.41 **
	(-0.88)	(0.55)	(-2.21)	(3.55)	(2.17)	(2.54)
Profits $_{t*-2}$	1.16	4.19 **	-3.36 *	-0.41	-0.70	0.11
	(0.72)	(2.32)	(-1.82)	(-0.63)	(-0.97)	(0.08)
Ln Intangible Assets $_{t*-2}$	0.05 ***	0.07 ***	0.02	0.03	0.01	0.06
	(3.15)	(3.37)	(0.69)	(1.15)	(0.29)	(1.58)
Ln Corporate Taxes $_{t*-2}$	0.03 **	0.02	0.05 *	0.03 **	0.03 **	0.01
	(2.20)	(1.32)	(1.93)	(2.15)	(2.19)	(0.60)
Δ ln Value added $_{t*-2}$	0.40	0.53	0.13	1.53 ***	1.19 **	1.61 ***
	(1.07)	(1.21)	(0.23)	(3.93)	(2.55)	(2.71)
Δ Profits $_{t*-2}$	-0.57	0.40	-2.37	-3.63 ***	-4.19 ***	-1.58
	(-0.26)	(0.16)	(-0.98)	(-5.31)	(-6.52)	(-0.88)
Ln No. of plants $_{t*-2}$	0.24 ***	0.32 ***	0.08			
	(2.93)	(3.26)	(0.61)			
Observations	89,584	89,584		36,527	37,961	

Note: *, **, *** statistically significant at 10%, 5% and 1%. Robust standard errors in parentheses. All regressions include full set of industry, region and time dummies. Columns "All" report the results of a simple logit model, while columns "Rich" and "Poor" jointly report the results of a multinomial logit model.

The average wage is of particular relevance in the present paper as it is used to define comparative advantage and comparative disadvantage industries. This variable

measures differences across firms in the average wage bill per employee. As such differences are more likely to result from differences in the composition of the workforce than pay differences across firms for similar workers we interpret this variable as a measure of skill-intensity. The results indicate that the impact of skill depends on the sector of the parent and the location of investment. In manufacturing, the average wage is associated with a positive albeit insignificant coefficient for the propensity to invest in rich countries and a negative and significant coefficient for the propensity to invest in poor countries. This is consistent with our priors discussed in Section 2 about pure investment strategies: French firms in comparative-advantage industries tend to invest in high-income countries (horizontal FDI), while those in comparative-disadvantage industries are more likely to carry out investments in low-income countries (vertical FDI).

In services, by contrast, the average wage is estimated to have a positive and significant impact on the propensity to invest abroad whatever the location. In this respect, FDI in services behaves in a way similar to horizontal FDI in manufacturing, presumably reflecting the important role of market-access considerations in driving service investments abroad.

The propensity scores are used to construct the unobserved counterfactual, i.e. to match switching firms to non-switching domestic firms which are similar in terms of their observable characteristics. While treated firms differ significantly and substantially from other firms in most respects, the balancing tests reported in Appendix Table 1 show that the matching procedure satisfactorily removes these differences.

