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Article

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Home Market Effects of Foreign Direct Investment: The Case of Germany

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The paper provides new evidence on the impact of foreign direct investment on the labour market of home countries. It is based on a new data set on change rates of foreign direct investment and domestic employment of German multinationals. The econometric analysis suggests that public concerns about a massive exodus of jobs to low-wage countries are not well-founded. Instead, parent firm's employment significantly increases with an increase of their FDI. All in all, our results provide strong evidence against traditional trade theory, which predicts a negative relationship between foreign and domestic employment, and weakly support the theory of the multinational firm.

JEL Codes: F 21, F 23
Keywords: Foreign Direct Investment, Multinational Firms, Off-shoring.

1 Introduction

How does foreign direct investment (FDI) affect employment in home countries? Many observers are concerned that the relocation of jobs to low-wage countries will erode industrial employment opportunities in highly developed countries. It is the basic message of this paper that such concerns are empirically not well-founded.

Section 2 of the paper briefly discusses the concepts of vertical and horizontal foreign FDI in international trade theory. It elabourates the different implications of these two concepts for the regional and sectoral structure of FDI and for domestic employment. Section 3 confronts these predictions with the actual patterns of German outward FDI. Section 4 analyses newly available micro-data which allow to compile information on the change rate of domestic employment of German multinational firms and to regress this variable on regionally and sectorally disaggregated micro-data on FDI. This particular information from the micro-data set of the Deutsche Bundesbank on German multinationals will be analysed here for the first time. Section 5 concludes.

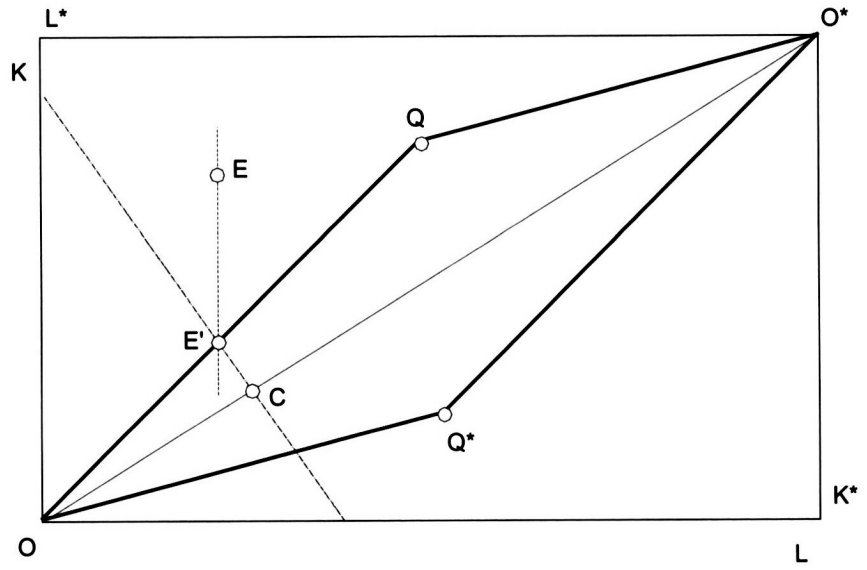
* The authors are grateful to Frank Ramb (Deutsche Bundesbank) for helpful assistance in compiling the data.

2 Vertical and Horizontal FDI in International Trade Theory

In traditional trade theory, the main purpose of FDI is to exploit international factor price differentials resulting from international differences in relative factor endowment. This type of international investment is usually labelled as vertical FDI. The basic mechanism can be illustrated by an EDGEWORTH-BOX, where E represents the initial endowment point and OQO*Q* represents the factor price equalisation space (Figure 1). When E lies outside this space, international trade is not sufficient for achieving factor price equalisation and relative wages are higher in the capital-rich country, whereas its profit rate is lower. This gives an incentive for capital-owners to shift capital to the capital-poor country via FDI until the new factor endowment point E' is reached.

Now, factor price equalisation can be achieved by international trade. As the HECKSCHER-OHLIN model behind this graphical illustration assumes internationally identical and homothetic consumer preferences, C is the consumption point for both countries. The capital-exporting country will therefore be a net-exporter of capital-intensive goods and a net-importer of labour intensive goods.

