Sectoral Analysis of Foreign Investment and Growth In the Developed Countries

by Tam Bang Vu,
College of Business and Economics,
University of Hawaii-Hilo
tamv@hawaii.edu

and Ilan Noy,
Department of Economics,
University of Hawaii-Manoa
noy@hawaii.edu

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Abstract

Empirical studies on FDI and growth in developed countries have yielded conflicting results using cross-country regressions. We use sectoral data for a group of six country members of the Organization for Economic Cooperation and Development. Our paper is the first to identify the sector-specific impact of FDI on growth in the developed countries. Our results show that FDI might have positive or negative effect on economic growth operating directly and through its interaction with labor. Moreover, we find the effects seem to be very different across countries and economic sectors.

Key Words: Foreign direct investment, growth.
JEL Classification: F21, F43.

1. Introduction

During the past two decades, foreign direct investment (FDI) has become increasingly important, with increasing volumes of direct investment flowing between and into the developed countries recently. Figure 1 presents foreign direct investment flows into and out of the OECD for 1992-2005. The theoretical literature in economics identifies several channels through which FDI inflows are predicted to benefit the receiving economy. Yet, the empirical literature has lagged behind and has had more trouble identifying these advantages in practice. Most prominently, a large number of applied papers have looked at the FDI-growth nexus, but their findings have been far from conclusive.[1] Notwithstanding the absence of any robust conclusions, most countries continue to vigorously pursue policies aimed at encouraging more FDI inflows.[2]

In this paper, we use an endogenous growth framework to estimate the impact of FDI on growth using sectoral data for the OECD member countries. Using an augmented production function, we let FDI directly affect GDP growth and also indirectly through its interaction with labor. This approach creates heteroskedasticity, and so feasible generalized least squares (FGLS) is employed. The results show that FDI has a positive and statistically significant effect on economic growth operating both directly and indirectly through its interaction with labor. Interestingly, the effect is not equally distributed across economic sectors.

Our paper contributes insights on the FDI-growth nexus in several important ways. First, we employ a country-panel fixed effects regression-based approach that

[1] With the availability of better data, the last few years have seen an especially large number of empirical papers devoted to this question (e.g., Alfaro et al., 2004; Bengoa and Sanchez-Robles, 2003; Durham, 2004; Hsiao and Shen, 2003; and Li and Liu, 2005).

[2] For a critical look at the fiscal revenue and spending policies targeting FDI inflows, see Hanson (2001) and Mooij and Ederveen (2003).

enables us to disregard variables that measure the time-invariant institutional, legal and cultural environment in which FDI projects are implemented and which may have an important impact on growth. These time-invariant institutional details are very difficult to quantify precisely, and our approach allows us to overcome this potential omitted-variables bias.

Second, our paper is one of the very first to use data from different sectors to examine the sectoral differences in the impact of FDI on economic growth. This is potentially important since much of the recent theoretical and empirical micro-econometric literature concludes that FDI spillovers, if they exist, are found in intra-industry rather than in inter-industry settings.[3] This finding further justifies our attempt to ask whether the impact of FDI on growth might be different for different sectors and to begin to investigate whether particular sectoral characteristics are conducive to a positive impact of FDI.

Section 2 provides a brief survey on the state of current research on the growth effects of FDI. Section 3 presents our model and the data we use. Section 4 analyzes the empirical results, and Section 5 concludes.

2. The Literature

A number of hypotheses have been offered regarding the interaction of foreign investment and growth. Singer (1950) argued that FDI will "crowd out" domestic investment since foreign firms often have greater access, at better terms, to international capital markets and will use the cheaper credit to drive out otherwise productive firms.

[3] For a recent survey of the issue of inter- vs. intra-industry spillovers from FDI see Lipsey and Sjöholm (2005).

This makes the foreign firms superior to the domestic ones in financing large projects and in taking advantage of changes in comparative costs, consumers' tastes, and market conditions. Findlay (1978) models this channel explicitly using an augmented Solow model. Assuming that domestic technology is an increasing function of FDI, he finds that the growth effect of FDI is ambiguous; an increase in the technology level might be offset by an increase in the dependency on foreign capital.[4]

Romer (1990) looks at technology as a non-rival input and at foreign direct investment as a source of technological advance. In this case, the FDI effect is unequivocally positive. Balasubramanyam et al. (1996) on the other hand, suggests that the growth effects of FDI might be positive for export promoting (EP) countries but negative for import substituting (IS) ones; the reduction of foreign import goods in the domestic market reduces competition and efforts to improve efficiency among the domestic firms.

Reis (2001) uses an endogenous growth model to evaluate the growth effects of FDI when the investing firm's profits may be repatriated. She finds that, in equilibrium, foreign firms replace all domestic firms in the R&D sector. In this model, FDI only adds a positive effect to growth if the world interest rate is lower than the home interest rate.

