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Does Foreign Direct Investment Transfer Technology Across Borders? A Reexamination

Jürgen Bitzer and Monika Kerekes

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Jürgen Bitzer* and Monika Kerekes†

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Abstract

Reexamining foreign direct investment (FDI) as a potential channel for knowledge diffusion – based on industry data from seventeen OECD countries during the period 1973-2000 – we find that FDI-receiving countries benefit strongly from FDI-related knowledge spillovers. We do not find evidence for positive FDI-related technology sourcing effects. Instead, our results suggest that outward FDI might have negative effects on the output of the FDI-sending country.

Keywords: foreign direct investment, knowledge spillovers
JEL classification: F21, O33, O47, E23

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*Free University Berlin, Corresponding author: Department of Economics, Garystr. 55, D-14195 Berlin, Germany, Tel.: +49-30-838 53594, Fax.: +49-30-838 52072, e-mail: jbitzer@wiwiss.fu-berlin.de. We are grateful to Ingo Geishecker, Holger Görg, and Philipp J. H. Schröder for valuable comments. The usual disclaimer applies.

†Free University Berlin

1 Introduction

The analysis of potential channels for international knowledge diffusion has a long history. In the nineties, an increasing number of empirical studies have attempted to determine the impact of foreign knowledge on output or productivity. While the studies of Mohnen (1992), Keller (1998), Braconier and Sjöholm (1998), and Edmond (2001) try to identify the impact of foreign knowledge without determining the channel through which the spillover takes place, the majority of these studies (e.g. Coe and Helpman 1995, Verspagen 1997, Keller 1999, Kao, Chiang, and Chen 1999, Frantzen 1998) analyse whether and to what extent trade is a source for knowledge spillovers. In contrast to trade, FDI as a potential channel for knowledge diffusion has received very little attention, and research has remained limited to country studies (e.g. Blomström 1986, Globerman 1974, Kokko 1994) and micro-econometric studies (e.g. Aitken and Harrison 1999, Blomström and Sjöholm 1999, Javorcik 2004, Görg and Strobl 2003).[1] To the best of our knowledge, the only panel country study analysing the role of FDI in international knowledge diffusion is that of van Pottelsberghe de la Potterie and Lichtenberg (2001) hereafter referred to PL2001. Their most striking result is that inward FDI does not have an impact on the productivity of the host country. On the other hand, they are able to show that FDI into R&D-intensive countries is a significant source of technology spillovers. Thus, based on their data they conclude that FDI transfers knowledge in only one direction.[2]

[1] For reviews of the literature, see Görg and Greenaway 2004, Keller 2004.

[2] While these results might be surprising, they are in line with recent micro-econometric findings (Görg and Greenaway 2004).

This is the starting point for our paper. Using a newly compiled data set on ten manufacturing sectors in seventeen OECD countries during the period 1973-2000, we reexamine the hypothesis that FDI transfers knowledge in only one direction.

Furthermore, we expand the approach of PL2001 in two directions. The first takes up their proposal to construct FDI capital stocks. Given that FDI flows are highly volatile and that the effects of FDI-related spillovers might occur only in the medium or long term,[3] PL2001 were restricted by data limitations to using a four-year moving average of FDI flows for the construction of their FDI-weighted variables. Due to the availability of new data, we have been able to overcome these data limitations and construct the preferable FDI capital stocks suggested by PL2001, which we then use in the construction of our FDI-weighted variables.

The second direction in which we expand the approach of PL2001 is to relax their strict focus on direct FDI-related spillovers by accounting for third-country effects and thus capturing indirect FDI-related spillovers as well. Therefore, we construct the FDI-weighted R&D capital stock variable by weighting the total foreign R&D capital stock with the share of the FDI capital stock on the physical capital stock. This ensures that knowledge flows between FDI-sending countries are taken into account, capturing, for example, knowledge flows from country C into country B and then via country B's FDI into country A.[4]

Reexamining the hypothesis that FDI transfers knowledge only in one direction, we find – based on our data and the described expansions – that inward FDI has a positive, and outward FDI a negative influence on output. The results are

[3] See PL2001, p. 492.

[4] A similar point is made by Lumenga-Neso, Olarreaga, and Schiff (2001) regarding trade.

statistically highly significant and very robust to changes in the model specification.

The paper is organized as follows. In Section 2 the empirical implementation and the estimation technique are presented. Section 3 reports and discusses the results. Section 4 concludes.