Figure 1: Vertical FDI



In a strict sense, this analytical framework does not allow to address the employment effects of FDI, because it assumes full employment in both countries. It predicts, however, that FDI leads to an international shift of production from the home country to the host country and that full-employment in the home country can only be maintained by declining domestic wages. An extended HECKSCHER-OHLIN model with rigid labour markets would then predict that FDI reduces employment in the home country and increases employment in the host country. In this view, FDI is associated with an export of jobs from high-wage to low-wage countries.

In new trade theory, the employment effects of FDI are more complex. This theory explicitly takes into account the existence of multinational firms, which provide so-called headquarter services for their domestic and foreign subsidiaries. These services, which are typically (although not necessarily) produced at headquarters, can be utilised in different plants within firms without additional costs, i.e. they can be regarded as firm-specific public goods. Examples are research and development, public relation and branding activities, or the development of managerial know-how. Such headquarter services give rise to firm-specific scale economies which can be exploited in domestic and foreign plants as well. Thus, the basic rationale for (horizontal) FDI in these models is the exploitation of firm-specific scale economies by establishing new production sites in foreign countries (see, e.g., MARKUSEN 1984; BRAINARD 1997; KLEINERT 2004).

In this framework, investing abroad not only involves an export of physical capital, but also an export of services – notably headquarter services. The EDGEWORTH-BOX therefore has to be extended to three goods: two types of final goods (capital-intensive ones and labour-intensive ones), and one intermediate good (headquarter services) (Figure 2).[1] Again, OQO*Q* describes the factor price equalisation space prior to FDI and E describes the initial endowment point which lies outside this space. Without FDI, the wage level in the capital-rich country exceeds the one in the capital-poor country, and its profit rate is lower. An investment flow from the capital-rich to the capital-poor country has two effects:

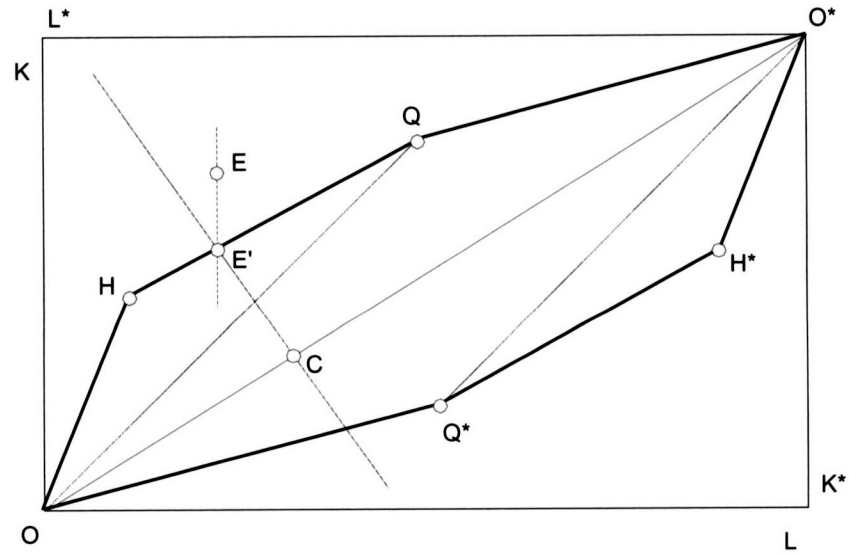
- the capital-rich country starts to produce headquarter services, which are complementary to FDI and are assumed to be highly capital-intensive. This third type of goods extends the factor price equalisation space to OHQO*H*Q*.

1 This graphical illustration is a modified version of the one by HELPMAN AND KRUGMAN (1985).

- the endowment point shifts from E to E' (but to a smaller extent than in Figure 1).

As in Figure 1, FDI results in a relocation of production of final goods from the high-wage to the low-wage country.[2] But there are two important differences: Firstly, the relocation of final goods production is smaller than in the case of vertical FDI. Secondly, the high-wage country increases its production of headquarter services, which may compensate or even overcompensate the reduction of final goods production.