These hypotheses guide, to a large extent, all the empirical research that is described in the following section. While even the theoretical literature sometimes finds certain conditions under which FDI can be potentially harmful, it largely views direct investment flows positively. The empirical work on this topic, however, is probably even further from reaching any consensus view. The early empirical work on the FDI-growth nexus modified the growth accounting method introduced by Solow (1957). This approach

[4] A related channel is the 'creative destruction' hypothesis raised by Aghion and Howitt (1992). If the competition from the foreign investors results in the destruction of inefficient firms, the FDI effect will turn out to be positive.

defined an augmented Solow model with technology, capital, labor, inward FDI, and a vector of ancillary variables such as import and export volumes. In light of the developed theory, most of the empirical research on the effects of FDI flows focused on their impact on output and productivity, with particular attention being paid to the interactions of FDI flows with human capital and the level of technology. The hypotheses being examined center on whether FDI impacts economic activity through its impact on human capital accumulation, and what are the various interactions between investment flows, adoptions of new technologies, and the impact of the technology gap between the source and host countries.

Influenced by Mankiw et al. (1992) pioneering research, most recent empirical models add education to the standard growth equation as a proxy for human capital. Blomström et al. (1994) and Coe et al. (1997) find that, for FDI to have positive impacts on growth, the host country must have attained a level of development that helps it reap the benefits of higher productivity. In contrast, De Mello (1997) finds that the correlation between FDI and domestic investment is negative in developed countries.

Li and Liu (2005) find that FDI not only affects growth directly but also indirectly through its interaction with human capital. In the same paper, Li and Liu (2005) also find a negative coefficient for FDI when it is interacted with the technology gap between the source and host economies. Using an equally large sample, Borensztein et al. (1998) find similar results – i.e., that inward FDI has positive effects on growth with the strongest impact through the interaction between FDI and human capital.

De Mello (1999) finds positive effects of FDI on economic growth in both developing and developed countries but concludes that the long-term growth in host

countries is determined by the spillovers of technology and knowledge from the investing countries to host countries. Using annual data for 46 developing countries, Balasubramanyam et al. (1996) find support for their hypothesis that the growth effect of FDI is positive for export promoting countries and potentially negative for import substituting ones.

Alfaro et al. (2004) and Durham (2004) focus on the ways in which the FDI effect depends on the strength of the domestic financial markets of the host country. Both find that only countries with well-developed banking and financial institutions gain from FDI. Additionally, Durham (2004) finds that only countries with strong institutional development and investor-friendly legal environment enjoy the positive effects of FDI on growth, while Hsiao and Shen (2003) add that a high levels of urbanization is also conducive to a positive effect of FDI on growth.

Blonigen and Wang (2005) argue that mixing wealthy and poor countries is inappropriate in empirical FDI studies. They note that the factors that affect FDI inflows are different across the income groups. Additionally, they find evidence of beneficial FDI only for the developing countries, and not for the developed ones; while the crowding out effect of FDI on domestic investment is only apparent, in their sample, for the richer countries.

In more recent work, Carkovic and Levine (2005) argue that the positive results described above are due to a biased estimation methodology. When employing a different estimation technique (Arellano-Bond GMM) they find no robust relationship between FDI inflows and domestic growth.

In the paper most similar to ours, Alfaro and Charlton (2007) examine the effect of FDI on growth using sectoral data from OECD member countries during 1990-2001 for nineteen sectors and 22 countries. They investigate the aggregate effect of FDI on growth using industry-level data, while we focus on the differential sectoral effect of FDI. In that sense, our paper is the next step beyond their work.[5] Two papers to which we contributed attempt to estimate the impact of FDI using sectoral data for specific case-studies in emerging markets. Vu et al. (2007) estimate the impact of FDI using sectoral data from Vietnam and China, while Khaliq and Noy (2007) do the same for Indonesian data.

3. Model and Data Issues

3.1. The Model

We use an augmented Cobb-Douglas production function:

$$Y_{ict} = AL_{ict}^{\alpha} K_{ict}^{\beta} F_{ict}^{\gamma} \prod_{j=1}^{n} C_{jct}^{\phi_j} e^{\sum_{k=1}^{m} \psi_k S_{ict}} e^{v_i + a_c + e_t + \varepsilon_{ict}}, \qquad (1)$$

where *Y, L, K,* and *F* are real value added, labor, domestic capital and foreign capital—in this case stocks of inward FDI— respectively; *C* is a vector of control variables in log forms, and *S* is a vector of country specific variables in levels. The subscripts *i, c,* and *t* denote sector, country and year, respectively. v_i is the sector-specific disturbance, a_c the country-specific disturbance, e_t the time-specific disturbance and ε_{ict} the idiosyncratic

[5] There are several further differences between our work and theirs. Alfaro et al. (2007)'s dataset is somewhat different than ours. They use the data on flows of inward FDI instead of stock of inward FDI. Additionally, their choices regarding the matching between the different sector-classification systems are different from ours.

disturbance. All of the coefficients are individually less than unity, but they do not have to sum to unity, as constant returns to scale are not assumed.

