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

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Abstract

In the present paper we attempt to estimate the effects of initiating production abroad through the establishment of a foreign production affiliate. We consider the impact of becoming a multinational on the level of employment, the degree of skill-intensity and productivity performance using data for French firms during the period 1987-1999. In order to solve the problem of the missing counterfactual we adopt matching techniques in combination with a difference-in-difference (DID) estimator. The paper contains two main novelties. First, we separately analyse the effects of becoming a multinational for manufacturing and services firms. 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 and the industry affiliation of the investing firm. Our main findings suggest that differentiating between different investment strategies is crucial if one wants to grasp the effects of outward investment in the home country. Manufacturing firms that make market-seeking investments typically see their employment rise by 25% after three years relative to their counterfactual outcome. For manufacturing firms that make factor-seeking investments, on the other hand, the picture is more complex. The visual representation of the results suggests that firms that invest in low income locations experience an immediate drop in employment at the time of investment followed by a larger positive effect after two years. However, these findings are not statistically significant. The results for services are more tentative, but overall similar to those for manufacturing.

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

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1. Introduction

The public debate on globalisation in Europe has recently gained in intensity and is increasingly focused on the potential negative effects of this phenomenon on home economies. In particular concerns are being expressed in relation to the cost of adjustment for displaced workers due to the relocation of production abroad, and particularly to China and India. Fears have been heightened further by the notion that services activities, often considered to be relatively skilled, are no longer invulnerable to the offshoring phenomenon. Consequently, within the EU initiatives are being discussed whether or not there should be a EU Globalisation Fund to deal with the adverse effects of globalisation. In France, concerns over delocalisation were according to the Eurobarometer the main reason for the no-vote in the referendum on the EU Constitution.

These fears of relocation as expressed in the public debate stand in contrast to the empirical evidence that is beginning to emerge on the actual employment effects of this phenomenon. 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 and do not appear to match up to the claims advanced in the public debate. Amiti and Wei (2005) explicitly look at service offshoring and find that while service offshoring may have become more prevalent, its importance is still limited relative to that in manufacturing. 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.

In the present study we take a more general approach to the issue of relocation by focusing on the effects of decisions by firms to globalise their production (i.e. to become multinational) on the parent firm at home. In order to evaluate the effects of going global on its domestic activities it is imperative to separate out cause and effect. Ideally one would like to compare the outcome of firms that decided to become multinationals (‘treated’) with the counterfactual outcome had those firms not decided

not become a multinational ('untreated'). This counterfactual outcome however is unobservable. In the present paper 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 outcome variables of interest. Matching involves re-constructing the missing information ex post for those who become multinational had they not decided to do so when a randomised control group is not available.

The causal effect of firm's global engagement strategies has received ample attention in the literature on exporting, but so far has received limited attention in the context of multinationals.[1] 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 (2003) use propensity score matching to estimate the causal effect of investing abroad on the performance of Italian firms. Similar to the present paper, Barba Navaretti *et al.* (2006) for France and Italy, and Debeare *et al.* (2006) for Korea analyse the causal effects of becoming a multinational whilst distinguishing between high and low income investment locations.[2]

In the present paper we will analyse the causal effect of initiating production abroad by establishing a foreign affiliate on firm-level employment, skill-intensity and productivity. For this purpose, we focus on the investment decisions of French firms during the period 1987-1999. France is an interesting case given the intensity of globalisation debate.

An important contribution of the present paper is that 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 appears to be

[1] 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)

[2] 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 (2005) and Girma and Görg (2005).

have 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.

An essential element of the paper is that 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 and the industry affiliation of the investing firm. In order to allow for the possibility that the effects of becoming a multinational differ according to the location of the newly established affiliate we consider investing in high and low income locations as different treatments. In order to explicitly evaluate the role of industry affiliation we split the sample between firms in comparative advantage and comparative disadvantage industries.

The appropriateness of matching to deal with selectivity bias depends critically on the extent to which one is able to reconstruct the unobserved counterfactual. Heckman *et al.* (1997) list three conditions: i) that 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 contains a rich set of variables that affect participation and performance. In the present case those three conditions are satisfied. A single source is used to analyse why firms decide to establish a foreign affiliate abroad and how this affects their performance. 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.

Our main conclusion is that differentiating between different investment strategies is crucial if one wants to grasp the effects of outward investment in the home country. Manufacturing firms that make market-seeking investments (firms in comparative advantage industries that invest in high income locations) typically see their employment rise by 25% after three years relative to their counterfactual outcome. For manufacturing firms that make factor-seeking investments, on the other hand, the picture is more complex. The visual representation of the results suggests that firms that invest in low income locations experience an immediate drop in employment at the time of investment followed by a larger positive effect after two years. However, these

findings are not statistically significant. The results for services are more tentative, but overall fairly similar to those for manufacturing.

The remainder of this paper is structured as follows. Section 2 explains the set-up. In Section 3 we provide a detailed discussion of the matching methodology. In Section 4 we provide some details on the data used for this study. Section 5 analyses the determinants of becoming a multinational in order to construct an appropriate counterfactual that we need to evaluate the effects of investing abroad. Section 6 presents the results. Finally, Section 7 concludes.

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, considerable interest has been directed to multinationals that one cannot easily classify as either horizontal or vertical. Foreign affiliates may be established because of a combination of horizontal and vertical motives, or multinationals may consist of several foreign affiliates, some of which horizontal, and others vertical. It has become common in the literature to refer to multinationals that are not easily classifiable as either horizontal or vertical as complex forms of multinational firms. As we believe that the effects of becoming a multinational are likely to depend on the investment strategy chosen this should be reflected in our set-up.

In the present paper we attempt to evaluate the causal effect of becoming a multinational via different foreign investment strategies: horizontal, vertical or complex. 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 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.

We conjecture that the international investment strategy chosen, and therefore the effects of becoming a multinational by establishing a production affiliate abroad, depends on the location of the foreign affiliate as well as on the characteristics of the firm. The former refers to differences in the treatment, whereas the latter refers to differences across individuals.

The international investment strategy adopted is likely to be reflected in the location choice of the new affiliate. For example, market-seeking investments are more likely in large, high income locations, whereas factor-seeking investments may be more likely in low wage countries. In order to allow for the possibility that treatment effects differ according to the location of the newly established affiliate we extend the standard single treatment analysis to a multiple treatment setting.[3] 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. We consider J locations which translate into J possible treatments. We are interested in estimating the causal effect of treatment j on a range of outcomes relative to that of no treatment.

