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FOREIGN INVESTMENT IN EUROPEAN OECD COUNTRIES.

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A time varying coefficient model for panel data: Foreign Direct Investment in European OECD countries *

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Abstract

The present article reexamines some of the issues regarding the Knowledge-Capital Model that encompasses both horizontal and vertical Foreign Direct Investment described in detail in the literature. The empirical support for this model is however a mixture. This article proposes a new way of estimating coefficients by allowing them to vary over time. The estimation results obtained using data from fourteen European countries for the period from 1982 to 2004 confirm that these coefficients cannot be considered constant over time and that the vertical component of the Knowledge-Capital Model is relevant even in the context of European countries with relatively similar endowments.

Keywords: Foreign Direct Investment, Time-varying coefficients

JEL Classification: C14, F21.

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1 Introduction

It is well known that the activity of multinational enterprises (MNE), measured by world Foreign Direct Investment (FDI) flows, has grown in recent decades at a rate that has outpaced growth in trade and income. This trend has led to an interest in empirically investigating the fundamental factors behind the determinants and location of FDI. Most of the research done has been based largely on the "eclectic paradigm" and on partial equilibrium analyses. However, a more recent line of the literature has begun to incorporate the MNE into a general equilibrium framework providing a solid base for empirical work in the shape of a well-founded theory. One basic question still in dispute in the realm of this newer theoretical setting is the extent to which FDI flows are horizontal or vertical and how they evolve over time. To quote Navaretti & Venables (2004, p. 144): "...even though the empirical evidence indicates that vertical FDI does not account for a significant amount of (world) FDI, it still suggests that it plays a role and, most likely, an increasing one".

Previous empirical studies that estimate constant time coefficients for the variables designed to capture horizontal FDI (HFDI) and vertical FDI (VFDI) in fact reveal the prevalence of HFDI factors behind FDI cross-country distribution. Helpman (1984) proposed a model of multinational activity that leads to a pattern of vertical integration of production across countries and vertical FDI (VFDI) in which headquarters activity is more capital- and skilled labor-intensive than production at the plant. So, in order to take advantage of factor cost differences, the firm will locate headquarters in the skilled labor-abundant country and the plant in the unskilled-labor one. Therefore, although the vertical model can explain FDI flows between roughly developed and developing countries, in fact a large amount of FDI is a two-way flow between advanced countries with similar factor endowments. Markusen (1984) and Markusen & Venables (2000) developed the horizontal model where multinational enterprises (MNEs) are multi-plant firms with one integrated plant (headquarters and production plant) at home and production plant replicas in foreign countries servicing each market with production from within its borders. As the model assumes that headquarters and production activities use factors in the same proportion, the model predicts that HDFI will be prevalent between countries with similar endowments, large, similarly-sized markets and when there are significant barriers to trade. Nevertheless, both types of investment can be observed in the real behavior of an MNE.

Based on this reasoning Markusen, Venables, Eby-Konan & Zhang (1996), Markusen (1997) and Markusen (2002) provide a closer approximation to the reality of MNE adopting both strategies by integrating the vertical and horizontal models into a unified general equilibrium framework called the knowledge-capital (KC) model. The KC model is a two-countries (parent and host), two-factor (skilled and unskilled labor) and two-sector model in which various combinations of vertical and horizontal multinationals and national firms can emerge endogenously. It is assumed that headquarter services, producing the intangible assets, are skill-intensive activities and that plant-level fixed costs are a combination of skilled and unskilled labor, whereas final production requires unskilled labor only. With this setup FDI between countries is now a function of all the following variables considered in the vertical and horizontal model together: differences between countries in relative factor endowments, differences in the size of home and host countries, trade costs and investment barriers. In equilibrium, as expected by the horizontal model, horizontal FDI (HFDI) between countries will dominate when trade costs are moderate or high and countries are similar in size and relative factor endowments. VFDI will prevail when trade costs are moderate or low and/or countries differ significantly in relative endowments independently of market size. Finally, there will be no FDI if trade costs are low and countries are similar in relative endowments and size or when trade costs are moderate and countries are very different in size. But due to the complexity of the model the simulations used to solve the equilibrium also disclose some interesting interactions between variables that make their relationships with FDI non-linear and the empirical specification challenging.

Previous empirical studies on FDI use different databases usually spanning several years in order to estimate time-constant coefficients of the above stated variables. However, changes in these variables over time are expected to reflect qualitative changes in FDI, converting for example most VFDI to HFDI between two converging economies. A varying-coefficient approach arises here in a natural way. Allowing the parameters of the model to vary over time makes it possible to gather any changes in the nature of FDI in a given sample.

We estimate nonparametrically a time varying coefficient variety of the KC model using panel bilateral data for fourteen European Union countries over twenty three years. We show that all parameters cannot be considered constant over time and, applying the constant parameter model, only "meaned" coefficients over the analyzed time period with misleading interpretation are estimated.