Taking the logarithms of both sides of equation (1) yields:

$$\ln Y_{it} = \ln A + \alpha \ln L_{ict} + \beta \ln K_{ict} + \gamma \ln F_{ict} + \sum_{j=1}^{n} \phi_j \ln C_{ict} + \sum_{k=1}^{m} \psi_k S_{ict} + \nu_i + a_c + e_t + \varepsilon_{ict} \quad (2)$$

Since FDI might affect growth through its interaction with labor, as discussed above, we write the labor coefficient as:

$$\alpha_{ict} = \alpha_1 + \alpha_2 F_{ict}\,, \quad (3)$$

Substitute equation (3) into equation (2) yields:

$$\ln Y_{ict} = \ln A + \alpha_1 \ln L_{ict} + \alpha_2 F_{ict} \ln L_{ict} + \beta_1 \ln K_{ict} + \gamma \ln F_{ict} + \sum_{j=1}^{n} \phi_j \ln C_{ict} + \sum_{k=1}^{m} \psi_k S_{ict} + \nu_i + + a_c + e_t + \varepsilon_{ict}. \quad (4)$$

Converting equation (4) into the empirical model we estimate:

$$VAL_{ict} = \beta_1 + \beta_2 LAB_{ict} + \beta_3 FDI_{ict} + \beta_4 FDILAB_{ict} + \beta_5 CAP_{ict} + \sum_{j=1}^{n} \beta_j CON_{ict} + \nu_i + a_c + e_t + \varepsilon_{ict} \quad (5)$$

where *VAL* is the log of value added; *LAB* is the log of labor, *FDI* the log of FDI, *FDILAB* the interaction term between FDI and the log of labor, *CAP* the log of capital, *CON* the (other) control variables in log forms.

3.2. The Data

Data on shares in total value added (henceforth called the share ratio), investment (gross fixed capital formation), and employment for 32 sectors of each country in the

OECD group are obtained from the OECD Structural Statistic Analysis (STAN), 2006 edition, for 1980-2003. All three variables are expressed as shares in total values of the economy. Data on the stocks of inward FDI for 22 sectors of each country are from the OECD International Direct Investment Statistical Yearbook (IDI), 2004, for 1980-2003. Only twelve sectors match neatly with the STAN data. The aggregate figure for the OECD member countries are provided in the appendix.[6]

The remaining sectors of the two data sets are too different from each other and so are eliminated from our regressions. Hence, the twelve sectors included in our estimations are agriculture and fishing, mining and quarrying, food products, petroleum-chemical-rubber-plastic products (henceforth oil and chemical), machinery-computers-RTV-communication (henceforth machinery), vehicles and other transport equipment (henceforth transport equipment), electricity-gas-water (henceforth utility), construction, trade and repairs, hotel and restaurants, financial intermediation, and real estate.

Data on research and development (R&D), imports, and exports from STAN only contains seven sectors matching the IDI data set and were not used in this paper. Instead, we use aggregate country annual data on the other macroeconomic control variables from the World Development Indicators, secondary school enrollments as a proxy for human capital from the United Nation Common Database, and country-specific political economy variables from the International Country Risk Guides.

After removing any country that has data on one of the twelve sectors missing entirely, we obtain data for six countries: Denmark, Germany, Netherlands, Spain, United

[6] The twelfth sector of Agriculture and Fishing is a large subset of the STAN data set on Agriculture, Hunting, Forestry, and Fishing. We decided to include this twelfth sector.

Kingdom, and The United States; for the years 1989-2003.[7] Figure 2 demonstrates that the general trends we observed for the total FDI flows into the OECD countries also hold for these six countries with their direct investment accounting for roughly 50 percent of the total. Figure 3 presents the detailed aggregate flow data for each of these six countries. Because of the relatively short time period, we calculate three-year averages for all variables.[8]

The STAN and the IDI data are both in current US dollars. We first multiply the share ratios by the aggregate data for each country to obtain values in levels. Next, we calculate accumulated investment as a proxy for capital. Data are then converted into constant 2000 US dollars using the implicit GDP deflators before taking the logs of the relevant variables. Data from the WDI are in constant 2000 US dollars except for data on total length of railways and roads in kilometers as proxies for infrastructures. Data on secondary school enrollments from the UN are divided by the population to serve as a proxy for human capital.

According to Carlin and Mayer (2003) two more variables might affect the growth of value added: one is the industry's initial output and the other is the industry's initial share of total value added in the country. However, these two variables are highly

[7] Data for Denmark on inward stock of FDI are missing entirely during the periods1980-1990, so we also perform estimations for the period 1992-2003 as a robust check. The data set for Germany from 1980 to 1990 are provided by West Germany only.