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 by concentrating on the difference in the means across treated and controls appropriately weighted by the distribution of individual firms, it may still be interesting to analyse how the average treatment effect changes over different segments of the population. In line with the recent theoretical literature on firm heterogeneity we assume that the choice between investing or not investing for a firm in a certain industry is expected to result from a process of self-selection (see for example Helpman *et al*, 2004). However, we posit that the type of investments undertaken abroad can be characterised by a combination of location choice and industry affiliation. More specifically, the choice between market-seeking or factor-seeking FDI is likely to depend on whether a firm is active in a comparative advantage industry or not. Firms in industries without a comparative advantage will be less likely to engage in market-seeking FDI and more likely to engage in factor-seeking FDI.

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

For simplicity assume that there are two countries: North, a high income country, and South, a low income country, and two (domestic) industries: a comparative advantage and a comparative disadvantage industry. This, allows us to define four investment strategies via which domestic firms may decide to become multinational. These modes are represented in Table 1.

On the one hand, domestic firms in comparative advantage industries that invest abroad are likely to be horizontal. However, to the extent that relative factor prices differ horizontal investments may also combine elements of vertical investments. Thus, investments by firms in comparative advantage industries in high income locations are labelled horizontal, whereas those in low income locations are labelled complex. On the other hand, firms that are active in comparative disadvantage industries will face incentives to relocate some or all of their production activities to low income countries where relative factor prices allow them to produce certain activities more efficiently. Such investments are thus likely to be vertical. Investment by firms with a comparative disadvantage towards high income locations cannot be justified on the grounds of comparative advantage and are therefore labelled complex.

Thus, we label investments by domestic firms in comparative advantage industries that start a foreign affiliate in a high income country as horizontal; investments by firms in comparative disadvantage industries in low income locations are labelled vertical; all other investments are not easily classifiable and therefore labelled complex.

Table 1:
Matrix of Foreign Investment Strategies

		Location	
		North	South
Industry	Comparative Advantage	Horizontal	Complex
	Comparative Disadvantage	Complex	Vertical

In order to give an idea of the expected impacts of becoming a multinational on firm outcomes it suffices to focus on the expected outcome of pure horizontal and pure vertical investment strategies as the outcomes of complex investment modes are a linear combination of both. We will focus on employment, skill-intensity, and total factor productivity (TFP).

Both horizontal and vertical investment strategies may result in job losses when domestic production for exports or domestic consumption is substituted to the foreign affiliate. However, one might advance that the displacement effect of vertical FDI is likely to be more pronounced than that of horizontal FDI. Pure horizontal FDI is only expected to lead the relocation of that part of production that was previously exported to a specific foreign market. Vertical FDI may lead to the relocation of all activities that can be produced more cheaply under the vector of factor prices in the host country. It is worth noting that in reality becoming a multinational does not necessarily have to result in job losses at the firm level. Jobs might be created when the establishment of foreign plants: i) represents expansionary investment, ii) involves scale effects due to productivity improvements, or when iii) important production complementarities.

The impact of the skill-intensity of establishing a foreign affiliate is expected to depend on the type of FDI. Market-seeking FDI is supposed to lead to the replication of identical activities in different locations. Factor-seeking FDI instead is typically associated with the fragmentation of production process into different activities so they can be produced in the different locations. Consequently, one would not expect any effect in the context of market-seeking FDI, but an increase in the skill-intensity of the domestic workforce when unskilled labour is replaced by low wage workers in developing countries.[4]

Theory has very little to say about the effects of relocation on the productivity of domestic inputs. In the literature on exporting and productivity it has sometimes been advanced that productivity may increase due to pro-competitive effects associated to increased exposure in foreign markets. A similar argument may apply in the context of

[4] To the extent that headquarter services are retained at home and those activities are relatively skill-intensive market-seeking FDI may also be expected to lead to an increase in the skill-intensity of the domestic workforce.

multinationals, although it should be noted that firms that become multinationals are likely to have already considerable experience in foreign markets. Perhaps, a more plausible effect of relocation on productivity may be based on the role of information sharing across affiliates. However, neither channel suggests a clear link between productivity improvements and the type of FDI. Of course, the productivity of the firm as a whole is expected to increase as a result of either type of FDI as otherwise a firm would not embark on such a strategy. The above discussion is summarised in Table 2.

Table 2:
Expected Effects across Foreign Investment Strategies

		Employment		Skill-Intensity	
		Location		Location	
		North	South	North	South
Industry	Comparative Advantage	-	--	0	+
	Comparative Disadvantage	--	---	+	++

3. Methodology

The need to evaluate the impact of particular policies has given rise to a vast literature on evaluation methods. This literature is primarily concerned with identifying the causal effect of a treatment on a certain outcome of interest relative to an unobserved counterfactual for the population of interest. In the present paper we borrow from the evaluation literature to evaluate the causal effect of treatment j on a range of outcomes relative to that of no treatment. 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 superscripts 0 refer to untreated and 1 to treated firms and D_i is dummy for treatment status for each 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 not been treated, is unobserved y_i^0. 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.[5]

In the present paper 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.[6] 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):

$$\hat{\alpha}_{ATT}^{j} = E(y^{j} - y^{0} \left| D^{j} = 1) = E(y^{j} \right| D^{j} = 1) - E(y^{0} \left| D^{j} = 1) \qquad (2)$$

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.

[5] See Blundell and Costa Dias (2002) for a survey of the alternative approaches to evaluation problems.
[6] 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).

$$E(y^0 \mid X, D^j = 0) = E(y^0 \mid X, D^j = 1) \text{ for } X \in S \quad (3)$$

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: i) the outcome variables are measured differently for treated and untreated, ii) differences in average outcomes across different markets, and iii) firms self-select into multinationals on the basis of unobservable characteristics. Consequently, the effectiveness of matching in re-constructing the unobserved counterfactual depends on three conditions: i) that 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.[7] 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.

$$0 < P(D^j = 1 \mid X) < 1 \quad (4)$$

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

[7] More specifically, the enquete 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.

dimensions.[8] Rosenbaum and Rubin (1983, 1984) propose to match on the *propensity score* which can be obtained in our case by specifying the propensity to establish an affiliate abroad as a function of observable characteristics.

$$E(D^j \mid y, X) = P(D^j = 1 \mid X) \tag{5}$$

Rosenbaum and Rubin (1983) have shown that CIA remains valid after controlling on the propensity score.[9] We will also present several statistical tests to evaluate to what extent matching on the propensity score results in an appropriately balanced treatment and control group along different observable characteristics. We will use the logit and the multinomial logit model to estimate the propensity score for the single and multiple treatment case respectively.