The paper is organized as follows. Section 2 reviews the empirical literature of the KC model. Section 3 presents the time varying coefficients approach of the KC model and the estimation method applied. Section 4 describes the data and results obtained. Finally, Section 5 presents our conclusions.

2 Econometric specification of KC model

The specification of the linear KC model has been adopted in different ways in numerous empirical studies. Carr, Markusen & Maskus (2001) base their econometric specification on simulation results and define various quadratic and interaction terms in order to capture nonlinearities observed in the simulation. Their basic specification of the FDI flows from parent to host country is:

$$\begin{aligned} FDI &= \beta_0 + \beta_1 \textit{GDP Sum} + \beta_2 \textit{GDP Difference Squared} + \\ &\quad \beta_3 \textit{Skill Difference} + \beta_4 (\textit{GDP Difference} \times \textit{Skill Difference}) + \\ &\quad \beta_5 \textit{Investment Cost Host} + \beta_6 \textit{Trade Cost Host} + \\ &\quad \beta_7 (\textit{Trade Cost Host} \times \textit{Skill Difference Squared}) + \\ &\quad \beta_8 \textit{Trade Cost Parent} + \beta_9 \textit{Distance} + u, \end{aligned} \tag{1}$$

where subscripts have been omitted and u is an error term. The first two variables include market size effects that are important for capturing HFDI determinants. Roughly speaking, the horizontal part of the model predicts a positive coefficient on *GDP Sum* (defined as the sum of the two countries' GDP) and a negative one on the *GDP Difference Squared* (defined as the squared difference of both countries' GDP). This second term is included because of the inverted U-shaped relationship between FDI and differences in country size that emerged in the simulations. In fact, simulations show that HFDI reaches a maximum when countries are of similar sizes. If the parent is larger than the host country (*GDP Difference Squared*> 0), then HFDI from parent to host country diminishes because of the inability to achieve scale economies in a small host country that still requires fixed investment costs.

The next two variables are related to relative factor endowments. *Skill Difference*, defined as the difference in relative skill endowments, captures the vertical component of the model and should have a positive coefficient to be consistent with vertical investment motivations. On the other hand, we should keep in mind that HFDI is promoted by similarity in relative skill endowments.

Note that, this variable interacts with two other variables. The first cross term is *GDP Difference* × *Skill Difference*, where a negative sign represents lower FDI for large market size differences and factor endowments. If the parent country is large and skill-abundant (*GDP Difference* × *Skill Difference* $>$ 0), then firms have weaker incentives to serve the home market from a foreign affiliate located in the host country due to trade costs. Model simulations indicate high VFDI when the parent country is small and skilled-labour abundant[1] so that the production plant tends to be installed abroad in a large, unskilled country.

The second cross product variable *Trade Cost Host* × *Skill Difference Squared* is the interaction between trade costs of exporting to the host country and the skill difference squared and is designed to capture the issue that trade costs may encourage horizontal, but not vertical investment. At the same time the horizontal investment prevails when relative endowments are similar. Although the effect of this cross variable is expected to be negative lowering the direct effect of host country trade costs, this conclusion is labelled by Carr et al. (2001) as not a sharp hypothesis.

[1]Sweden, Switzerland or Netherland are cited in Markusen (2002, p. 222) as an example.

FDI restrictions in the host country represented by the variable *Investment Cost Host* will discourage both kinds of FDI, which accounts for its expected negative effect. Trade costs in the host country captured by the variable *Trade Cost Host* encourage the substitution of exports by FDI as a better way to serve the foreign markets, so the expected sign of its coefficient is positive.

Trade impediments in the parent country, *Trade Cost Parent*, should affect VFDI negatively since it increases the cost of reexporting goods from the host to the parent country. Finally, the geographic distance between parent and host country, *Distance*, has an ambiguous effect in the literature. While it may encourage HFDI to offset potential negative effects on exports, it also raises the transaction costs of both types of foreign investments.

Carr et al. (2001) find empirical support for all the above stated effects except for *Trade Cost Host* $\times$ *Skill Difference Squared* using panel data from 1986 to 1994 and for the USA and 36 other countries. However subsequent papers (Markusen & Maskus (1999), Markusen & Maskus (2002), Davies (2002), Blonigen, Davies & Head (2003), Carr, Markusen & Maskus (2003) or Braconier, Norbäck & Urban (2005)) have thoroughly discussed the predictive power of the KC model, particularly with regard to its vertical component. In order to resolve the puzzle and better capture VFDI, these papers used different samples (different countries and time periods) and slightly modified specifications than that employed in Carr et al. (2001). Nevertheless it seems that VFDI it is still a controversial issue not robustly supported by data within a constant coefficient approach.