Figure 2: Horizontal FDI



Again, the HECKSCHER-OHLIN framework does not allow a straightforward assessment of employment effects, because full employment in both countries is assumed. It can be argued, however, that labour market rigidities in the home country will result in a declining number of domestic jobs in the production of final goods and an increasing number of domestic jobs in the production of headquarter services. The total effect of FDI on domestic employment can be either positive or negative. Thus, the home market effects turn from a theoretical into an empirical question.

2 In order to keep the diagram simple, we did not plot the respective production and trade volumes.

3 Regional and Sectoral Patterns of FDI

German multinational firms are employing about 4.6 million workers in foreign affiliates, which correspond to 12 percent of total domestic employment in Germany. In manufacturing, foreign affiliates employ about 2.3 million workers, which correspond to 30 percent of domestic manufacturing employment (calculated from Deutsche Bundesbank 2006 and Statistisches Bundesamt 2006). These figures demonstrate that the number of jobs related to FDI is not a negligible item and that FDI may be associated with substantial labour market effects in home countries and host countries as well. A closer look at the structure of international investment activities of German firms might help to get a first impression whether or not the creation of foreign jobs has contributed to destruction of jobs in the German economy. For a descriptive assessment of this structure, we will rely upon stock data of FDI collected by the Deutsche Bundesbank from the balance sheets of parent firms and foreign affiliates. These data are available at various disaggregation levels and are much less affected by statistical deficiencies than flow data of FDI (KLODT 1999). This definition of FDI is applied throughout the whole paper.

Let us consider regional structure first. FDI flows between highly developed countries will rather be horizontal than vertical, because there are no substantial factor price differentials to be exploited. Vertical FDI will predominantly flow to low-wage countries, although those host countries may also attract horizontal FDI if their markets seem likely to grow rapidly.

Table 1 displays the regional destination of German international investment activities for different country groups and for those host countries which attract more than 1 percent of German outward FDI. These data show that industrial countries strongly dominate as host countries of German multinational activities. Up to 2004, they have attracted more than 500 billion € of German outward FDI, which is equivalent to 86.5 percent of total German outward FDI. They further illustrate that the Netherlands is twice as important as all reform countries together. And German FDI in the United States is even three times higher. Most countries with extremely low wages do not even appear in Table 1, because they do not meet the 1 percent criterion.

For certain, the relative importance of the new EU members or China should be expected to rise in the future. But even a twofold or threefold increase in their shares in German outward FDI would not alter the domi-

nance of industrial countries as host countries of German foreign affiliates. This evidence suggests that German investors are not primarily looking for low labour costs, but for promising markets when they decide to establish foreign subsidiaries.[3]

Let us now turn to sectoral structure. Traditional trade theory would predict that (vertical) FDI from high-wage countries should be strongest in labour-intensive and standardised industries, where price competition dominates over quality competition and import pressure is strong. The theory of the multinational firm, by contrast, would predict that (horizontal) FDI concentrates on those industries where headquarter services play an essential role. Unfortunately, statistical information on the sectoral distribution of headquarter services is not directly available. However, research and development, branding and advertising, and other types of headquarter services can be regarded as crucial inputs especially for technology-intensive industries. Sectoral technology intensity can therefore serve as a proxy for the relative importance of firm-specific scale economies across industries.

In Table 2, German manufacturing industries are arranged by the share of their innovation expenditures in sales in descending order.[4] The last column displays the intensity of investment activities abroad – measured as the ratio of outward FDI to the stock of domestic fixed capital in 2004.[5] These calculations reveal that technology-intensive industries are much stronger engaged in international investment activities than less technology-intensive industries. Hence, also the sectoral FDI patterns support the view that exploiting firm-specific scale economies dominates over exploiting factor price differentials as the major driving force of FDI.

This general conclusion has repeatedly been confirmed by various survey studies based on firm questionnaires (see, e.g. KINKEL et al. 2002; MARIN 2004; DIHK 2005). In addition, these studies tend to report only minor effects of FDI on employment in the home countries.