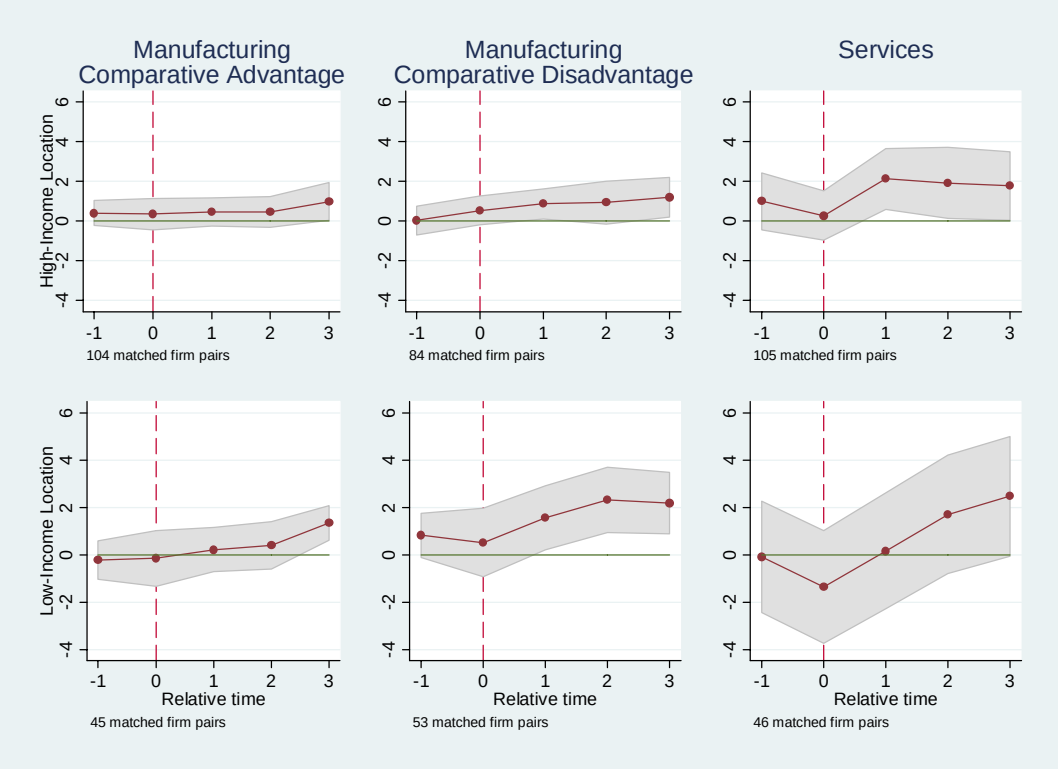
6. Results

Using the matched sample we now analyse the causal effect of initiating production abroad. Rather than analysing the differences in the means between the treated and the controls at arbitrary points in time, we use our dataset of stacked cohorts to track average differences over time. We first consider the impact of different FDI strategies on parent exports, then discuss its implications for parent employment and close with an analysis of FDI on technology.

6.1 International investment strategies and firm-level exports

As emphasised above, differences in investment motives can be a useful guide to interpret the employment effects of investment projects. Absent the possibility to ask firms about their motives, we argued in Section 2 that the combination of industry affiliation (comparative advantage versus comparative disadvantage) and income location choice (high income versus low income) allows obtaining a simple characterisation of different FDI strategies. Given the widely different implications of horizontal and vertical FDI for exports, the estimated causal effects of FDI on exports provide a rough test of the appropriateness of this characterisation.

Figure 2: Impact of FDI on Log Exports



Notes: Relative time is zero for the year when foreign investment takes place. The dependent variable is the change from t-2 in the difference in the log of exports between first-time investors and the matched control group. The red line represents the average impact; the shaded area corresponds to the associated 95% confidence interval, based on bootstrapped standard errors, clustered on individual firms (100 replications).

The estimates reported in Figure 2 lend support to the typology proposed above: FDI in low-income countries by manufacturing firms in comparative-disadvantage sectors are associated with strongly increased exports (*ceteris paribus*, their level is multiplied by almost nine with respect to the control group), consistently with the assumption that

such situations reflect vertical, or factor-seeking, FDI. In contrast, investments in high-income locations by firms in comparative-advantage sectors are not associated with a statistically significant effect on exports, consistent with the prior that they are horizontal, market-seeking investments. The intermediate results found for the remaining two cases also support the idea that they reflect complex motives, mixing factor- and market-seeking strategies.