The propensity score effectively defines the neighbourhood for each treated observation. The most common matching methods are nearest neighbour matching which attributes unity weights to the nearest neighbour and zero to others and kernel matching which takes account of the relative proximity of non-treated observations. We will be using nearest neighbour (one-to-one) matching.[10]

We further improve the performance of propensity score matching by combining it with the difference-in-differences 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 transforming the evaluation problem to that of the difference in the trend before and after treatment instead of that of the difference in

[8] This of course is a problem that characterises non-parametric methods in general, and is not specific to the issue of matching.
[9] More recently, Hahn (1998) has shown that using the propensity score may also improve the efficiency of ATT by reducing the number of dimensions.
[10] Using kernel matching does not significantly alter our results.

levels.[11] The CIA now requires that conditional on observables treatment status is independent of unobserved temporary individual-specific effects.[12]

$$E(\varepsilon_i^0 \left| X, D^j = 0) = E(\varepsilon_i^0 \right| X, D^j = 1) \qquad (3')$$

The DID-estimator assumes that unobserved macro-economic developments affect the treatment and the control in the same way ('common trends assumption'). However, in practice 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

Data on individual firms is obtained from the *Enquete Annuelle des Entreprises* (EAE) which covers all industries and is available for the years 1984-2002.[13] The survey comprises the complete universe of firms with more than 20 employees and includes a sample of firms smaller than 20 employees. 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) which documents information on French affiliates abroad. The data allow us to distinguish between production affiliates and distribution affiliates. For the present study we only use information on the year in which a firm establishes its first production establishment abroad. Firms that have according to DREE at least one foreign affiliate are classified as multinational firms. Firms that do not have any foreign affiliates are considered purely national firms. The main focus here however is on firms that switch from being national to multinational by establishing an affiliate abroad.

[11] Put differently, rather than assuming a common benchmark (read constant) DID allows the constant to differ across individuals.
[12] Practically, implementing the DID estimator simply involves estimating a fixed effects model on the difference in the means between treated and untreated firms.
[13] However, due to changes in the way information is being collected for services firms in 1996 we only use the period 1996-2002 for services.

A third dataset with information on business groups, LIFI, 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 effects due to investing abroad by one firm in a business groups may be spread through the entire business group thus mitigating the difference between the treatment firm and its control. Thus, we impose the condition on our matching procedure that control firms are active in the same 2-digit industry and are not part of the same business group.

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 should be balanced.[14] 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 (2005) observe that this effectively gives a system of seemingly unrelated regressions with cross-equation restrictions. They suggest that standard errors should be clustered within individuals to take account of the resulting correlation in the error structure. The structure of the resulting dataset is represented in the appendix in Table A1.[15]

It is worth noting that 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

[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. (2005) also use a balanced panel but not define cohorts.

[15] A similar methodology is used in Jacobson *et al*. (1993), Bender and Von Wachter (2005), and Hijzen *et al*. (2005).

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*. (2003) focus on the same parameter in their study of foreign direct investment. 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.

For the remainder of our analysis we distinguish two locations and two industries. The two locations are i) high income OECD countries ('high income or 'rich') and the rest of the world ('low income' or 'poor') respectively. The two industries are comparative advantage and comparative disadvantage industries where comparative advantage industries consist of industries with above-average average skill-intensity, and comparative disadvantage industries of industries with below-average average skill-intensity.

Table 3 reports the total number of firms that become multinationals in manufacturing and services during the period 1987-1999 after cleaning the dataset. Our sample includes 355 switching firms in manufacturing and 143 switching firms in services. We observe that on the basis of our definition about two thirds of switchers in both manufacturing and services initiate production in a high income country. To the extent that relocation of production towards low wage countries correspond to purely vertical investments (i.e. relocations) one should note that such investments account for a relatively small share of the total number of investments in our sample. Instead, our typology suggests that market-driven investments represent the most common international investment strategy for firms that initiate production abroad through the establishment of a foreign affiliate.

Table 3:
Summary Statistics by Foreign Investment Strategy

		Manufacturing		Services			
		Location		Location		Total	
		North	South	North	South	Man.	Services
Industry	Comparative Advantage	116	62	78	40	178	118
	Comparative Disadvantage	113	64	20	5	177	25
	Total	229	126	98	45	355	143

5. Constructing the Counterfactual

We now estimate the logit and multinational logit models in order to get the propensity of a domestic firm to establish an affiliate abroad. The propensity scores will be used to match switching firms with domestic firms that did not invest abroad but are very similar in terms of their observable characteristics. Apart from providing the propensity score for the construction of the unobserved counterfactual the estimates may be of interest in itself as they provide new insights in the determinants of becoming a multinational.

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.[16] Our results (not reported, but available upon request) suggest that varying the number of lags from one to three years does not

[16] In a manner similar to the Ashenfelter dip in the labour economics literature.

significantly change the fit of the regression. 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 t-star.

Table 4 represents 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 change in profits over value-added, the log change in value-added, log exports over value-added, total factor productivity (TFP), the log wage bill per worker, log turnover, profits over value-added, the log number of production plants, log intangible assets over value-added (AD), and log corporate taxes over turnover. The regressions also include a full set of region, sector and time dummies.

Table 4:
Propensity to Switch

	Manufacturing			Services		
	All	RICH	POOR	All	RICH	POOR
Δ Profits $_{t^*-t}$	-1.517	-0.849	-0.234	-0.062	-0.074	-0.035
	(1.481)	(1.432)	(1.082)	(0.011)	(0.012)	(0.023)
			*	***	***	
Δ ln Value added $_{t^*-t}$	0.425	0.465	0.100	0.602	0.671	0.412
	(0.242)	(0.246)	(0.275)	(0.190)	(0.196)	(0.467)
	*	*		***	***	
ln Value added squared $_{t^*-t}$	-0.028	-0.023	-0.019	0.012	-0.008	0.022
	(0.011)	(0.027)	(0.008)	(0.006)	(0.006)	(0.011)
	***		***	**		*
ln Exports $_{t^*-t}$	0.101	0.045	0.032	0.029	0.019	0.051
	(0.026)	(0.011)	(0.012)	(0.012)	(0.015)	(0.019)
	***	***	***	**		***
TFP_{t^*-t}	0.668	0.746	0.300	0.312	0.327	0.271
	(0.159)	(0.729)	(0.166)	(0.157)	(0.186)	(0.284)
	***		*	**	*	
ln Average Wage $_{t^*-t}$	-0.061	0.459	-0.489	0.523	0.422	0.742
	(0.338)	(2.408)	(0.275)	(0.182)	(0.228)	(0.270)
			*	***	*	***
ln Turnover $_{t^*-t}$	0.837	0.600	0.987	0.326	0.423	0.076
	(0.206)	(0.158)	(0.153)	(0.113)	(0.128)	(0.219)
	***	***	***	***	***	
Profits $_{t^*-t}$	4.338	4.216	2.209	0.749	0.753	0.662
	(0.893)	(2.513)	(0.858)	(0.587)	(0.638)	(1.307)
	***	*	***			
ln No. of plants $_{t^*-t}$	0.133	0.233	-0.103	-	-	-
	(0.087)	(0.155)	(0.109)			
ln Intangible Assets $_{t^*-t}$	0.063	0.058	0.022	0.024	0.004	0.087
	(0.016)	(0.012)	(0.015)	(0.021)	(0.022)	(0.061)
	***	***				
ln Corporate Taxes $_{t^*-t}$	0.047	0.032	0.043	0.027	0.030	0.019
	(0.014)	(0.015)	(0.015)	(0.013)	(0.015)	(0.023)
	***	**	***	**	**	
Constant	130.372	-841.490	16.283	-15.167	-54.700	-49.695
	(.)	(.)	(128.327)	(1.927)	(.)	(.)
				***		
Observations	173049	177530	177530	81986	82103	82103

*, **, *** statistically significant at 10%, 5% and 1%. Robust standard errors in parentheses. All regressions include full set of industry, region and time dummies.