Another type of empirical studies tries to identify the home country employment effects of FDI by a matching approach where firms engaged in

3 See also JOST, NUNNENKAMP (2003).

4 Innovation expenditures include R&D expenditures, innovation-related expenditures on equipment, software, patents and licensing, expenditures on construction and design, expenditures on education and training, and expenditures on marketing and sales promotion of innovative products. For further details see ASCHHOFT et al. (2006).

5 It should be kept in mind that not only fixed capital data, but also FDI data refer to stocks which reflect both past and present investment flows.

FDI are compared to similar firms which do not invest abroad. Such studies, which have been carried out for EU-based multinationals (KONINGS, MURPHY 2003) and Italian-based multinationals (NAVARETTI and CASTELLANI 2004), also fail to detect substantial substitution effects between foreign and domestic employment.

A third type of studies does not rely upon time series, but on cross-sectional data, which are utilised for estimating the parameters of a translog cost function. This approach, which has originally been developed by (SLAUGHTER 1995), allows to simulate the employment effects of changes in the relative wage levels in home and host countries. Related studies for the United States, Europe, and Germany and Sweden provide no convincing evidence for a relocation of jobs from parents to foreign affiliates (BRAINARD and RIKER 2001; KONINGS and MURPHY 2001; BECKER et al. 2005).

Due to the lack of appropriate data, however, so far no econometric study has directly estimated the impact of FDI on home employment. As such data have recently become available, the following section is intended to fill this gap.

4 Micro-Data Analysis

The Deutsche Bundesbank is collecting the balance sheets of German firms investing abroad and of their foreign affiliates. Selected data from these balance sheets are reported in a micro database which is available for empirical research.[6] The latest year available is 2003. Since the year 2002, the database also covers domestic employment of parent firms. From this data set we compiled firm-specific change rates of FDI and domestic employment which allows to estimate the impact of FDI activities on employment in the home country.

Our basic OLS-approach can be written as follows:

$$l_i = c + a\, fdi_i^j + \varepsilon,$$

where l_i denotes the change rate of domestic employment of the German parent firm i, fdi_i^j denotes the change rate of the stock of FDI of company i in region j, and ε represents the usual error term. The regional disaggre-

6 For a description of this database see LIPPONER (2003).

gation of *fdi* takes account of the fact that the home effects of FDI presumably differ between different host countries. We therefore define the following five regions which consist of rather homogenous countries with respect to market potential and factor prices: the European Union prior to its 2004 enlargement (EU-15), other industrial countries (IC), the new EU members from Central and Eastern Europe (CEE), non-European reform countries including China (NER), and less developed countries (LDC).[7]

In addition, we have included a firm-size variable (EMP), specified as firm's total employment, and 36 industry dummy variables in order to capture those employment changes which are independent from FDI activities. We excluded from our data set those observations where firms have carried out FDI activities in one of the two years only. Nevertheless, our data set is still affected by a few number of extreme outlyers which would substantially distort the estimated coefficients. This is probably due to the fact that we only cover a 2-year period where singular FDI projects and employment adjustment measures play a larger role than in longer time-series. We therefore excluded the upper two percent of FDI changes and domestic employment changes respectively from our data set, which reduces the number of observations from 2,288 to 2,195. Our regression results are summarised in Table 3. The table does not include the coefficients of the industry dummies which are documented in Table A1 in the appendix.

As our analysis does certainly not consider all relevant determinants of domestic employment change, the R^2 of the estimated equation is quite low.[8] Nevertheless, it is statistically significant at the one-percent level, and the rather large number of observations still allows to evaluate the employment effects of FDI. According to these results, domestic employment will significantly increase when multinational firms are increasing their FDI in the European Union (EU-15), in other industrial countries (IC), in Central and East European reform countries (CEE), or in less developed countries (LDC). Only in the case of non-European reform countries (NER) the regression displays a negative relationship between the change rates of FDI and domestic employment, but the respective coefficient is not statistically significant.

5 Conclusions

Most economists never shared the gloomy suspicions of the public about a massive exodus of jobs from high-wage to low-wage countries. In their view, rising FDI activities should basically be interpreted as an intensified international division of labour which tends to raise economic growth and employment opportunities in all participating countries. In addition, they argue that remaining jobs in high-wage countries, which are complementary to newly created jobs in foreign affiliates, become more competitive. Finally, they have repeatedly demonstrated that FDI improves access to foreign markets which simultaneously improves export (and employment) opportunities of parent firms.