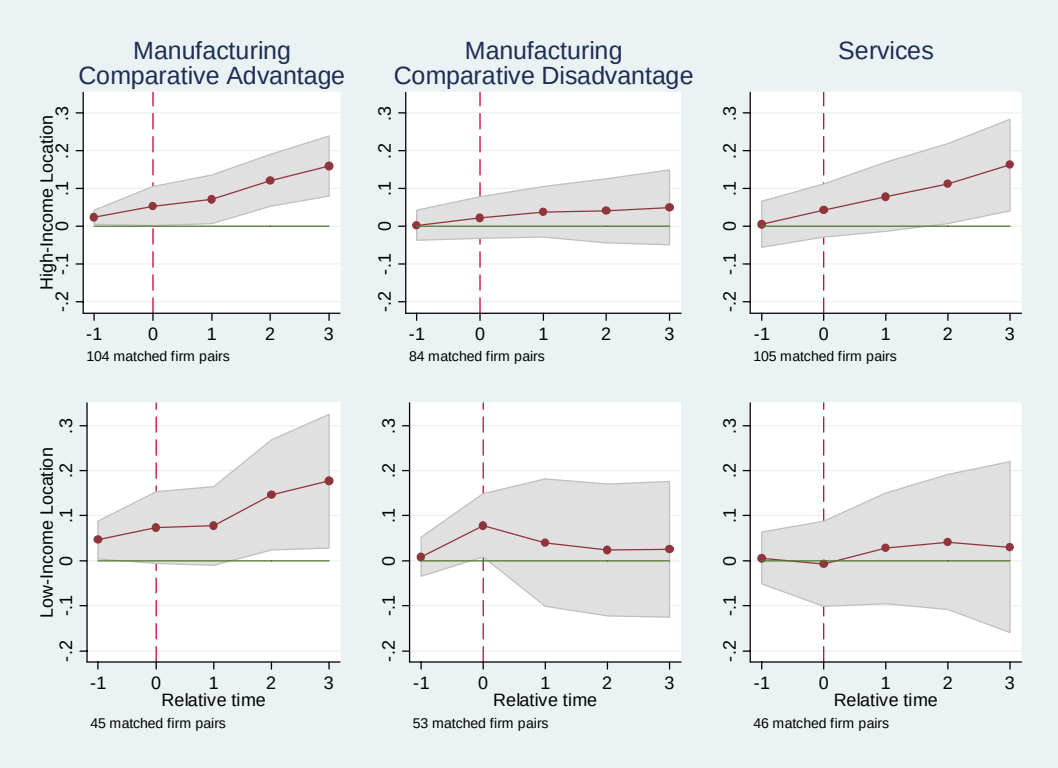
Our typology does not apply to service firms. The estimated export effects of initiating production abroad is positive for service firms, whatever the location, although somewhat imprecise. These results could reflect the existence of a division of labour between the parent firm and its affiliate, but also the existence of production complementarities, which are likely in particular for business services.

6.2 International investment strategies and firm-level employment

The results confirm the prior that horizontal FDIs are the most beneficial in terms of employment in the parent firm (Figure 3). For a firm in a comparative-advantage industry that invests in a high-income location, employment is 16% higher three years after investment relative to its counterfactual outcome that would have emerged had it not invested abroad and it is increasing over time. In contrast, vertical FDI associated with firms in comparative disadvantage industries that invest in low-income locations, does not have a statistically significant effect on employment which, if anything, appears to decrease over time. Complex FDI exhibits intermediate results, positive but only significant in the case of firms in comparative-advantage industries investing in low-income countries.

For services FDI, a large and significant positive impact is found in the context of investments in high-income locations (+17% three years after investment, significant at the 1% level), comparable to the effect found for horizontal investments in manufacturing. Investments in low-income location are found to have a small positive, but insignificant impact on employment.

Figure 3: Impact of FDI on Log Employment



Notes: Relative time is zero for the year when foreign investment takes place. The dependent variable is the change from t-2 in the difference in the log of exports between first-time investors and the matched control group. The red line represents the average impact; the shaded area corresponds to the associated 95% confidence interval, based on bootstrapped standard errors, clustered on individual firms (100 replications).