The propensity of manufacturing firms to establish a foreign presence abroad depends positively on the level of exports, TFP, the size of the firm, the level of profits, the level of intangible assets, and corporate taxes. These results are very much line with the model presented in Helpman, Melitz and Yeaple (2004) which suggests that more productive and larger firms self-select into multinationals. Moreover, before

establishing oneself as a multinational firms tend to have considerable experience in foreign markets through exporting. This is consistent with, for example, Bernard and Jensen (1999), who show that exporters are more productive than non-exporters.

The results from the multinomial logit model are generally a bit weaker, and do not reveal many differences between firms that invest in high and low income locations. The main difference relates to the role of the average wage. 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 multinomial logit estimates suggest that firms that invest in low income locations have lower levels of skill-intensity than the average domestic firms, whereas firms that invest in high income locations exhibit higher levels of skill-intensity. The latter difference however is not statistically significant.[17]

The results for services are fairly similar to those obtained for manufacturing, thus suggesting that also services firms that initiate production abroad tend to be larger, more productive and more important exporters. In contrast, to manufacturing firms services firms that initiate production abroad have higher levels of skill-intensity than firms that continue to produce exclusively at home. Moreover, there is no indication that firms that initiate production in low income countries have lower levels of skill-intensity than those that do this in high income countries. Finally, profitability and intangible assets do not appear to play a role for services firms in explaining the propensity to locate production abroad.

We now retrieve the propensity scores from the logit and multinomial models to match switching firms to non-switching domestic firms which are similar in terms of their observable characteristics. Firms are matched separately for each year and industry using one-to-one matching with replacement. As required by the methodology the common support assumption is imposed. Propensity score matching provides an

[17] Grossman, Helpman and Szeidl (2005) analyse complex FDI strategies. They show that in the presence of intermediate trade costs and fixed costs to establish an affiliate abroad the most productive firms locate all production in low income locations and export from there, whilst somewhat less productive firms tend to choose subsidiary sales in high income markets.

adequate method to evaluate the causal effect of becoming a multinational when conditional on the propensity score the pre-treatment characteristics of the untreated are independent of treatment status. In order to verify whether the balancing condition in satisfied in our matched sample we conduct two tests.

First, following Smith and Todd (2005b) we examine the standardised bias for variables included in the propensity score estimation before and after matching. While no formal criterion exists to assess the standardised bias Rosenbaum and Rubin (1985) assume that a standardised bias in excess of 20% is large. Second, we perform standard t-tests for equality of means in the treated and non-treated for each variable in the propensity score before and after matching.

Table 5 reports the means of a range of covariates in the unmatched and the matched sample for manufacturing and services. In addition, the table reports the results from the two the balancing tests. In order to save space, we only report these statistics for the multiple treatment case. As one would expect, the means of the treated and the control observations in the unmatched sample are typically statistically different. This is also reflected in the standardised bias before matching which exceeds 100% for many variables included in the model for the propensity score. After matching, both the standardised bias and the t-test for the equality of the means indicate that the balancing condition is satisfied in our matched sample for both manufacturing and services.[18]

[18] The balancing tests are generally more easily satisfied in the single treatment case and are available upon request.