Torosyan & Waidkirch (2006) proposed a new approach for estimating the KC model in light of the following two problems. The first is the impossibility of obtaining an analytic solution of the KC model given its complexity and the second is the contradictory conclusions obtained when specifying the nonlinear terms in empirical models. They estimate nonparametrically a generalized additive model (Hastie & Tibshirani (1990)) in order to avoid the specification of the functional form between the explained and the explanatory variables. In this kind of model and under the assumption of additivity, each explanatory variable is related to the explained variable through a smooth unknown (linear or nonlinear) function[2] that does not need to be specified. The advantage of estimating this kind of model is that there is no misspecification problem with respect to nonlinearity and nonmomotonicity. So if we are more interested in adjusting than in forecasting, this approach is the most appropriate. Nevertheless, Torosyan & Waidkirch (2006) do not include interaction terms in their model which may lead to a possible misspecification error if some variables are really interrelated. Thus, if for example the variable (*GDP Difference* $\times$ *Skill Difference*) is relevant and no interactions are considered, this effect would not be explained by the model. A clear disadvantage of this kind of model when comparing with linear parametric models is that there is no direct interpretation of the estimated functions. So that if the aim of the analysis is to study the marginal influence of a variable or the economic implications of unit changes, a generalized additive model is inapplicable due to the lack of a direct interpretation of the estimated functions. Nonetheless, it is very useful as a descriptive tool that provides worthy information about the relations between variables.

3 Time varying specification of KC model

In this paper we are interested in analyzing the influence of the explanatory variables over the explained variable in order to determine the nature of FDI flows between a set of countries. As this nature depends on variables such as the degree of development in host and parent countries, market size, factor endowments, trade or investment costs that may vary over time, we consider that a time varying coefficient model comes out naturally. In this way the model allows for situations where countries' bilateral flows can change from a vertical FDI to horizontal FDI or vice versa.

In this framework of time varying coefficients Robinson (1989) proposes a nonparametric estimator based on the assumption that each sequence of coefficients lies on a smooth unknown function of the time index[3]. The advantage of

[2]The linear relation of $GDP\,Sum$ over FDI in the parametric model given in (1) is given by β_1 $GDP\,Sum$. In a generalized additive model this relation is measured by the function $m(GDP\,Sum)$, where $m(\cdot)$ is a smooth function that may, or may not, be linear.

[3]The smoothness assumption assumes that $\{\beta_{it} = f_i(t/T)\}_{t=1}^{T}$, $\forall i$ where $f(\cdot)$ is an unknown

this estimator is that it does not need to specify the unknown smooth linear or nonlinear function to determine how coefficients behave in time. Note that the smoothness assumption is not made over the explained or explanatory variables as in the classical nonparametric setting (Härdle (1990)), but over the coefficients instead. This time varying coefficient model allows for constant jumps, gradual reactions to economic changes, time tendencies or combinations of all the above. Obviously, if the moment when the change occurs is known, the duration of its impact is known and it is possible to assume that the changes remain constant, then a dummy variable specification works well. Nevertheless, such cases will not often be encountered by econometric practitioners.

Motivated by the above reasoning, we are interested in this paper in the estimation of a time varying coefficient in the KC model. To this end, we adopt the model proposed by Carr et al. (2001) in which we allow the coefficients to vary over time:

$$\begin{aligned} FDI_{it} \;=\; & \sum_{i=1}^{N} \alpha_{it} H_i + \beta_{1t}\ \mathit{GDPSum}_{it} + \beta_{2t}\ \mathit{GDP\ Difference\ Squared}_{it} + \\ & \beta_{3t}\ \mathit{Skill\ Difference}_{it} + \beta_{4t}\ (\mathit{GDP\ Difference}_{it} \times \mathit{Skill\ Difference}_{it}) + \\ & \beta_{5t}\ \mathit{Investment\ Cost\ Host}_{it} + \beta_{6t}\ \mathit{Trade\ Cost\ Host}_{it} + \\ & \beta_{7t}\ (\mathit{Trade\ Cost\ Host}_{it} \times \mathit{Skill\ Difference\ Squared}_{it}) + \\ & \beta_{8t}\ \mathit{Trade\ Cost\ Parent}_{it} + \beta_{9t}\ \mathit{Distance}_{it} + u_{it}. \end{aligned} \tag{2}$$

where N is the number of home countries and H_i takes value one when the t-th observation belongs to home country i and zero otherwise. Thus we allow a different time varying intercept for each home country to ensure our results were comparable to the classical fixed effect approach. Since the pioneering paper of Robinson (1989), the literature on varying coefficients and its application has increased considerably (e.g. Orbe, Ferreira & Rodriguez-Póo (2005), Orbe, Ferreira & Rodriguez-Póo (2006), Cai (2007), Mariel & Orbe (2005), etc). The application of this methodology to panel data is in its initial stages but there are already many theoretical results as well as applications in the related field of longitudinal data (Wu, Chiang & Hoover (1998), Hoover, Rice, Wu & Yang (1998) or Huang, Wu & Zhou (2004)).

twice differentiable function of time.