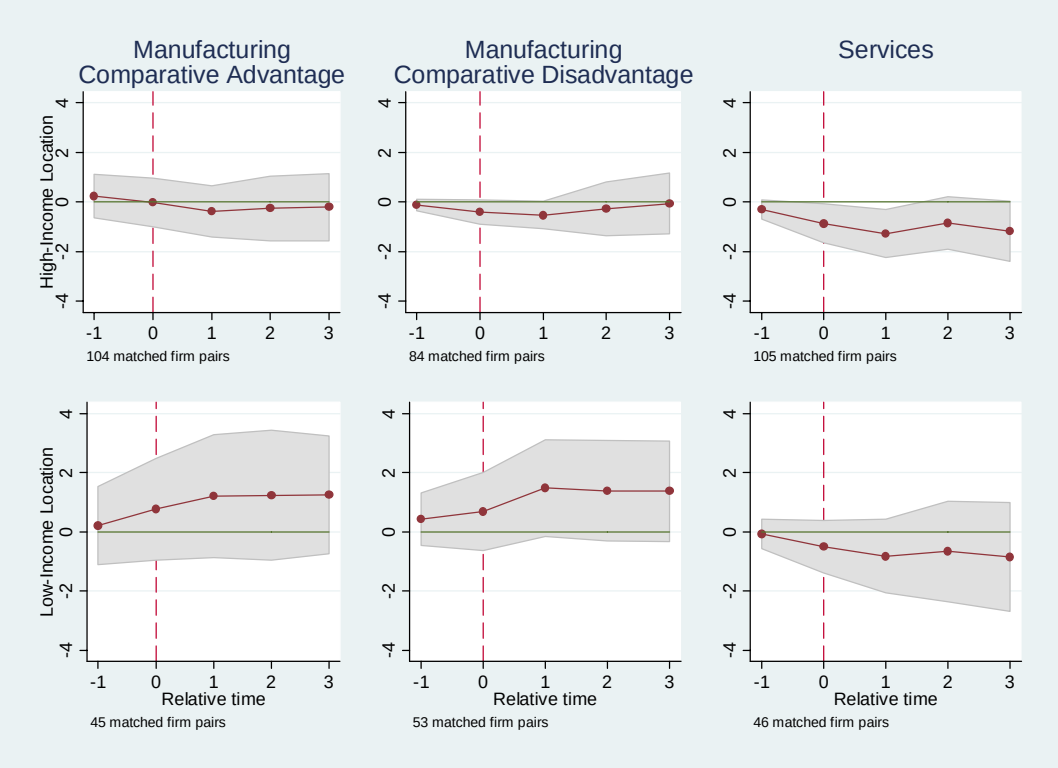
Remarkably, among the various configurations studied, no sign could be found of any negative effect on the parent firm's employment. As a robustness check, the employment impact was carried out adding the log wage as an additional control. These semi-parametric estimates were very close to the one presented above (see Appendix Table 2).

6.3 International investment strategies, the input mix and efficiency

Figure 4 represents the trajectories of the capital-labour ratio relative to our re-constructed counterfactual by location and type of industry. For horizontal FDI the estimated impact is negative, but not statistically significant. In principle, this could reflect the role of production complementarities associated with such investments in the form of greater co-ordination and management needs. Such production complementarities may be particularly important for services investment abroad. By contrast, vertical FDI is found to increase the capital-labour ratio. While these estimates

are only significant at the 10% level, they are consistent with vertical FDI allowing further division of labour across affiliates, with the parent firm retaining the most capital-intensive parts of the production process. A qualitatively similar pattern is obtained when replacing the average wage, a rough measure of skill-intensity, instead of the capital-labour ratio (with no change for horizontal FDI and a slight increase for vertical FDI). These results are reported in Figure 1 of the Appendix.