The persuasiveness of such reasoning is limited, however, when it lacks authentic empirical support. Such support is provided by this paper, which makes use of a new micro-data set on the development of parent firm's employment of German multinationals over time. Although the time-period covered is short, the empirical results significantly illustrate that an increase of FDI activities comes along with an increase (and not a decrease) of domestic employment. This result holds for German FDI in the EU-15, in other industrial countries, in Central and East European reform countries and in less developed countries as well. Only for the remaining group of non-European reform countries the impact of FDI on domestic employment is statistically insignificant.

These findings are hard to reconcile with traditional trade theory, where FDI is primarily motivated by factor-price arbitrage and where new jobs in foreign affiliates substitute domestic jobs in parent firms. Instead, it tends to support the theory of the multinational firm, where FDI serves for exploiting firm-specific scale economies by establishing international production networks. This theory predicts that investing abroad may reduce the number of production jobs at home, but will improve the employment opportunities in the provision of headquarter services of the parent company. Our results suggest that the latter effect dominates. This is not to deny that the geographical structure of global production networks may be sensitive to factor price differentials. But on balance the establishment of such networks seems to promote employment opportunities in high-wage home countries.

7 These country groups correspond to the ones applied in Table 1. For the complete country list see DEUTSCHE BUNDESBANK (2006).

8 Our data base provides only a limited number of further variables. We ran some further regressions with a quadratic employment term and net profits as additional control variables, but the quality of the fit to the data and the size of estimated coefficients essentially remained unchanged.

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Table 1: German Outward FDI by Country Groups and Selected Countries 2004 (percent)

World total	**100.0**
Industrial countries	***86.5***
EU-15	55.9
Austria	3.8
Belgium	4.4
France	7.0
Ireland	1.3
Italy	3.6
Luxembourg	4.9
Netherlands	13.7
Spain	2.7
Sweden	2.1
United Kingdom	10.9
Other industrial countries	***30.6***
Japan	1.3
Switzerland	2.8
United States	23.7
Central and East European reform countries	***5.8***
Czech Republic	1.4
Hungary	1.6
Poland	1.3
Non-European reform countries	***1.2***
China	1.2
Less developed countries	***6.5***

Source: DEUTSCHE BUNDESBANK (2006).

Table 2: Technology Intensity[a] and FDI Intensity[b] by Industry 2004 (percent)

Industry	Technology intensity	FDI intensity
Technology-intensive industries average	***6.8***	***22.5***
Motor cars	8.5	29.7
Instruments	8.3	17.2
Electrical machinery	7.2	22.0
Chemicals, refineries	5.1	28.0
Non-electrical machinery	4.8	15.5
Less technology-intensive industries average	***2.4***	***7.7***
Rubber and plastics	3.2	11.9
Metal and metal products	2.7	3.7
Wood, paper, printing and publishing	2.6	2.3
Textiles, apparel, leather	2.3	17.1
Stone, clay, glass	2.2	14.4
Food, beverages, tobacco	1.6	3.2
Other manufacturing (incl. furniture)	1.9	1.1

a Innovation expenditures/sales.

b Stock of outward FDI/gross domestic capital stock.

Source: ASCHHOFF et al. (2006); DEUTSCHE BUNDESBANK (2006); STATISTISCHES BUNDESAMT (2006); own calculations.

Table 3: OLS Estimates on FDI and Parent Firm Employment

	Dependent variable: domestic employment change of parent firm	
	Coefficient	***t-value***
Constant	0.855	47.10
EU-15	0.120	13.28
IC	0.097	8.70
CEE	0.085	8.86
NER	–0.021	–1.07
LDC	0.033	2.32
EMP	–0.000	–3.04
R^2 : 0.135	$R^2_{adjusted}$: 0.118	SEE: 0.285 n: 2195

Source: Own calculations.