In this context of panel data, the semiparametric estimation of Model (2) is done by minimizing a smoothed sum of squared residuals. This optimization problem provides the following closed form estimator:

$$\widehat{\beta}_t = \left[\sum_{s=1}^{T}\sum_{i=1}^{N} K_{h,ts} X_{it} X_{it}'\right]^{-1} \sum_{s=1}^{T}\sum_{i=1}^{N} K_{h,ts} X_{it} FDI_{it} \tag{3}$$

where $K_{h,ts} = h^{-1}K((t-s)/h)$ is the kernel weight with bandwidth parameter h and X_{it} is a vector containing the it-th elements of each explanatory variable. As usual in the nonparametric setting, the kernel weights introduce smoothness, so the larger the value of h, the greater the amount of imposed smoothness over the coefficients. In this context, a large amount of smoothness ($h \to \infty$) leads to horizontal estimated coefficients, where no time variation is allowed and a fixed effects model estimations are obtained as a particular case. A bandwidth parameter tending to zero provides wiggly coefficients leading to an estimated response variable that connects the observations. Thus, the selection of the bandwidth parameter is crucial in order to reach an adequate trade off between adjusted values ($h \to 0$) and degrees of freedom ($h \to \infty$). We select the bandwidth parameter using the leave-one-out method which compensates the squared bias and variance of the coefficient estimator.

4 Data and Results

As the nonparametrical estimator used in this study has asymptotic properties only, we need as long a time period as possible. That is why we choose only fourteen OECD countries with available FDI data[4] for the period from 1982 to 2004. The selected OECD countries are relatively homogenous, meaning that no unexpected observations should appear in our sample. Subsequently, it should be easier to formulate expected results and to focus our attention on the time evolution or stability of the coefficients of the KC model.

The data on inward and outward FDI were collected from various OECD International Direct Investment Statistics Yearbooks for 182 pairs of the $N = 14$ selected countries over $T = 23$, years which led to 4186 observations reduced

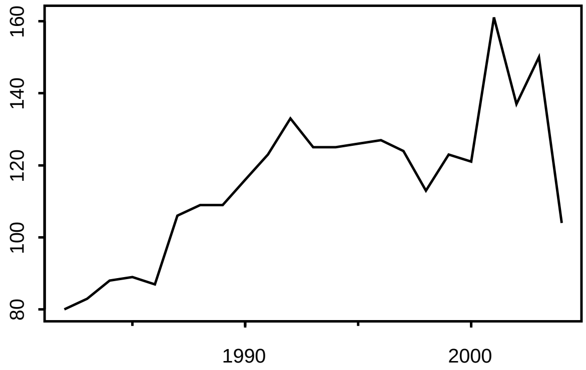
[4] Austria, Belgium plus Luxembourg, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and United Kingdom.

finally to 2359 observations owing to unavailable data. *GDP* data were obtained from the AMECO database. The *Skill* variable is defined as the educational attainment of the total population aged 25 and over, namely as a percentage of this part of the population with secondary or higher education (Barro & Lee (2000)). The *Investment Cost* variable is represented by investment restriction which is an indicator ranging from 0 (least restrictive) to 1 (most restrictive) (Golub (2003)). The *Trade Cost* variable is defined as the maximum value of trade openness minus the proper value of trade openness, which is defined as the ratio of total country trade (exports plus imports) to country GDP, obtained from OECD statistics. Finally, the variable *Distance* represents the number of kilometers between capitals of analyzed countries and has been collected by the authors.

The number of available observations per year is shown in Figure 1. Note that many observations are not available for the first decade of the sample. We do not present the summary statistics such as overall means, standard deviations, minimums and maximums of all observed variables, because our aim is to analyze coefficient variation over time. That is why we present the time evolution of some summary statistics in Figures 2 and 3. All variables are transformed by logarithm, a transformation also applied in the fixed effect and time-varying estimations presented below. The evolution of the yearly mean of bilateral FDI flows increased almost for the whole time period of the sample and peaked in 2000. Another expected and clearly decreasing trend can be observed in mean host investment cost compatible with the aspiration of all countries included to join a common market.

Table 1 presents the estimated coefficients by the standard OLS estimator for the constant fixed effects specification using our panel data from 1982 to 2004 for fourteen OECD European countries. Note that these results can also be obtained by estimating equation (2) with a very large bandwidth parameter. The estimated signs and t-statistics may lead to incorrect conclusions about the significance of included variables and the compatibility of the estimated signs with the KC model theory. We do not draw these conclusions because the estimated coefficients of the Table 1 cannot be interpreted when the underlying

Figure 1: **Number of available observations per year**



real coefficients are time varying, as seems to be the case here.