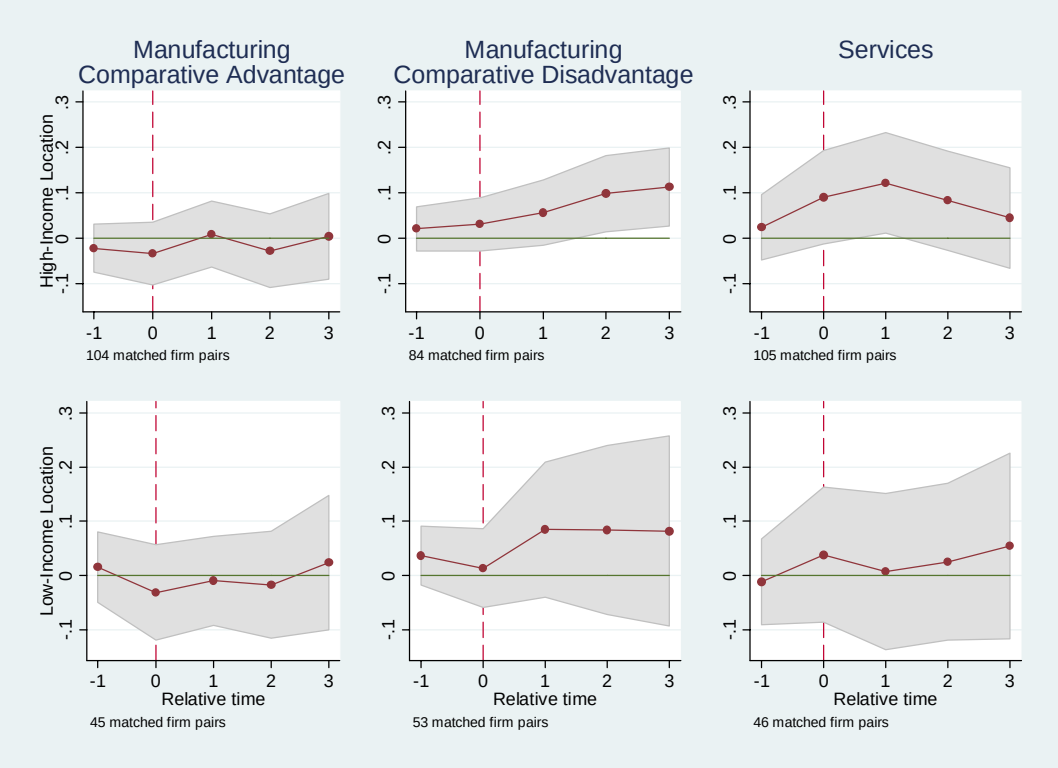
Figure 4: The Impact of FDI on Capital-Labour Ratio



Notes: As in Figure 2. The dependent variable is the capital-labour ratio, computed as fixed assets per employee.

Figure 5 reports the estimated effects of FDI on total factor productivity (TFP) by international investment strategy. The efficiency gains associated with vertical FDI could be potentially large, but lack precision. Nevertheless, they are fully consistent with the idea that the division of labour across affiliates is a source of efficiency gains. There is no indication that similar efficiency gains may also arise for horizontal FDI. For complex FDI, statistically significant efficiency gains are found for firms in comparative-disadvantage sectors investing in high-income locations, perhaps as a result of outsourcing those fragments of the production process in which they were least efficient. No such effect is found for firms in comparative-advantage sectors investing in low-income locations or for services firms.

Figure 5: The Impact of FDI on TFP



Notes: As in Figure 2. See Appendix 1 for details on TFP measurement.

As a robustness check, semi-parametric estimates are carried out for TFP, adding firm turnover as an additional control (see Appendix Table 3). Although qualitatively comparable to the results presented in Figure 5, the estimated TFP impacts are systematically lower due to the positive impact of FDI on turnover. This suggests that part of the efficiency gains mentioned could reflect economies of scale that arise from greater specialisation.