Table 5:
Balancing Tests for Multiple Treatment Matching

		Mean			t-test		Mean			t-test	
Variable	Sample	Rich	Control	%bias	t	p>|t|	Poor	Control	%bias	t	p>|t|
MANUFACTURING											
Δ Profits	Unmatched	0.06	0.05	5.4	1.95	0.051	0.06	0.05	4.7	1.19	0.233
	Matched	0.10	0.11	-3.0	-0.25	0.804	0.06	0.07	-5.3	-0.44	0.661
Δ ln VA	Unmatched	0.00	0.00	1.1	0.38	0.704	0.00	0.00	-0.8	-0.19	0.848
	Matched	0.01	0.01	-6.1	-0.68	0.495	-0.01	0.00	-14.3	-1.35	0.180
ln VA^2	Unmatched	135.37	92.52	149.7	70.63	0.000	127.64	92.55	126.8	42.73	0.000
	Matched	131.39	132.60	-4.2	-0.41	0.680	125.56	129.33	-13.6	-0.89	0.374
Ln EXP	Unmatched	-1.14	-6.45	90.4	25.48	0.000	-1.69	-6.45	75.3	16.89	0.000
	Matched	-1.16	-1.92	12.9	2.00	0.046	-1.45	-1.53	1.3	0.15	0.885
TFP	Unmatched	1.43	0.22	135.0	60.64	0.000	1.22	0.22	115.0	36.98	0.000
	Matched	1.35	1.39	-4.8	-0.45	0.651	1.12	1.27	-17.8	-1.21	0.226
Ln Wage	Unmatched	4.98	4.79	59.5	21.50	0.000	4.93	4.79	42.8	11.61	0.000
	Matched	4.96	4.95	2.4	0.26	0.795	4.93	4.95	-7.3	-0.58	0.563
Ln Y	Unmatched	12.58	10.44	167.7	64.96	0.000	12.31	10.44	142.2	41.90	0.000
	Matched	12.42	12.47	-4.1	-0.41	0.683	12.21	12.38	-12.3	-0.87	0.385
Profits	Unmatched	0.12	0.08	39.5	14.89	0.000	0.10	0.08	17.9	4.67	0.000
	Matched	0.12	0.12	3.3	0.35	0.724	0.10	0.10	-0.3	-0.02	0.985
Ln IA	Unmatched	-5.37	-11.56	112.1	37.91	0.000	-5.96	-11.55	97.4	25.37	0.000
	Matched	-5.45	-5.59	2.5	0.27	0.785	-6.57	-6.45	-2.0	-0.15	0.883
Ln TAX	Unmatched	-4.84	-6.05	23.4	7.74	0.000	-5.38	-6.05	12.5	3.22	0.001
	Matched	-4.70	-5.19	9.4	1.00	0.317	-4.73	-5.17	8.1	0.64	0.524
Ln Plants	Unmatched	0.87	0.26	83.2	45.07	0.000	0.67	0.26	59.2	22.62	0.000
	Matched	0.77	0.79	-3.0	-0.26	0.798	0.59	0.66	-10.7	-0.67	0.504
SERVICES											
Δ Profits	Unmatched	0.08	0.05	3.2	1.10	0.272	0.09	0.05	5.2	1.13	0.260
	Matched	0.15	0.22	-6.9	-0.61	0.541	0.08	0.09	-2.2	-0.14	0.891
Δ ln VA	Unmatched	0.00	0.00	0.4	0.08	0.936	0.00	0.00	-1.1	-0.13	0.895
	Matched	-0.02	0.01	-8.2	-1.77	0.079	0.00	0.00	-1.1	-0.25	0.803
ln VA^2	Unmatched	123.18	77.27	148.4	43.95	0.000	122.74	77.30	130.7	29.44	0.000
	Matched	119.82	119.26	1.8	0.12	0.903	113.30	112.48	2.4	0.14	0.892
Ln EXP	Unmatched	-11.99	-15.33	44.7	14.85	0.000	-10.56	-15.33	62.6	14.38	0.000
	Matched	-12.09	-12.38	3.9	0.22	0.823	-9.90	-9.39	-6.7	-0.26	0.794
TFP	Unmatched	2.33	0.89	132.5	36.62	0.000	2.23	0.89	113.8	23.02	0.000
	Matched	2.20	2.18	2.2	0.14	0.891	2.01	2.03	-1.4	-0.07	0.943
Ln Wage	Unmatched	5.17	4.79	56.9	14.84	0.000	5.21	4.79	70.0	11.12	0.000
	Matched	5.19	5.14	8.5	0.64	0.520	5.25	5.25	0.5	0.03	0.977
Ln Y	Unmatched	11.66	9.26	154.3	40.06	0.000	11.65	9.26	145.6	27.09	0.000
	Matched	11.54	11.47	4.2	0.31	0.758	11.28	11.32	-2.0	-0.11	0.911
Profits	Unmatched	0.07	0.04	11.6	2.32	0.020	0.08	0.04	14.4	1.92	0.055
	Matched	0.09	0.08	2.5	0.38	0.706	0.07	0.08	-0.3	-0.03	0.978
Ln IA	Unmatched	-3.17	-8.30	86.3	19.35	0.000	-2.12	-8.30	110.3	15.78	0.000
	Matched	-4.01	-3.72	-4.8	-0.36	0.716	-2.42	-3.14	12.9	0.75	0.454
Ln TAX	Unmatched	-5.65	-11.18	70.4	19.02	0.000	-6.08	-11.17	66.8	11.87	0.000
	Matched	-5.46	-4.85	-7.8	-0.54	0.589	-6.48	-5.83	-8.6	-0.42	0.676

6. Results

Using the matched sample we now analyse the causal effect of establishing an affiliate 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.

6.1 Firm-level employment

Table 6 presents the single and multiple treatment results for the full sample for the employment outcomes from t-1 to t+3. The results give the change in the difference in the means relative to the year for which the firms have been matched (t-2). In that year all observable characteristics of the control and treatment group should be identical (as can be verified from Table 5).

Figure 1 graphically reports similar information by comparative and comparative disadvantage industry. The red line represents the average treatment effect of initiating production abroad over the period t-1 up to t+3. As before firms are matched using observable information at t-2. At t-2 therefore control and treated firms are identical in terms of their observable characteristics. At t-1 the paths of control and treated firms are allowed to diverge, although at this stage both treated and control firms produce exclusively in France. Any significant differences between the two at this stage are thus attributed to anticipatory changes within the group of firms that will become multinational at t-star. Any differences from t-star onwards reflect the causal effect of initiating production abroad relative to our constructed counterfactual. The shaded area corresponds to the associated 95% confidence interval. The standard errors used for the construction of the confidence interval are robust and clustered around individual firms to take account of the possible correlation over relative time within firms (Bender and Von Wachter, 2005). The results are shown for all four possible international investment strategies as discussed in Section 2.

Table 6:
Baseline Results Employment

	Manufacturing			Services		
	All	Rich	Poor	All	Rich	Poor
D_{t^*-1}	0.015	0.020	0.030	0.0322	0.028	-0.042
	(0.011)	(0.008) **	(0.021)	(0.066)	(0.043)	(0.106)
D_{t^*}	0.065	0.066	0.069	0.129	0.252	0.17
	(0.020) ***	(0.022) ***	(0.039) *	(0.082)	(0.106) **	(0.108)
D_{t^*+1}	0.081	0.076	0.036	0.153	0.203	0.11
	(0.027) ***	(0.021) ***	(0.049)	(0.085)	(0.131)	(0.119)
D_{t^*+2}	0.139	0.107	0.215	0.037	0.128	-0.217
	(0.069) **	(0.060) *	(0.087) **	(0.112)	(0.137)	(0.235)
D_{t^*+3}	0.165	0.136	0.266	0.209	0.21	-0.126
	(0.082) **	(0.077) *	(0.112) **	(0.130)	(0.089) **	(0.233)
N	3582	3606	3606	1698	1680	1680
Groups	597	601	601	283	280	280

Robust standard errors in parentheses. *, **, *** statistically significant at 10%, 5% and 1%. Error terms are clustered around individual firms. All regressions include a constant.

Manufacturing

Firms that become multinationals have higher levels of employment from t+2 onwards irrespective of the location of their foreign affiliate. For firms that invest in high income locations there is a positive effect on employment at t-1 of 2%. The employment gap widens gradually to 14% at t+3, the end of our window. Initiating production in low income locations does not generate an immediate positive employment effect, but is associated with a positive effect from t+2 onwards. Interestingly, the positive effect for firms that invest in low income locations is considerably larger at t+3 than for firms that invest in high income locations (27% and 14% respectively).

When we distinguish between comparative advantage and disadvantage industries in addition to the location of investment, we observe considerable differences in the relative employment trajectories of our matched firms. In fact, distinguishing between high and low skill-intensity industries appears to be even more important than distinguishing between locations. For manufacturing firms that invest in comparative advantage industries, we find that initiating production in a high income location leads

to an increase in employment of 4% at t-1 to 25% at t+3. For manufacturing firms in the same industries that initiate production in low income countries the impact on employment is even more positive ranging from 5% at t-1 to 32% at t+3.