[8] Rather than the 5-year averages that are more common in much of the growth literature (see Barro and Sala-i-Martin, 2004). If one of the three observations is missing, we average the remaining two observations. If two of the three observations are missing, we take the only data point available as a representative of the three-year period. Since this might bias the results somewhat, we only perform estimations on the six countries that have less than 20% missing observations. Additionally, since most of the missing observations for these six countries belong to the 1989-1991 period, we also perform a robustness test using data for the 1992-2003 period.

correlated; hence we only add the initial log of value added to Equation (5) to control for the industry's mean reversion.

4. Results

4.1. Specification Tests

We carry out a downward piece-wise specification search in order to avoid omitted variable bias. We start with our list of available variables that is based on past research. The variables are then eliminated gradually, using multi-colinearity tests. The model is initially estimated without the interaction term. As a preliminary step, we use OLS with time dummies to control for autocorrelation and adjust for heteroskedasticity with a White correction. We do not include sector fixed-effects estimation to preserve information that might be lost once the time-invariant effects are included.

We first perform multicolinearity tests using the Variance Inflation Factors (VIF) approach (Kennedy, 2003): When an independent variable, X_i, is regressed on k other independent variables, the covariance matrix is: $Cov\hat{\beta}_i = \sigma_\varepsilon^2 (X_i' M_k X_i)^{-1}$. The inverse of this correlation matrix is used in detecting multicolinearity. The diagonal elements of this matrix (the variance inflation factors) are given by $VIF_i = (1 - R_{ik}^2)^{-1}$, where R_{ik}^2 is the R^2 from regressing X_i on the k other variables. When there is perfect multicolinearity, R^2 equals one, and VIF approaches infinity. Kennedy (2003) recommends elimination of any variable with VIF greater than ten. After several rounds of elimination, we have seven variables left for estimations: labor (LAB), FDI, capital (CAP), imports (IM), roads as a proxy for infrastructure (NFRA), inflation (INFL), and initial value added (IVAL).

We carry out the endogeneity t- test for each right-hand-side variable using both OLS and fixed effect estimations.[9] The results indicate three endogenous variables: FDI, the interaction term of FDI and labor (FDILAB), and capital (CAP). Hence two stage least squares (2SLS) estimations are called for. The first lagged values of FDI and investment (INV) are selected as instrument variables (IVs) for FDI, whereas the first lagged values of FDILAB and FDI are selected as IVs for FDILAB, and the first lagged values CAP and INV are selected as IVs for CAP. Performing fixed-effect estimation of each endogenous variable on the respective IVs, we find that they are individually and jointly significant, so the validity condition for the IVs is satisfied. The test results for over-identifying restrictions also show that at least one of the two IVs is not correlated with the residuals for each case.[10] Hence, the exogeneity condition is satisfied.

4.2. Growth Effects of FDI

We begin by examining aggregate effects of FDI. The results of the 2SLS are given in Table 1 and those of the fixed effect 2SLS (FE2SLS) with country, sectoral, and time dummies added are given in Table 2. Since we do observe different average growth rates for different countries, time periods and sectors the FE2SLS results are likely to be more reliable than those of the 2SLS.

Column 1.1 and 2.1 presents specifications without the primary variables of interest, but include only the other control variables: labor (LAB), capital (CAP), imports (IM), infrastructure (NFRA), inflation (INFL), and initial value added (IVAL). We add

[9] The endogeneity t-test is a form of the Hausmann (1978) specification test. A right-hand side variable is treated as the instrument in a first-stage regression, and the resulting error is introduced as a regressor in the second-stage regression. If the coefficient on this error term is significantly different from zero, this is taken as evidence of the existence of endogeneity.

[10] Please contact Tam Vu at tamv@hawaii.edu for the results of these tests.

the FDI measure in columns 1.2 and 2.2, FDILAB in columns 1.3 and 2.3, and both of them in columns 1.4 and 2.4.

As discussed in Greene (2003) and Wooldridge (2003), an adjusted R-squared in an IV estimation does not have a meaningful interpretation. Instead of an adjusted R-squared, the Stata package w use provides the root mean square error (RMSE) that we report in each of our tables.[11] Comparing Table 1 to Table 2, this fitness measure implies that the results from the FE2SLS fit better than those from the 2SLS estimations.