8. Concluding Remarks

While anecdotal evidence of jobs displacement abounds, our systematic analysis of French manufacturing and services investment abroad over the period 1987-1999 shows that initiating production abroad is not detrimental to the parent firm's domestic employment. This confirms previous results in the literature, in particular those found by Barba-Navaretti *et al.* (2009) for French manufacturing firms.

The first key contribution of our analysis is to show that the consequences of initiating production abroad for parent firms in manufacturing depend on the investment underlying strategy, which, in turn, can be related to the sector of origin and the income level of the recipient country.

- Investments in high-income countries by manufacturing firms in comparative-advantage sectors mainly reflect horizontal, market-seeking motives. They have a significant positive impact on domestic employment in the parent firm compared to the counterfactual outcome of not investing abroad. No discernible impact is found on exports, TFP or the input mix, consistent with the prior that this type of investment does not significantly change the way the production process is organised in the parent firm.

- Investments in low-income countries by manufacturing firms in comparative-disadvantage sectors reflect vertical, factor-seeking motives. Vertical investment strategies pave the way for an international division of labour across the firm's production units. This has a strong positive impact on parent exports, and not surprisingly, has important implications for the way the production process is organised in the parent firm. Vertical FDI increases the capital-labour ratio (and possibly skill-intensity) and may also yield positive efficiency gains. However, in contrast to conventional wisdom, they do not translate into job losses in the parent firm. If anything, a positive impact is found on employment in the investing firm (these estimates are not statistically significant). On the whole, vertical FDI appears to be an efficient strategy to withstand competitive pressures. Despite relocating part of the production process abroad, employment gains are being registered on the segments that are retained at home.

- We classify as complex those FDIs that do not correspond to any of those two polar cases, and the results found in these cases are indeed a mix of those obtained for the pure strategies.

The second main contribution of this paper is to extend the analysis to the services sector. This is important for two reasons. First, FDI in services is very important. In the most recent year of our sample, the number of first-time investors abroad in the services

sector exceeded that in manufacturing. Second, our understanding of the growing internationalisation of the services sector is still very limited. The manufacturing-based typology referred to above cannot be straightforwardly applied to services. We find that service FDI is associated with strongly increased employment in the parent firm, by almost 20% (the same order of magnitude as that for horizontal FDI by manufacturing firms). Services FDI also appears to lead to lower capital-labour ratios in the parent firm. This may reflect the role of production complementarities between the parent firm and its affiliates, arising from new management and co-ordination needs. As for vertical FDI in manufacturing, services FDI is associated with a strong positive impact on the parent exports.

The present firm-level analysis allows one to provide a detailed picture of the effects of initiating production abroad in the parent firm after controlling for a rich set of observed and unobserved characteristics. However, such an analysis is also necessarily partial in nature as it does account for potentially important general equilibrium effects. Another limitation worth recalling is that we focus on firms investing abroad for the first time. This is useful from an empirical perspective as it improves the identification of the impact of FDI.[19] However, it may also affect the generality of our results, particularly when the impact of first-time investment on the parent firm is very different from that of foreign investments by MNEs. If anything, we would expect the effects of investment abroad by MNEs to be smaller than those observed for first-time investors as subsequent investments may be expected to have less radical implications for the production process at home.

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[19] Debeare *et al* (2009) relax this to some extent.

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APPENDIX 1

A Measuring TFP

In order to measure Total Factor Productivity (TFP) we apply the mean value theorem as suggested by Klette (1999). In practice this means that we transform the data in differences from the industry median within each year. There are two advantages to this transformation: i) it increases the flexibility to deal with firm heterogeneity within the industry; ii) it removes the need to use industry level price deflators which are difficult to obtain for services. After transforming the data we estimate TFP as the residual of a Cobb-Douglas production function of capital, labour and materials. The production function controls for the possible correlation between input-choice and time-invariant productivity shocks by including individual specific fixed effects.