Table A1: OLS Estimates: Industry Dummies

Variable	Coefficient	t-value
Agriculture	–0.000	–0.00
Apparel	–0.041	–0.68
Banking	–0.040	–1.37
Basic metals and metal products	0.016	0.58
Chemicals	–0.031	–1.00
Communication equipment	–0.011	–0.32
Construction	–0.045	–0.09
Data processing services	–0.018	–0.34
Education and health	0.141	1.20
Electrical machinery	0.019	0.56
Food and beverages	0.021	0.56
Instruments	0.011	0.22
Leather and leather products	–0.052	–0.51
Mining	0.022	0.32
Motor vehicles	–0.008	–0.23
Non-electrical machinery	0.003	0.12
Office and computing machines	–0.105	–1.20
Other manufacturing	0.015	0.29
Other transport equipment	–0.013	–0.16
Paper and printing	–0.034	–0.82
Petroleum refineries	–0.080	–0.62
Private households	–0.048	–0.24
Private non-profit organizations	–0.029	–0.18
Producer services	–0.015	–0.47
Real estate	–0.033	–0.71
Research and development services	–0.143	–1.31
Restaurants and hotels	0.230	2.11
Retail trade	–0.011	–0.28
Rubber and plastic products	–0.045	–1.42
Sports and recreation	–0.061	–0.70
Stone, clay, glass	–0.061	–1.44
Textiles	–0.031	–0.68
Transport and communication	–0.013	–0.35
Utilities	0.074	1.10
Waste disposal	–0.128	–1.09
Wood and wood products	–0.100	–0.92

Source: Own calculations.

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In diesem Beitrag werden die Auswirkungen deutscher Direktinvestitionen im Ausland auf den heimischen Arbeitsmarkt analysiert. Dafür wird auf einen neuen Datensatz zurückgegriffen, der es erstmals erlaubt, anhand von Mikrodaten für einzelne Unternehmen den Zusammenhang zwischen der Veränderungsrate ihrer Direktinvestitionen und der Veränderungsrate ihrer Inlandsbeschäftigung empirisch zu überprüfen. Eine ökonometrische Analyse legt den Schluss nahe, dass die weit verbreiteten Befürchtungen über einen massiven Exodus deutscher Arbeitsplätze in Niedriglohnländer eher unbegründet sind. Die Inlandsbeschäftigung deutscher multinationaler Unternehmen geht bei verstärkten Auslandsinvestitionen nicht etwa zurück, sondern steigt sogar statistisch signifikant an. Insgesamt stehen unsere Ergebnisse im Widerspruch zur traditionellen Aussenhandelstheorie, nach der Auslandsinvestitionen und Inlandsbeschäftigung negativ miteinander korreliert sind, und stützen eher die Theorie multinationaler Unternehmen.

The paper provides new evidence on the impact of foreign direct investment on the labour market of home countries. It is based on a new data set on change rates of foreign direct investment and domestic employment of German multinationals. The econometric analysis suggests that public concerns about a massive exodus of jobs to low-wage countries are not well-founded. Instead, parent firm's employment significantly increases with an increase of their FDI. All in all, our results provide strong evidence against traditional trade theory, which predicts a negative relationship between foreign and domestic employment, and weakly support the theory of the multinational firm.

Beyond Biosafety –
An Analysis of the EC-Biotech Panel Report
Lorenz Franken and Jan-Erik Burchardi 77

Der Panelbericht in EC-Biotech ist der vorläufige Abschluss eines der komplexesten Verfahren in der Geschichte der WTO-Streitschlichtung. Die vorliegende Analyse bezieht sich auf diejenigen Aspekte, deren Bedeutung über die Biotechnologie hinausgeht, nämlich die Auswirkungen völkerrechtlicher Normen ausserhalb des WTO-Rechts auf die Auslegung des WTO-Rechts, den Anwendungsbereich des SPS Übereinkommens, die Kategorien «unangemessene Verzögerung» und «unzureichende naturwissenschaftliche Beweise» im Zusammenhang mit Vorsorgemassnahmen und schliesslich die Produktherkunft als Prüfkriterium für das Prinzip der Inländergleichbehandlung. Dabei zeigt sich einerseits, dass ein Teil der gegen den Panelbericht ge-

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