The signs of the coefficient estimates generally fit our priors except that the initial value added in 2SLS estimations has positive sign. Nonetheless, it has the correct negative sign in the FE2SLS. The FDI term enters with a positive and significant effect at the 1% level for both 2SLS and FE2SLS estimations; but its magnitude more than doubles in the FE2SLS specification (columns 1.2 and 2.2). A similar increase in the size of the coefficient can be observed in columns 1.3 and 2.3, in which we include the interaction term FDILAB, which shows FDI's indirect effect through interaction with labor. Including both the level of FDI and the interaction term (in columns 1.4 and 2.4) does not markedly change the coefficient of FDI. The results in column 2.4, our preferred specification, show that FDI appears to have a beneficial impact on aggregate growth both directly and indirectly through its interactions with labor.[12]

As a robustness check, we also perform regressions on the data set from 1992 to 2003 since the earlier period contains many more missing observations. Table 3 presents

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[11] Defined as $RMSE = \sqrt{\frac{1}{n}\sum_i (y_i - \hat{y}_i)^2}$.

[12] The control variable measuring imports loses its statistical significance in this full specification in column 2.4. This is mostly likely because fo the the correlation between imports and foreign direct investment inflows (the current and capital account).

FE2SLS results equivalent to table 2, for this sub-sample of the dataset. Results are very similar.

The impact we identified for aggregate FDI was statistically significant and positive. It is possible that the aggregate results mask important differences in the effect of FDI on economic performance across individual country and sectors – and this is the primary motivation for our work here. In table 4, we report the estimated results for regressions that include all of the previously discussed control variables and that also allow for sector -specific effects of FDI on growth by including sector-slope dummies. Since the results for the control variables are similar to the previous tables, only results for the twelve sectors are reported. The results from the 2SLS estimation are in column 4.1, whereas those from the FE2SLS are in columns 4.2 and 4.3. We choose the real estate as the base dummy and compare the other sectors to this base. From Column 4.2, the effect of FDI on growth is positive and significant at 1% level for the real estate sector. The effects for mining and quarrying, food products, transport equipments, and trade and repairs are not significantly different from that for the real estate. The FDI effects for the other sectors are much smaller than that for the real estate but all are still positive and significant.

Columns 4.3 present regression FE2SLS results which include only the FDILAB interaction terms without the direct effect. The results reveal that indirect effects of FDI on growth via interaction with labor also differ across sectors. The effect for real estate sector is positive and significant at 1% level. Only coefficient estimate for construction sector is not significantly different from that of the base sector. Coefficients for the remaining sectors are all smaller than that of the real estate. However, they all sum up

(together with the baseline sector) to be positive and significant except for the mining and quarrying sector, for which the effect is not statistically distinguishable from zero.

These results, however, are somewhat different when the direct effect is included as well as the interaction term (column 4.4). For the direct effect, the real estate sector shows a negative and significant effect, while all the other sectors are significantly different from it. But only for mining and quarrying is the total direct effect positive and significant. Financial intermediation is also negative and significant but is significantly less negative than real estate. All other coefficients are not significantly different from zero. For the indirect (interaction) channel, the coefficient for real estate is positive and significant. Except for the indirect coefficient for construction, which is positive and significant, all other coefficients are not significantly different from zeros. The results from this final specification are different from our previous conclusions; and suggest that potentially the positive results we have found in all other specification are not as robust as they initially appear.

5. Conclusion

Our results suggest that FDI has a significant and positive effect on economic growth both directly or through its interaction with labor. However, the effect is not equally distributed across countries and sectors, and its identification may depend on only a positive correlation between FDI and growth in only a few sectors. In some sectors, we find no evidence that FDI enhances economic growth.

The main obstacle we faced in this paper is data. A comprehensive aggregate sectoral data is sorely lacking, even for the OECD member countries. While it is

becoming apparent that the evidence for the beneficial role of FDI is strengthening, better data with wider coverage should make it feasible to examine many related questions. For example, the different impact of FDI across sectors, and the possible spillovers between sectors have not been thoroughly addressed here. Future work should be able to shed a more precise light on the possibility that FDI in certain sectors is more productive in generating value added in the same sector, or even better, in other sectors.