B Data Management

In order to follow individual firms through time we organise the data around cohorts. Cohorts are defined as six-year windows around year t [t-2; t+3] in which domestic firms establish a foreign presence. We impose the condition that within a six-year window the panel should be balanced. After having defined the cohorts we stack them together in order to create a 'panel of cohorts' running from 1988-1998 for manufacturing. Bender and Von Wachter (2006) observe that this effectively gives a system of seemingly unrelated regressions with cross-equation restrictions.

APPENDIX 2: Additional results

Appendix Table 1:
Balancing Tests for Multiple Treatment Matching

	Unmatched		Matched	
	p < 0.1	p < 0.05	p < 0.1	p < 0.05
Manufacturing *(out of 176 comparisons)*				
Investors to high-income locations	126	120	15	8
Investors to low-income locations	106	95	17	9
All	133	127	7	5
Services *(out of 190 comparisons)*				
Investors to high-income locations	116	106	16	6
Investors to low-income locations	65	57	8	1
All	121	110	15	9

Note: The table shows the number of cases where the p-value of a t-test for equality of means between treated and non-treated firms is smaller than the indicated significance level. The comparison is carried out for each variable used in estimating the propensity scores (except squared log VA, i.e. 11 variables in manufacturing, 10 in services), separately for each sector (16 in manufacturing, 19 in services), hence 11 x 16 = 176 comparisons in manufacturing, 10 x 19 = 190 in services.

Appendix Table 2: Semi-parametric estimates of the impact of FDI on employment

	Manufacturing, comparative advantage		Manufacturing, comp. disadvantage		Services	
	High-income locations	Low-income locations	High-income locations	Low-income locations	High-income locations	Low-income locations
Log Employment						
t-1	0.02 *	0.04	0.02	0.01	0.02	-0.02
	(1.91)	(1.56)	(0.91)	(0.67)	(0.88)	(-0.49)
t	0.05 *	0.06	0.04	0.08 **	0.06	-0.02
	(1.85)	(1.39)	(1.27)	(2.27)	(1.54)	(-0.46)
t+1	0.07 **	0.07	0.04	0.04	0.09 **	0.02
	(2.10)	(1.45)	(1.21)	(0.58)	(2.02)	(0.34)
t+2	0.12 ***	0.13 **	0.04	0.04	0.13 **	0.04
	(3.02)	(2.05)	(1.06)	(0.73)	(2.42)	(0.61)
t+3	0.16 ***	0.17 **	0.05	0.05	0.17 ***	0.04
	(3.53)	(2.03)	(1.15)	(0.68)	(2.90)	(0.47)
Log wage	-0.48 ***		-0.84 ***		-0.69 ***	
	(-3.08)		(-2.75)		(-6.40)	
Observations	1,248	540	1,008	636	1,260	552
Matched firm pairs	104	45	84	53	105	46