2 Empirical implementation and estimation technique

In order to reexamine the question of whether FDI transfers technology across borders, we use industry data on seventeen OECD countries in the time period 1973-2000.[5] We apply the following standard Cobb-Douglas production function approach:

$$\begin{aligned} \ln Q_{cit} = \alpha_i D^i + \alpha_c D^c + \beta_1 \ln S^d_{ct} + \beta_2 \ln S^F_{ct} \\ + \beta_3 \ln K_{cit} + \beta_4 \ln L_{cit} + \beta_5 \ln M_{cit} + \alpha_t D^t + \nu_{cit}, \end{aligned} \tag{1}$$

where Q is output, S^d is the domestic R&D capital stock, S^F is the external foreign R&D capital stock, L is labor, K is physical capital[6], M is material / intermediate inputs and D^i, D^c and D^t are full sets of sector, country, and time dummies respectively. Subscripts i, c, and t denote sectors, countries, and years respectively.

Taking into account that the estimations are carried out on an industry level, the total domestic R&D capital stock S^D consists of the internal R&D capital stock of a

[5] A detailed description of the data is given in the appendix.

[6] The physical capital stock is constructed using the perpetual inventory method with a depreciation rate of ten percent.

sector and the R&D capital stocks of the other domestic sectors. Thus, the variable represents the effects of a sector's own R&D capital stock as well as spillovers from the R&D capital stocks of other domestic sectors. The variable is constructed using the perpetual inventory method with an assumed depreciation rate of ten percent.[7]

$$S^d_{ct} = \sum_{i=1}^{10} R_{cit} + (1-\delta) S^d_{c,t-1}, \tag{2}$$

where R_{cit} is the expenditure on R&D of sector i in country c at time t. The R&D capital stocks at time $t = 0$ were constructed using the standard procedure as described in Goto and Suzuki (1989) or Hall and Mairesse (1995).

In constructing the three different foreign R&D capital stocks, we depart in several ways from the procedure proposed by PL2001 in order to capture third-country effects.

For the inward-FDI-related spillovers, PL2001 construct the foreign R&D capital stock embodied in FDI by summing up the weighted R&D capital stocks of FDI sending countries. As a weight, they use the share of FDI[8] flow in the gross fixed capital formation of the FDI sending country. Thus, the weight captures the bilateral investment flow of two countries in comparison to the domestic investments in the FDI-sending country. What remains unconsidered in PL2001 is the case in which country C has no FDI in country A but its knowledge is nevertheless transferred to country A via another country's FDI. Consider the following real world example. Opel, a former German car manufacturer and today a subsidiary of GM, has its European headquarters in Switzerland, where no R&D is carried out. The major

[7] An alternative approach for the construction of R&D capital stocks is pointed out by Bitzer (2005).

[8] More precisely a four-year moving average flow of FDI.

part of Opel's R&D is carried out in Germany. If Opel invests in Eastern Europe the FDI would be accounted as coming from Switzerland. However, no R&D is carried out at the headquarters. Indeed, any positive knowledge spillover via the FDI would be due to the R&D carried out by Opel in Germany. This indirect impact would not show up in the specification applied in PL2001, who focussed their analysis on direct effects only. As multinationals might transfer their knowledge and their financial means from different countries, the only possibility to tackle this problem is to measure foreign investors' activities in the receiving country and weighting this with the world-wide R&D capital stock. This is how the foreign FDI-weighted R&D capital stock variable of the present paper is constructed. We furthermore depart from PL2001 by using FDI capital stocks rather than flows to construct the weights.[9] We allow for inter- and intra-sectoral spillovers from FDI by weighting the foreign R&D capital stock with the ratio between the inward FDI capital stock to the physical capital stock of the country in question. The FDI capital stock in country c is constructed by applying the perpetual inventory method with a ten percent depreciation rate to the FDI flows into country c. The inward-FDI-weighted foreign R&D capital stock is therefore computed with the following formula:

$$S_{ct}^{ff} = \frac{f_{ct}^{in}}{k_{ct}} \sum_{l \neq c} S_{lt}^{D}, \tag{3}$$

where f_{ct}^{in} denotes total FDI capital stock of the world in country c at time t. k_{ct} is the total physical capital stock of country c at time t.

The same arguments as in the case of the inward-FDI-weighted R&D capital stock are valid for the construction of an outward-FDI-weighted R&D capital stock.

[9] See footnote 3.