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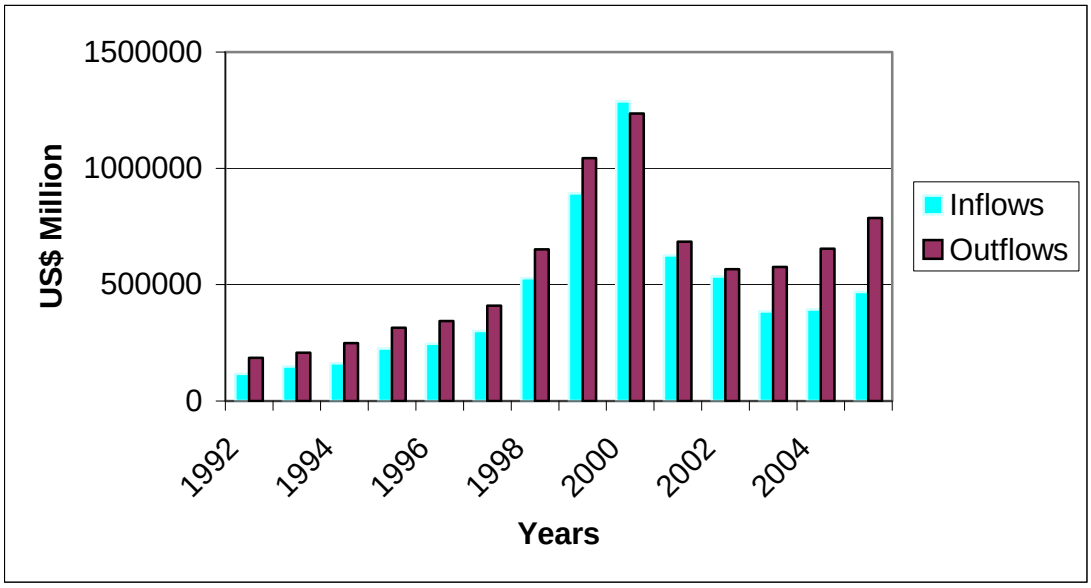
Appendix. Sectoral Distribution of the G6: Stock of Inward FDI

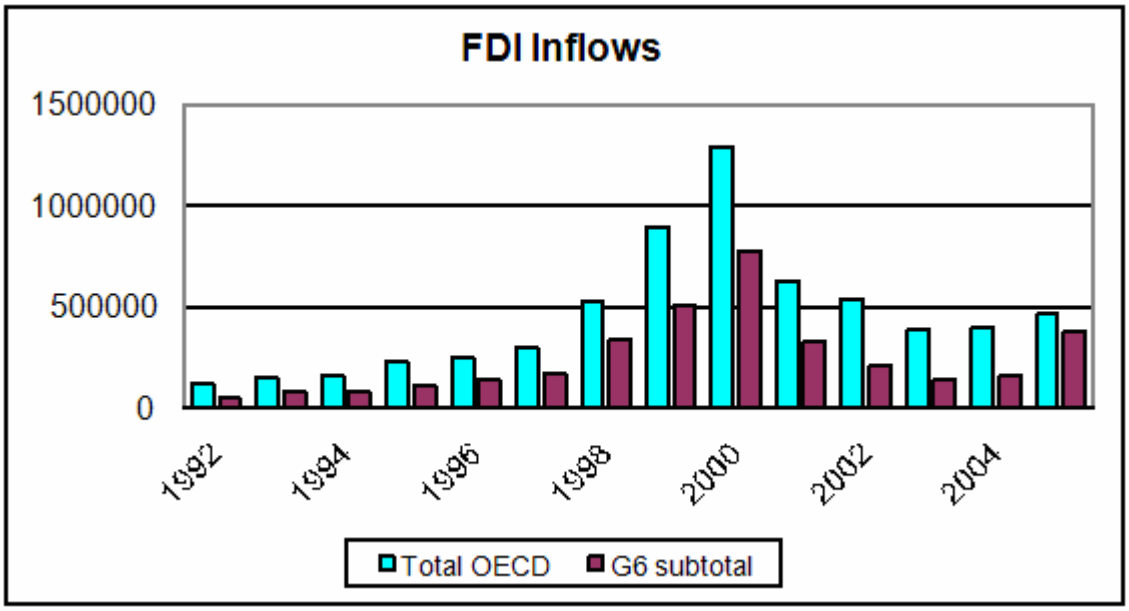
Sector	1989-1991	1992-1994	1995-1997	1998-2000	2001-2003
Financial intermediation	161.5	197.8	263.7	399.3	558.1
Mining and quarrying	74.1	67.0	3.9	57.7	83.8
Oil and chemicals	66.1	113.9	187.4	250.9	308.6
Food products	42.7	47.2	54.2	50.1	69.8
Trade and repairs	41.6	41.8	76.1	64.4	73.9
Real estate	36.8	42.8	53.5	67.8	82.5
Machinery	29.0	35.9	51.2	97.4	80.5
Transport equipment	14.3	17.8	27.4	72.8	86.8
Hotels and restaurants	13.1	16.1	19.8	24.8	34.1
Construction	6.3	5.0	7.1	10.7	18.1
Utilities	3.1	3.5	11.0	30.5	55.3
Agriculture and fisheries	2.7	2.9	3.2	3.9	4.1