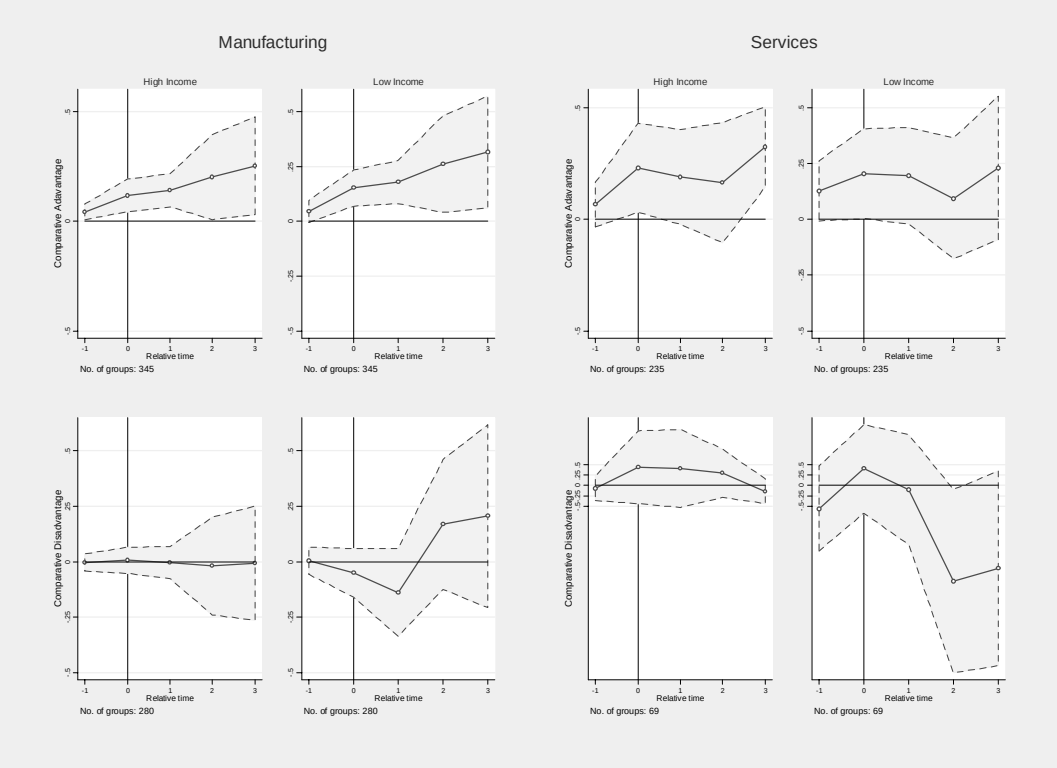
The effect of investing abroad for firms that are active industries without a comparative advantage is quite different. There is no effect on employment for firms that invest in high income locations. For firms that invest in low income locations we find an immediate negative effect followed by a larger positive effect from t+2 onwards. Investments by comparatively disadvantaged firms in low income locations may thus represent the relocation of production. However, it should be emphasised that whilst the trends are consistent with the reports in the media, these results are statistically significant. While it seems likely that some investments in this category reflect the relocation of production towards low-wage countries this reasoning does not appear to be sufficiently pervasive across switching firms, even within this specific category of investments, to warrant the conclusion that investments by firms in low skill-intensity sectors towards low wage countries lead to job losses in the short-run and job creation in the medium term.

Services

For services our sample is considerably smaller than that for manufacturing. Consequently, the results have to be interpreted with caution, in particular when moving on to the results for firms in low skill-intensive industries. According to the aggregate results in which we do not distinguish between location of investment and industry affiliation, we do not find any significant effects. In order to get some idea of the role of initiating production broad on firm-level employment in France we thus need take account of different investment strategies. When we only control for location of investment we find a positive employment effect at t-star and t+3 of 25% and 21% respectively for firms that invest in high income locations and no effect for firms that invest in low income locations. For firms in comparative advantage industries we find a similar picture. Note that we do not observe a gradual increase in employment after t-star as in the case of manufacturing. In fact, most of the positive effect appears to take place in the period that the foreign affiliate is established or even before that.

We do not find any effect for firms in low skill-intensity industries that invest in high income locations. There is some indication that the effect of investing in low income locations results into job losses after two or three years. One may get the impression that offshoring of services activities to low wage economies may be a more important issue than that of offshoring of manufacturing activities. However, these results are based on tiny samples and should therefore be interpreted with caution. Moreover, even if this picture gives an accurate impression of the employment effects of investing in low income countries by firms in low skill-intensity activities it is important to point out that this only relates to a very small share of all firms that initiate production abroad.

Figure 1: Relative Employment Trajectories of Matched Firms



Notes: The red line represents the average treatment effect on the treated from t-1 up to t+3 using the matched sample. Firms are matched using observable information at t-2. The shaded area corresponds to the associated 95% confidence interval based on standard errors that are robust and clustered on individual firms.

6.2 Firm-level skill-intensity

Table 7 gives the single and multiple treatment results for skill-intensity. Figure 2 represents the skill-intensity trajectories relative to our re-constructed counterfactual by location and type of industry.

Table 7:
Baseline Results Skill-Intensity

	Manufacturing			Services		
	All	Rich	Poor	All	Rich	Poor
D_{t^*-1}	-0.008	-0.012	-0.016	0.052	0.009	-0.034
	(0.012)	(0.012)	(0.020)	(0.040)	(0.050)	(0.048)
D_{t^*}	-0.018	-0.025	0.003	0.087	0.053	-0.011
	(0.012)	(0.020)	(0.018)	(0.044) **	(0.046)	(0.070)
D_{t^*+1}	0.001	-0.012	0.017	0.167	0.066	0.135
	(0.016)	(0.014)	(0.023)	(0.099) *	(0.126)	(0.118)
D_{t^*+2}	0.007	0.014	-0.09	0.136	-0.043	0.205
	(0.063)	(0.059)	(0.085)	(0.102)	(0.117)	(0.126)
D_{t^*+3}	0.002	0.021	-0.061	0.087	0.134	-0.112
	(0.072)	(0.083)	(0.103)	(0.083)	(0.077) *	(0.131)
N	3582	3606	3606	1698	1680	1680
Groups	597	601	601	283	280	280

Robust standard errors in parentheses. *, **, *** statistically significant at 10%, 5% and 1%. Error terms are clustered around individual firms. All regressions include a constant.