When estimating the time varying coefficients model defined in (2), the first step is the selection of the degree of smoothness. The Gaussian kernel is used in the estimation procedure, so when estimating the coefficients in a given period all observations in the sample are weighted positively. These weights decrease according to the distance between the period in which the coefficients are estimated and the remaining periods. Note that since it is assumed that coefficients do not vary across countries, except for the intercepts, all observations associated with the same time period are weighted in the same way. The use of leave-one-out data driven method for selecting the bandwidth leads to $h = 0.07$.

Figures 4-6 present estimated time varying coefficients of the model defined in (2) together with their 95% pointwise confidence intervals[5]. A general conclusion to be drawn from these figures is that virtually no coefficients may be considered constant over the time period under study since it is not possible to draw a horizontal line without crossing the confidence limits. When the horizontal zero line appears between both interval limits, the coefficient can be considered statistically zero and subsequently the corresponding variable is not significant for the considered period.

[5]The pointwise intervals can be approached by $\left[\hat{\beta}_{it} \pm 3/4\ N(0,1)_{\alpha/2}\hat{\sigma}_t m_{tt}\right]$ where $\hat{\sigma}_t^2 = (\sum_{s=1}^{T} K_{h,st}(FDI_s - \widehat{FDI}_s)^2)/\sum_{s=1}^{T} K_{h,ts}$, m_{tt}^2 the tt-th element of the matrix $\sum_{s=1}^{T}\sum_{i=1}^{N} K_{h,ts}X_{it}X_{it}'$ and in our case $\alpha = 0.05$.

Figure 2: **Yearly means**

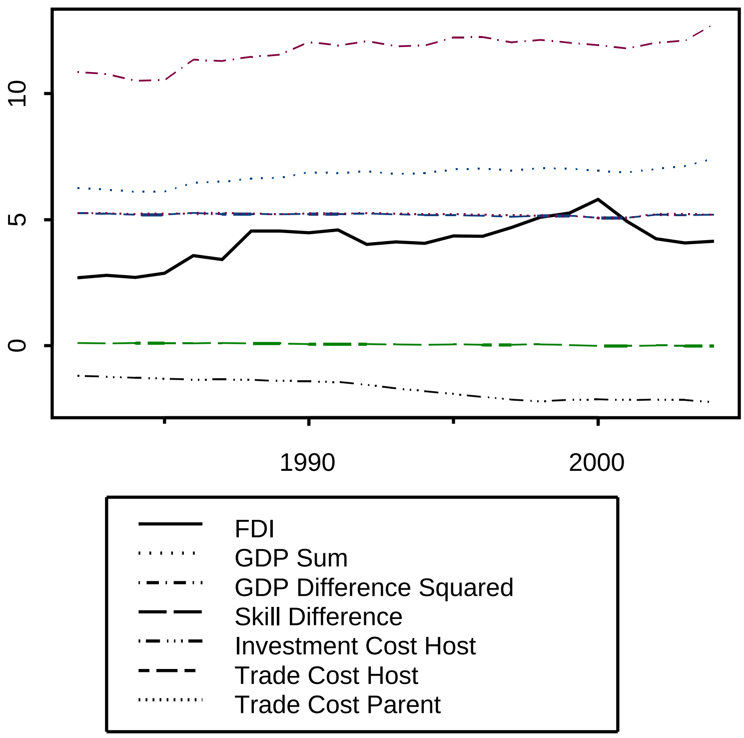
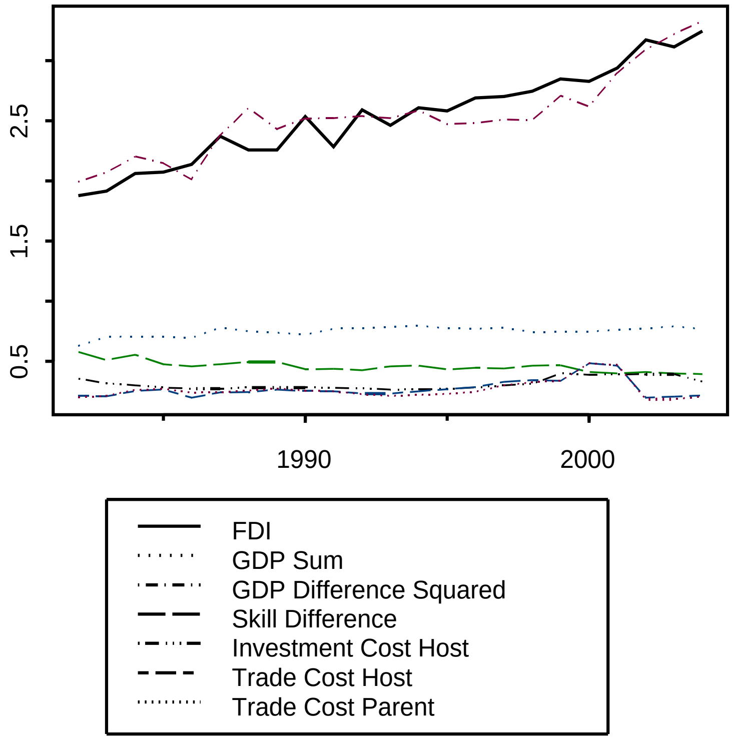