Again the procedure used by PL2001 is extended to account for third-country effects. To take into consideration that the country providing FDI could benefit from the R&D capital stock of country C via its FDI in country A, the outward-FDI-weighted R&D capital stock variable has to be constructed in a way different from that of PL2001. Thus, we measure the foreign investment activity of a country by the share of its outward FDI capital stock in the rest of the world in relation to the domestic physical capital stock. This relation is used to weight the foreign R&D capital stock. Correspondingly, the outward-FDI-weighted R&D capital stock is constructed as follows:

$$S_{ct}^{ft} = \frac{f_{ct}^{out}}{k_{ct}} \sum_{l \neq c} S_{lt}^{D}, \tag{4}$$

where this time f_{ct}^{out} is the total outward FDI capital stock of country c in the rest of the world at time t and k_{ct} is again the total physical capital stock of country c at time t.

In order to account for technology transfers between countries by means of imports, we proceed similarily to the FDI-weighted variables amd weight the foreign R&D capital stock with the import-output relation of the importing country. The import-weighted R&D capital stock S^{fm} is constructed using the following formula:

$$S_{ct}^{fm} = \frac{m_{ct}}{Q_{ct}} \sum_{l \neq c} S_{lt}^{D}, \tag{5}$$

where m_{ct} denotes the sum of all imports into the manufacturing sector of country c in t and Q_{ct} denotes the gross domestic product of county c's manufacturing sector in t.

The empirical assessment is based on the logarithmic form of the Cobb-Douglas production function developed above (see Equation 1). The estimations have been carried out as FGLS, with a correction for panel-specific autocorrelation of the form AR(1), panel heteroscedasticity and a full set of sector, country, and time dummies.

Unit root tests rejected the hypothesis of a unit root for all time series used, thus showing that the time series are trend-stationary.[10]

The estimations have been carried out with fixed effects. The specification was furthermore supported by Hausman tests (not reported), which showed that the fixed sector, country, and time effects appear to be correlated with the explanatory variables. The estimations have therefore been carried out with a full set of sector, country, and time dummies. The latter set not only control for economy-wide exogenous shocks, but also guarantee that the time series are detrended.[11]

Furthermore, Lagrange multiplier (LM) tests (see Godfrey, 1988) based on residuals from eq. (1) reveal that ν_{cit} follows a panel-specific autoregressive process of order 1, i.e. $\nu_{cit} = \rho_1 \nu_{ci,t-1} + \varepsilon_{cit}$, with $\varepsilon_{cit} \sim N(0, \sigma^2)$. The Pagan-Hall statistic indicates heteroscedasticity in the estimated errors. Accordingly, the estimations have been carried out as FGLS with AR(1) and heteroscedasticity-corrected standard errors.

Finally, we have tested for the endogeneity of factor input. This issue arises in particular in firm or plant level productivity studies because firms might partly base their decision concerning the factor input combination on the observed total factor

[10] The details of the unit root test performed as well as the test results are described in the Appendix.

[11] Using a time trend for detrending does not alter the results. However, to also control for economy-wide exogenous macroeconomic shocks, we use time dummies instead of a time trend.

productivity. In this case, the error term and the contemporaneous levels of factor inputs would be correlated, leading to biased estimates of the coefficients. However, following Zellner et al. (1966) we argue that due to the aggregation of individual data the industry level output can be considered stochastic. For stochastic outputs Zellner et al. (1966) show that OLS regressions of Cobb-Douglas production functions yield consistent estimates of the output elasticities. The null hypothesis that inputs are exogenous is not rejected when tested by the test statistic outlined in Baum, Schaffer and Stillman (2003).[12] Thus, our line of argumentation is corroborated.

3 Results

Following the procedure of PL2001, we estimate Equation (1) using different specifications regarding the channel through which foreign knowledge can diffuse into the economy (see Table 1). In Variant A, the transmission channel is assumed to be imports. In Variant B, inward FDI is added as another transmission possibility. Finally, in Variant C, we allow for foreign knowledge to diffuse through imports, inward FDI, and outward FDI.

The elasticities of the domestic R&D capital stock (S^d), physical capital (K), labour (L), and material / intermediate inputs (M) with respect to output have the expected signs and are highly significant in all specifications. Unlike PL2001 we find in all model specifications that inward FDI, too, generates statistically significant positive knowledge spillovers. The elasticity amounts to 0.0114 and is significant at the 1%-level in the fully specified model (Variant C). However, these different results

[12]The results are reported in the appendix.

can be explained by the two deviations from PL2001's procedure introduced in our paper: first, the broader concept of FDI-related spillovers, and second, the use of FDI and physical capital stocks instead of flows as weights. Both derivations tend to pick up more of the existing FDI-related spillovers. While the first one accounts for third-country effects, the second picks up FDI-related spillovers materializing in the long run.