Figure 1. FDI Flows: Total OECD



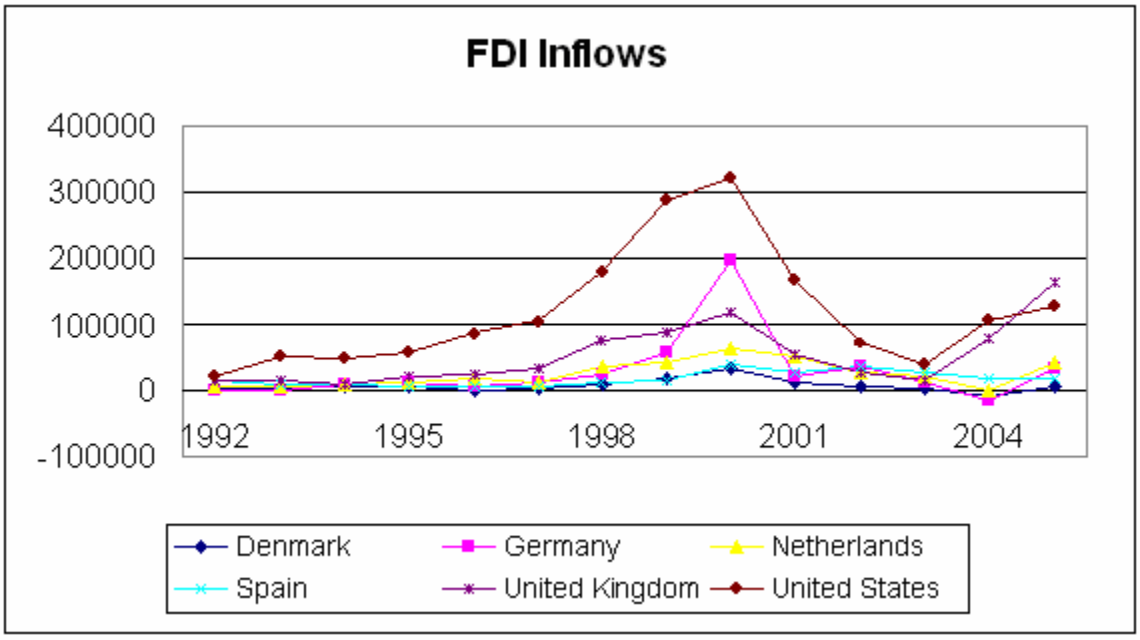
Source: OECD International Direct Investment Statistics Yearbook, 2004, update from the OECD website, www.oecd.org/investment.

Figure 2. FDI Flows: The G6 versus Total OECD



Source: OECD International Direct Investment Statistics Yearbook, 2004, update from the OECD website, www.oecd.org/investment.

Figure 3. FDI Flows: Individual Countries



Source: OECD International Direct Investment Statistics Yearbook, 2004, update from the OECD website, www.oecd.org/investment.

Table 1. Aggregate Effects of FDI on Growth: 2SLS Results
Dependent Variable: Log of value added (VAL)

	1.1	1.2	1.3	1.4
FDI		.0600***		.0494**
		(.0196)		(.0222)
FDILAB			1.84e-07***	8.52e-08
			(4.82e-08)	(5.52e-08)
LAB	.5089***	.5543***	.5704***	.5506***
	(.0332)	(.328)	(.0306)	(.0328)
CAP	.2821***	.2746**	.2828***	.2716***
	(.0212)	(.0328)	(.0207)	(.0225)
IM	.8699***	.8677**	.8682***	.8681***
	(.0069)	(.0644)	(.0676)	(.0647)
NFRA	6.38e-08**	3.29e-08*	3.74e-08*	3.08e-08*
	(1.99e-08)	(1.84e-08)	(1.94e-08)	(1.68e-08)
INFL	.0057	.0021	.0008	.0017
	(.0056)	(.0057)	(.0059)	(.0057)
IVAL	2.36e-16	2.34e-16	2.99e-16	2.51e-16
	(1.91e-16)	(1.91e-16)	(1.98e-16)	(1.95e-16)
Observations	276	274	276	274
Prob > F	.0000	.0000	.0000	.0000
Root MSE	.5011	.5007	.5013	.5018

Notes: Standard errors are in parentheses. Significance levels are * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 2. Aggregate Effects of FDI: Fixed Effect 2SLS Results
Dependent Variable: Log of value added (VAL)

	2.1	2.2	2.3	2.4
FDI		.1281***		.1024***
		(.0363)		(.0353)
FDILAB			3.57e-08*	4.16e-08*
			(1.99e-08)	(3.34e-08)
LAB	.3673***	.3560***	.3649***	.3807***
	(.0702)	(.0729)	(.0704)	(.0644)
CAP	.3581***	.2832***	.2934***	.2037***
	(.0570)	(.0611)	(.0580)	(.0479)
IM	.4880***	.4158**	.4766***	.1967
	(.1771)	(.1875)	(.1804)	(.1799)
NFRA	2.92e-08	3.08e-08	2.60e-08	2.84e-09
	(2.71e-08)	(2.51e-08)	(2.78e-08)	(.2.24e-09)
INFL	.0072	.0048	.0771	.0019
	(.0066)	(.0072)	(.0067)	(.0074)
IVAL	- 8.70e-17	-9.32e-17	-7.7e-17	-1.36e-16
	(1.69e-16)	(1.74e-16)	(1.72e-16)	(1.74e-16)
Observations	276	274	276	274
Prob > F	.0000	.0000	.0000	.0000
Root MSE	.3158	.3177	.3162	.3232