Figure 4 shows that the coefficient for joint market size exhibits a positive sign for the whole period as predicted by the theoretical model. However the time varying coefficient approach reveals that throughout the 1980s to early 1990s, the effect of joint market size on intra European Union (EU) FDI flows declined. This HFDI-linked determinant seems thereafter to have had a smaller effect on bilateral FDI. The sign for market size differences (*GDP Difference Squared*) is also in accordance with the KC model over the whole period under study (negative impact on FDI). However, during the 80s the value of the parameter again followed a declining trend (in absolute value) and market size differences, although still negative, became less important.

The turn-off point in both of these coefficients coincide with the signing of the European Union Treaty (1992) which supposed primarily the removal of the remaining obstacles to trade and capital flows. Trade barrier removal could have had a negative impact on HFDI between EU-15 countries, substituting

Figure 3: **Yearly standard deviations**



this type of FDI by exports as a way to serve foreign markets and reduce the importance of both these FDI determinants[6]. In any case, growing market sizes and falling fixed costs for production in foreign markets may have made it easier to cover the larger fixed costs associated with HFDI strategies that involve production plants in home and host markets, making GDP differences less important for HFDI.

The investment costs variable in the host country (Figure 5), has the correct negative sign and the wide confidence intervals suggest this coefficient is constant over the whole sample period. So even between EU countries, and despite the long term commitment towards FDI liberalization, there is still a relatively restrictive FDI environment that depresses FDI flows, specially in some important non-manufacturing industries, such as, electricity, transport and telecoms

[6]Another explanation for the declining importance of these determinants may be that the relevant host market size for EU MNEs is no longer the local host country market only, but also other adjacent markets to which they can export. So it may be an indication of an export platform strategy that can not be captured by this two country model.

Table 1: **Fixed effects estimation of constant coefficients of the KC model**

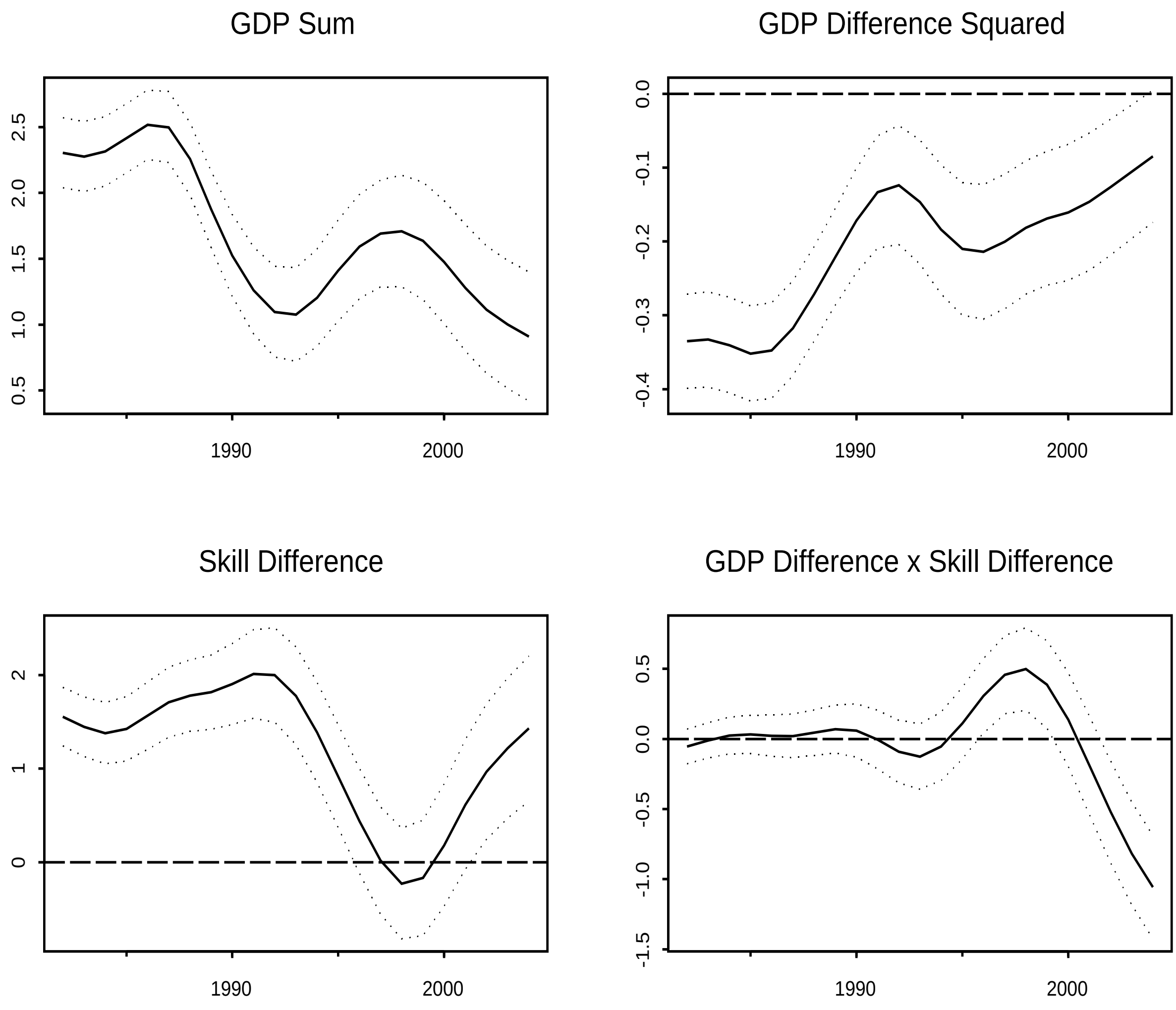
Variable	*Coefficient*	*t-Statistic*
GDP Sum	1.704	16.23
GDP Difference Squared	-0.204	-8.56
Skill Difference	1.152	7.87
Skill Difference × GDP Difference	0.005	0.07
Investment Cost Host	-0.580	-5.15
Trade Cost Host	-0.884	-5.62
Trade Cost Host × Skill Difference Squared	-0.001	-0.28
Trade Cost Parent	-1.898	-4.43
Distance	-1.270	-16.36