Manufacturing

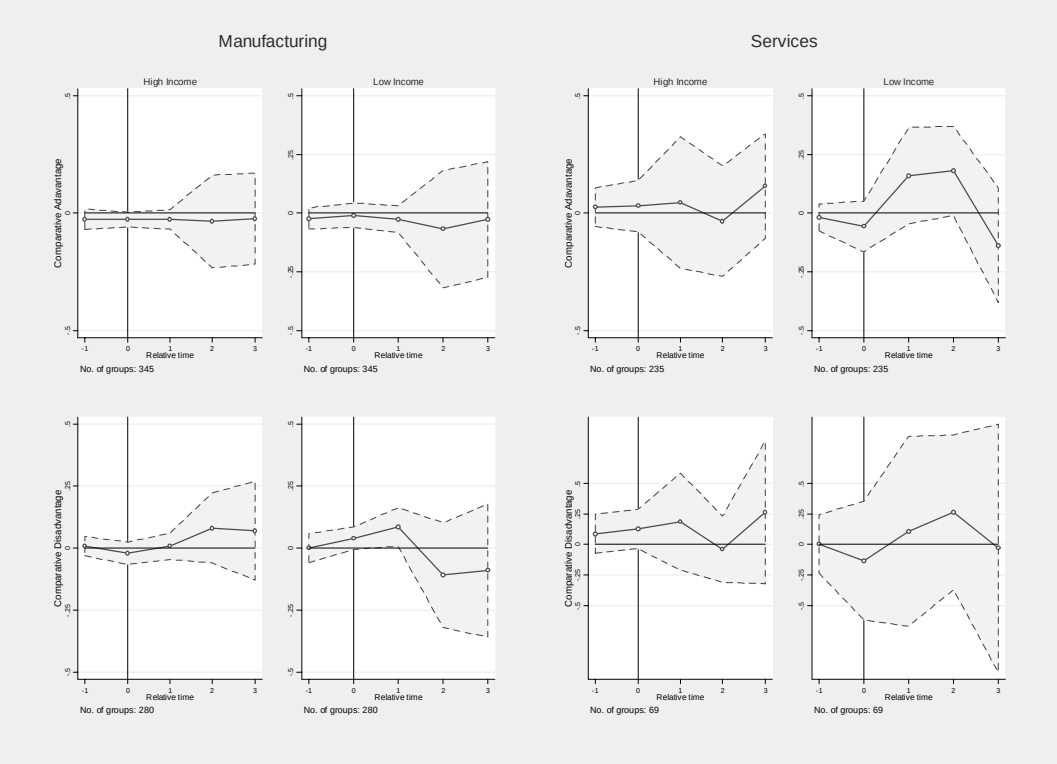
We do not find much of an effect of establishing a plant abroad on the average level of wages, i.e. skill-intensity. All we find is a temporary positive effect on skill-intensity around t-star and t+1 for firms in comparative disadvantage industries that invest in low-income locations of about 4%-9%. The small increase in skill-intensity in the short-run is consistent with the impression that investments by firms in low-skill-intensity industries in low wage-countries involve the relocation of low-skill intensive activities. After t+1, we no longer observe any significant effects. Presumably, the contemporaneous expansion in employment brings the level of skill-intensity back to pre-multinational levels. To the extent that the average wage bill per worker also

captures pay differences across firms for similar workers the results suggest that workers in multinational firms experience lower wage growth. The remaining (low-skill) workers employed by the multinational firms might be willing to accept lower wage growth in fear of losing their jobs.

Services

In general, we do not find that initiating production abroad has an impact on the skill-intensity of production in the parent firm in France. If anything, location choice appears to be more important than industry affiliation in explaining the relative skill-intensity trajectories. Firms that invest in high income locations tend to have stable or positive skill-intensity trajectories. The relative skill-intensity trajectories of firms that invest in low income countries are less stable and appear to peak around t+1 and t+2.

Figure 2: Relative Skill-Intensity Trajectories of Matched Firms



Notes: The red line represents the average treatment effect on the treated from t-1 up to t+3 using the matched sample. Firms are matched using observable information at t-2. The shaded area corresponds to the associated 95% confidence interval based on standard errors that are robust and clustered on individual firms.

6.3 Productivity

Table 8 gives our baseline results for productivity, whereas Figure 3 represents the results by location and industry.

Table 8:
Baseline Results Productivity

	Manufacturing			Services		
	All	Rich	Poor	All	Rich	Poor
D_{t^*-1}	0.007	0.028	0.019	0.015	0.024	-0.018
	(0.013)	(0.015) *	(0.021)	(0.054)	(0.054)	(0.099)
D_{t^*}	0.044	0.075	0.041	0.033	0.162	0.115
	(0.024) *	(0.025) ***	(0.036)	(0.074)	(0.099)	(0.094)
D_{t^*+1}	0.047	0.091	0.017	0.057	0.132	0.097
	(0.032)	(0.026) ***	(0.057)	(0.083)	(0.102)	(0.115)
D_{t^*+2}	0.120	0.141	0.150	0.053	0.104	-0.080
	(0.034) ***	(0.037) ***	(0.049) ***	(0.113)	(0.112)	(0.160)
D_{t^*+3}	0.14	0.161	0.161	0.16	0.14	-0.037
	(0.037) ***	(0.042) ***	(0.058) ***	(0.088) *	(0.086)	(0.178)
N	3582	3606	3606	1698	1680	1680
Groups	597	601	601	283	280	280

Robust standard errors in parentheses. *, **, *** statistically significant at 10%, 5% and 1%. Error terms are clustered around individual firms. All regressions include a constant.

Manufacturing

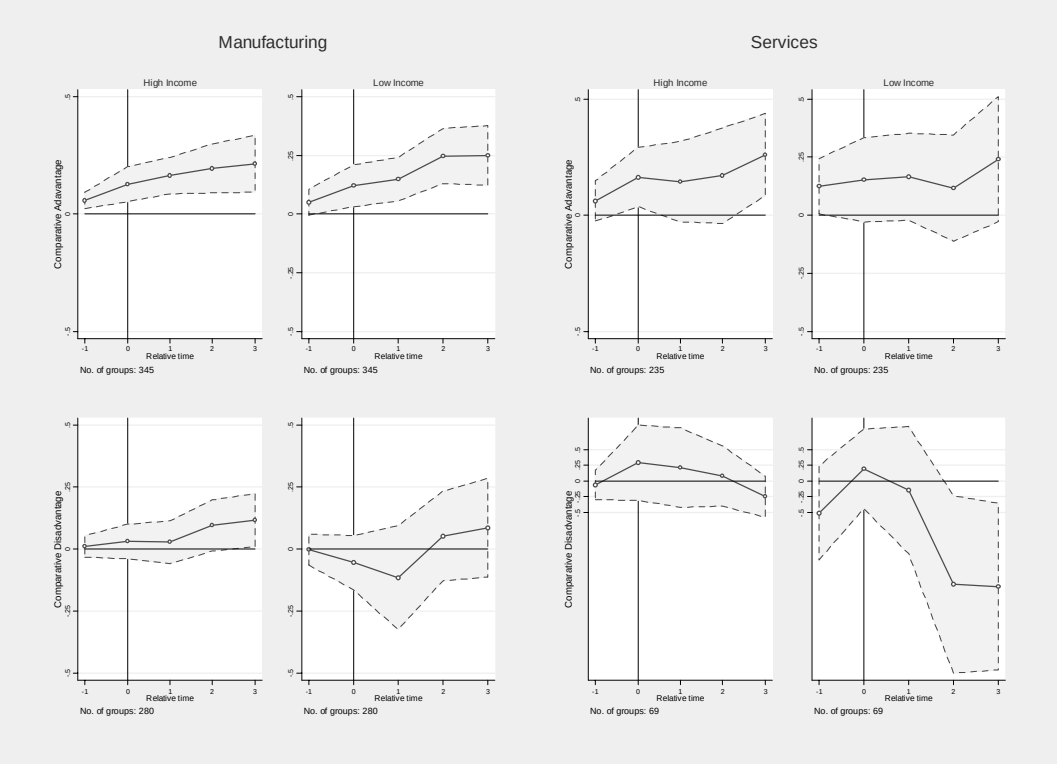
Initiating production abroad has a positive effect on firm-level productivity in France. For the whole sample the average difference between switchers and stayers amounts to about 14% at t+3. These differences are significantly more pronounced in comparative advantage industries where productivity rises from 6% (5%) at t-1 for firms that invest in high income locations (low income locations) up to 21% (25%) at t+3. On the contrary, in comparative disadvantage industries the causal productivity effect from becoming a multinational is much more muted. Firms that invest in high income locations experience a positive productivity effect from t+2 onwards (10% in t+2, 12%