Notes: Standard errors are in parentheses. Significance levels are * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 3. Aggregate Effects of FDI: Fixed Effect 2SLS Results for 1989-2003

Dependent Variable: Log of value added (VAL)

	3.1	3.2	3.3	3.4
FDI		.1036**		.0934**
		(.0471)		(.0472)
FDILAB			3.26e-08*	3.81e-08*
			(1.94e-08)	(2.24e-08)
LAB	.3672***	.3475***	.3656***	.3457***
	(.0815)	(.0841)	(.0698)	(.0828)
CAP	.3583***	.3151***	.3039***	.3195***
	(.0681)	(.0757)	(.0817)	(.0772)
IM	.4434**	.3843*	.4342**	.3738*
	(.2025)	(.2142)	(.2061)	(.2177)
NFRA	2.99e-08	2.73e-08	2.74e-08	2.44e-09
	(2.87e-08)	(2.66e-08)	(2.73e-08)	(.2.68e-09)
INFL	.0045	.0037	.0045	.0038
	(.0082)	(.0087)	(.0082)	(.0087)
IVAL	- 1.18e-16	-1.17e-16	-1.10e-16	-1.09e-16
	(1.95e-16)	(1.99e-16)	(1.98e-16)	(2.01e-16)
Observations	216	214	216	214
Prob > F	.0000	.0000	.0000	.0000
Root MSE	.3272	.3250	.3232	.3258

Notes: Standard errors are in parentheses. Significance levels are * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 4. Sectoral Effects of FDI

Dependent Variable: Log of value added (VAL)

Variable	4.1 $FDIxS_i$	4.2 $FDIxS_i + S_i + T_i + C_i$	4.3 $FDIxLABxS_i + S_i + T_i + C_i$	4.4 $FDIxS_i + FDIxLABxS_i + S_i + T_i + C_i$	
				$FDIxS_i$	$FDIxLABxS_i$
Real Estate	.1445***	.3965***	6.81e-06***	-1.830***	.00002***
	(.0405)	(.1298)	(1.34e-06)	(.5012)	(4.36e-06)
Agriculture	-.1239***	-.3187***	-.00001*	1.915***	-8.63e-06
and	(.0287)	(.1227)	(6.19e-06)	(.4999)	(.00002)
Fishery					
Mining and	-.1176***	-.2541	-6.75e-06***	1.965***	-.00002***
Quarrying	(.0269)	(.1630)	(1.55e-06)	(.4913)	(4.38e-06)
Food	-.0929***	-.1748	-4.05e-6***	1.581***	-.000015***
Products	(.0249)	(.1172)	(1.15e-06)	(.4396)	(3.71e-06)
Oil and	-.0883***	-.2668**	-6.48e-06***	1.616***	-.000019***
Chemical	(.0235)	(.1277)	(1.31`e-06)	(.4591)	(4.26e-06)
Machinery	-.0734***	-.3038**	-6.29e-06***	1.742***	-.000018***
	(.0237)	(.1298)	(1.32e-06)	(.4772)	(4.20e-06)
Transport	-.1157***	-.2089	-5.57e-06***	1.748***	-.000018***
Equipments	(.0259)	(.1388)	(1.28e-06)	(.4723)	(4.12e-06)
Electricity	-.0962***	-.3363***	-5.50e-06***	1.709***	-.000017***
Gas and	(.0208)	(.1303)	(1.38e-06)	(.4767)	(4.02e-06)
Water					
Construction	-.0060	-.2424*	6.61e-06	1.768***	-9.37e-06
	(.0266)	(.1347)	(2.10e-05)	(.4561)	(5.93e-06)
Trade and	-.0328	-.1487	-6.45e-06***	1.733***	-.000019***
Repairs	(.0218)	(.1243)	(1.37e-06)	(.4568)	(4.26e-06)
Hotels and	-.0815***	-.3222**	-5.51e-06***	1.767***	-.000017***
Restaurants	(.0303)	(.1479)	(1.33e-06)	(.4805)	(4.04e-06)
Financial	-.0576**	-.2819*	-6.65e-06***	1.302***	-.000019***
Intermediation	(.0234)	(.1476)	(1.38e-06)	(.4394)	(4.28e-06)
Observations	274	274	274	274	
Prob > F	.0000	.0000	.0000	.0000	
Root MSE	.4622	.3311	.3504	.3934	

Notes: C, S and T are country, sector, and time dummies, respectively. The coefficient reported for real estate is the slope coefficient on FDI or FDIxLAB (real estate is the omitted sectoral dummy). Standard errors are in parentheses. Significance levels are *10 percent level, **5 percent level, ***1 percent level.