(Nicoletti, Golub, Hajkova, Mirza & Yoo (2003)). Regarding the time varying coefficient of host trade costs (Figure 5), the sign is negative in contrast to what the theoretical model predicts and may be considered relatively stable over the whole period. This may be an indication of an impropriety of the traditional tariff-jumping argument in explaining HFDI between EU countries, effect which this proxy mainly captures. In fact a negative sign for this variable shows that there is a complementary effect between trade flows in the host country and inward VFDI, found also in other empirical studies based on different theoretical settings (Wheeler & Mody (1992), Sin & Leung (2001), Chakrabarti (2001)).

This indication towards the incidence of VFDI determinants in the EU is clearly depicted by the sign and value of the skill difference coefficient[7] presented in Figure 4. Endowment differences in skilled labour and their concomitant factor price differentials is a motive for undertaking FDI in the EU-15 that cannot be neglected during the whole period despite the falling trend of the coefficient during the 1990s, attributable to a partially real convergence process between EU countries. This despite the fact that, a priori it may be a counterintuitive that VFDI determinants still have explanatory power in the context of EU countries. Host country trade costs, which exert a direct negative impact in our

[7]The time varying coefficient approach used in this study also reveals a trend towards a negative sign of the interaction term, indicating that skill differences encourage FDI but less so if the two countries differ in size.