in t+3). Firms that invest in low income locations do not experience any productivity effect.

Services

The qualitative picture for services is fairly similar to that for manufacturing. Firms in comparative advantage industries tend to benefit in terms of their productivity from having a production affiliate abroad. The average productivity of firms that invest in high income locations raises from 16% at t-star to 26% at t+3, whereas firms that invest in low income locations see their productivity rise from 13% at t-star to 24% at t+3. Firms in comparative disadvantage industries do not appear to benefit in terms of their productivity from becoming multinational.

Figure 3: Relative Productivity Trajectories of Matched Firms



Notes: The red line represents the average treatment effect on the treated from t-1 up to t+3 using the matched sample. Firms are matched using observable information at t-2. The shaded area corresponds to the associated 95% confidence interval based on standard errors that are robust and clustered on individual firms.

7. Concluding Remarks

In the present paper we attempted to estimate the causal effect of initiating production abroad by establishing a foreign affiliate on firm-level employment, skill-intensity and productivity. In order to solve the problem of the missing counterfactual we adopted matching techniques in combination with a difference-in-difference (DID) estimator.

We concentrated on the investment decisions of French firms during the period 1987-1999. France is an interesting case as the debate on globalisation is increasingly focused on the potentially adverse consequences of globalisation on the labour market via the relocation of production activities to low wage countries.

An important contribution of the present paper is that 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 appears to be have 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.

An essential element of the paper is that 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 and the industry affiliation of the investing firm. In order to allow for the possibility that the effects of becoming a multinational differ according to the location of the newly established affiliate we considered investing in high and low income locations as different treatments. In order to explicitly evaluate the role of industry affiliation we split the sample between firms in comparative advantage and comparative disadvantage industries.

Our main conclusion is that differentiating between different investment strategies is crucial if one wants to grasp the effects of outward investment in the home country. Manufacturing firms that make market-seeking investments typically see their employment rise by 25% after three years relative to their counterfactual outcome. These same firms also experience an increase in productivity of about 21% after three

years. Thus, not only do larger and more productive domestic firms self-select into multinationals, these firms also appear to benefit from having become multinational further reinforcing their size and productivity advantage over domestic firms. In fact, the rise in post-investment employment is likely to be related to the productivity improvement upon becoming multinational. 'Complex' forms of investment in low income countries by firms in comparative industries experience very similar employment and productivity trajectories. It is interesting to note that for manufacturing firms with a comparative advantage that invest in low income locations the benefits of becoming a multinational appear to be even larger than for those who invest in high income locations.

For manufacturing firms, on the other hand, that make factor-seeking or 'vertical' investments the picture is much more complex. The visual representation of the results suggests that firms that invest in low income locations experience an immediate drop in employment and productivity at the time of investment followed by a larger positive effect after two years. While it seems likely that some investments in this category reflect the relocation of production towards low-wage countries this phenomenon does not appear to be sufficiently pervasive across switching firms, even within this specific category of investments, to warrant the conclusion that investments by manufacturing firms in low skill-intensity sectors towards low wage countries lead to job losses in the short-run and new jobs in the medium term. In any case, relative to the total number of firms that become multinational the number of switches that may be associated with serious job losses at home is likely to be extremely small. Moreover, any negative employment effects are unlikely to persist into the medium term.

The results for services are less clear-cut and more tentative due to the smaller sample size. However, also for service firms the effects of becoming a multinational appear to be generally positive for firms active in comparative advantage industries. For firms in comparative disadvantage industries initiating production abroad has either no or a negative effect on firm-level employment depending on whether one invests in high or low income locations respectively. However, these results only relate to a very small fraction of services firms that become multinational. Again the results for productivity are very similar to those for employment.

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APPENDIX

A Measurement TFP

In order to measure Total Factor Productivity (TFP) we apply the mean value theorem as suggested by Klette (1999) and applied in Criscuolo and Leaver (2005). 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 centred around year t in which domestic firms establish a foreign presence. We impose the condition that within an 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 (2005) observe that this effectively gives a system of seemingly unrelated regressions with cross-equation restrictions. The structure of the resulting dataset is represented in Table A1.

Table A1:
The Dataset – Manufacturing

	t-star						
Cohort	-2	-1	0	1	2	3	Total
1987	15,930	15,930	15,930	15,930	15,930	15,930	95,580
1988	16,041	16,041	16,041	16,041	16,041	16,041	96,246
1989	16,254	16,254	16,254	16,254	16,254	16,254	97,524
1990	16,375	16,375	16,375	16,375	16,375	16,375	98,250
1991	16,390	16,390	16,390	16,390	16,390	16,390	98,340
1992	16,369	16,369	16,369	16,369	16,369	16,369	98,214
1993	16,422	16,422	16,422	16,422	16,422	16,422	98,532
1994	16,407	16,407	16,407	16,407	16,407	16,407	98,442
1995	16,118	16,118	16,118	16,118	16,118	16,118	96,708
1996	16,319	16,319	16,319	16,319	16,319	16,319	97,914
1997	16,241	16,241	16,241	16,241	16,241	16,241	97,446
1998	16,126	16,126	16,126	16,126	16,126	16,126	96,756
1999	15,872	15,872	15,872	15,872	15,872	15,872	95,232
Total	210,864	210,864	210,864	210,864	210,864	210,864	1,265,184