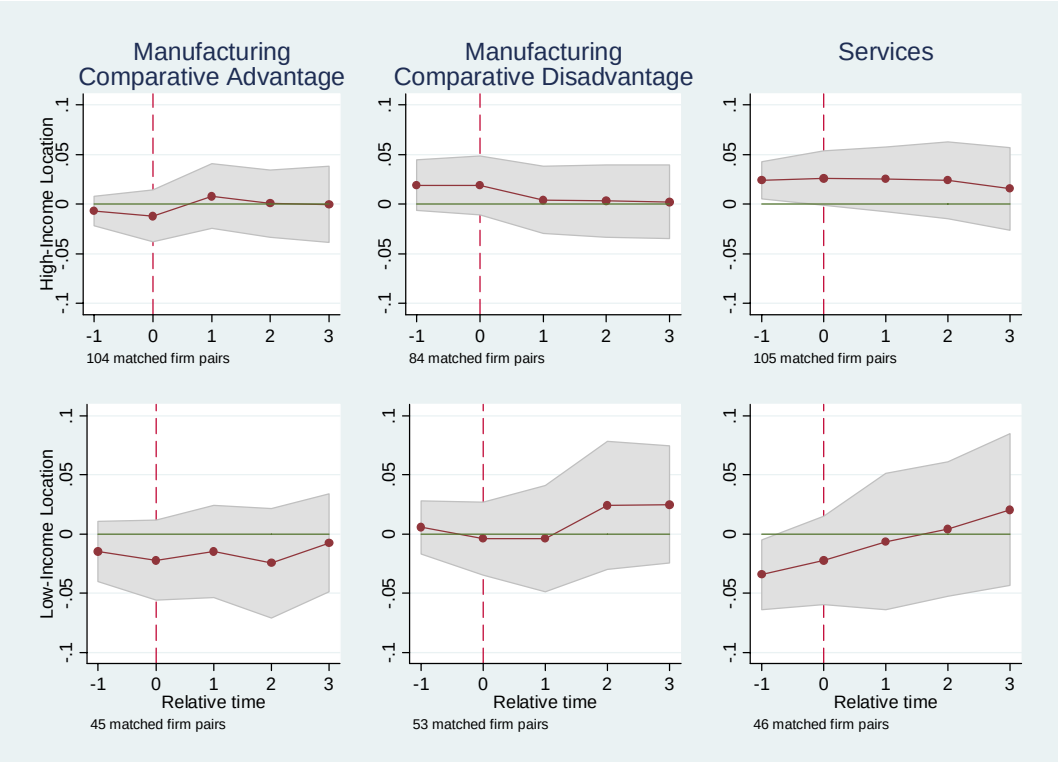
Note: The dependant variable is the change in the difference between switchers (i.e., first-time foreign investors) and the matched control group, based on means relative to the year for which the firms have been matched (t-2, where t refers to the year of investment). Bootstrapped standard errors in parentheses. *, **, *** indicate statistically significance at 10%, 5% and 1%. Standard errors are clustered around individual firms. All regressions include a constant, dummies for relative time and log average monthly wage (measured at the firm-level).

Appendix Table 3: Semi-parametric estimates of the impact of FDI on TFP

	Manufacturing, comparative advantage		Manufacturing, comp. disadvantage		Services	
	High-income locations	Low-income locations	High-income locations	Low-income locations	High-income locations	Low-income locations
Total Factor Productivity						
t-1	-0.03	0.00	0.02	0.02	0.02	-0.02
	(-1.24)	(-0.01)	(1.03)	(0.77)	(0.60)	(-0.49)
t	-0.05	-0.05	0.02	-0.02	0.07	0.012
	(-1.53)	(-1.28)	(0.66)	(-0.86)	(1.61)	(0.22)
t+1	-0.02	-0.05	0.03	0.04	0.10 **	-0.02
	(-0.64)	(-1.01)	(0.91)	(0.68)	(2.11)	(-0.29)
t+2	-0.07 **	-0.08	0.05	0.05	0.06	0.01
	(-2.08)	(-1.38)	(1.22)	(0.74)	(1.27)	(0.14)
t+3	-0.07 *	-0.06	0.05	0.02	0.01	0.04
	(-1.69)	(-1.14)	(1.24)	(0.30)	(0.27)	(0.52)
Log turnover	0.48 ***		0.53 ***		0.23 ***	
	(13.77)		(8.57)		(5.04)	
Observations	1,248	540	1,008	636	1,236	552
Matched firm pairs	104	45	84	53	103	46

Note: The dependant variable is the change in the difference between switchers (i.e., first-time foreign investors) and the matched control group, based on means relative to the year for which the firms have been matched (t-2, where t refers to the year of investment). Bootstrapped standard errors in parentheses. *, **, *** indicate statistically significance at 10%, 5% and 1%. Standard errors are clustered around individual firms. All regressions include a constant, dummies for relative time and log turnover.

Appendix Figure 1: Impact of Foreign Investment on Skill-Intensity, by Income-Level of the Recipient Country and by Sector



Notes: As in Figure 2. Average labour skill is measured as the average yearly wage in the firm.