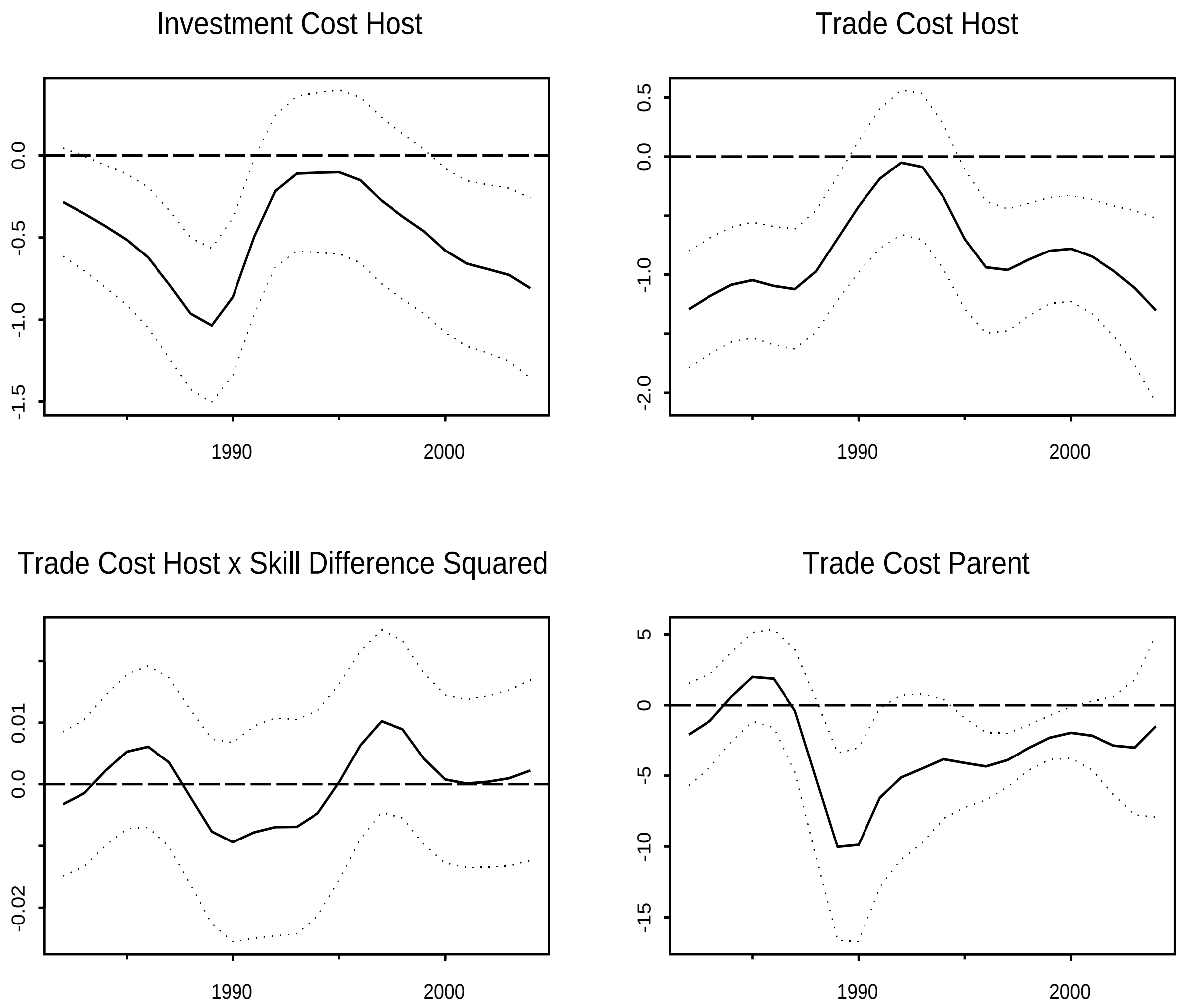
Figure 4: **Nonparametric estimation of the time-varying coefficients of the KC model**



study on FDI, do not have any further negative indirect effect when interacted with skill differences because zero line is included between both intervals of the coefficient associated with the interaction term (Figure 5). This result is in line with the previous discussion of the papers mentioned above concerning the doubts of the expected sign for this variable. The hypothesis that VFDI determinants play an important role in the EU is also confirmed by the evolution of the remaining variables, parent trade costs (Figure 5) and distance (Figure 6), which have a negative impact on FDI flows.

The negative estimated sign of the distance parameter is also coherent with

Figure 5: **Nonparametric estimation of the time-varying coefficients of the KC model**



HFDI (non trading MNEs,) as a consequence of the correlation between foreign plant setup costs and distance. However, it seems that despite the falling communication and travelling costs which should have had a depressing effect on foreign setup and management costs, distance becomes increasingly important. That is why we interpret this result as a symptom of the dominance of vertical MNEs or more complex strategies that use more intense trade and transport of intermediate inputs (Egger (2004))[8].

[8]The increasing negative impact of distance has also been found regarding trade flows in Brun, Carrere, Guillaumont & De Melo (2005) and Disdier & Head (2007). Though the explanation of such evolution is not clear, the arguments put forward are in line with the vertical

Figure 6: **Nonparametric estimation of the time-varying coefficients of the KC model**

5 Conclusions

The results of the present paper indicate that the vertical component of the KC model is relevant even in the context of European countries with relatively similar endowmwnts. The applied time varying coefficients approach reveals, in contrast to the prevailing opinion stating that FDI worldwide and more so in the EU is mainly horizontal, that FDI was much more diverse during the 1980s and 1990s. The results support the findings of Hanson, Mataloni & Slaughter (2001) and the notion that VFDI plays an increasing role (Navaretti & Venables (2004)). Nevertheless attributing the signs and evolutions of the parameters to the dominance of VFDI and to a somewhat declining trend in HFDI may be a partially accurate conclusion.

It is possible that in a two-country KC model setting, where only pure horizontal and vertical strategies are considered, third country effects are missing. These may be relevant for explaining more complex strategies like export platforms and complex vertical integration strategies. Likewise, the recent theoretical and empirical literature on complex MNEs (Yeaple (2003), Ekholm,

complex strategies of MNEs mentioned above: increasing fragmentation of the production process with newly outsourced stages of production in near-neighbor countries.

Forslid & Markusen (2003), Baltagi, Egger & Pfaffermayrd (2007)) may throw further light on the composition of FDI flows in the EU. These kinds of strategies between European Union countries probably involve a larger share of total FDI flows than pure vertical and horizontal FDI. As a matter of fact, European integration entailed considerable restructuring and rationalization of European MNEs through mergers and acquisitions.

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