Table 1 about here

The additional inclusion of outward FDI generates yet another deviation from PL2001, showing that outward FDI does not generate positive spillovers. A one percent increase in outward-FDI-weighted R&D capital stock even decreases the output of the FDI-sending country by 0.83 percent. This result, too, is statistically significant at the 1%-level. Thus, although we include third-country effects and account for long-run effects of outward FDI, we do not find significant evidence of technology sourcing. There are two possible explanations for the results. First, the negative output elasticity could be caused by increased outsourcing from the FDI-sending country, resulting in a drop in domestic production. Second, increased competition on the markets where the FDI is being received could lead to negative repercussions on the FDI-sending sectors. Thus, for example, in the case of a strongly integrated international production network, a competition-induced drop in production in the FDI could lead to decreasing production in the FDI-sending sector itself. Another possibility is that reduced profits from the FDI might lead to reduced investments in the FDI-sending sectors. Unfortunately, with the data at hand, we are not able to investigate these different explanations.

In a second step, we estimate equation (1) in first differences in order to assure that the elasticities remain in a similar order of magnitude on a growth-rate level (see Table 2). As with the level estimations, the regression equation is stepwise augmented by the different transmission channels.

Table 2 about here

The results given in Variants D, E and F confirm our level estimates. As before, we find positive and statistically highly significant knowledge spillovers stemming from domestic R&D capital stock, import-embodied foreign R&D capital stock and inward-FDI-embodied foreign R&D capital stock. The effect of outward FDI on the growth rate of the sending economy remains negative and significant at the 10 percent level.

Finally, as proposed by PL2001, we control for the possibility that G7 countries face different output elasticities than other countries (see Table 3).[13] To that end all transmission mechanisms are interacted with a dummy variable, which takes on the value of one if the country belongs to the G7 countries. Again, the regression is stepwise augmented.

[13]PL2001 argued that a G7 dummy would control for different effects of FDI in large industrialised countries.

Table 3 about here

In Variant G, knowledge is assumed to be transferred only via imports. The domestic R&D capital stock still enters positively and is statistically highly significant. However, non-G7 countries benefit far more from the domestic R&D capital stock than G7 countries. This result holds through all of the variants. One possible interpretation of this result is the existence of decreasing returns to scale of knowledge. For G7 as well as non-G7 countries import weighted foreign knowledge has a statistically significant positive impact on production, albeit it is more pronounced for G7 countries. However, once we control for spillovers via inward-FDI (Variant H) the picture changes. Knowledge transfer via imports no longer plays a role for non-G7 countries. Instead, knowledge transfer primarily takes place via inward FDI projects. This result does not change even if all transfer channels are included. With regard to outward-FDI-weighted R&D capital, non-G7 countries face a highly significant negative output elasticity. G7 countries, on the other hand, do not suffer from a negative impact of the outward-FDI-weighted R&D capital[14] but also do not benefit from technology sourcing.

[14]A Wald test shows that the sum of the coefficients for non-G7 and G7-countries are not significant different from zero.

4 Conclusions

In this paper, we reexamined the question of whether FDI transfers technology across borders. Using a newly compiled data set on ten manufacturing sectors in seventeen OECD countries during the period 1973-2000, we are able to account for third-country effects and the long-term nature of FDI in transferring knowledge. In addition to using a new data set, we expand upon the existing research by van Pottelsberghe de la Potterie and Lichtenberg (2001) in two directions. First – as proposed by PL2001 – we use FDI capital *stocks* – instead of the normally used FDI flows – as weights for constructing the FDI-weighted R&D capital stock variables, thus taking mid- and long-term effects of foreign knowledge into account. Second, we relax the strict focus of PL2001 on direct FDI-related spillovers by taking indirect FDI-related spillovers into consideration, i.e. capturing third-country effects. To do so, we weight the total foreign R&D capital stock by the share of the FDI capital stock on the domestic physical capital stock. Omitting bilateral weights ensures that indirect knowledge transfers are captured.

Applying a standard Cobb-Douglas production function approach, we find positive and statistically highly significant knowledge spillovers stemming from inward FDI. Furthermore, in contrast to former studies, we do not find positive international knowledge spillovers transferred via outward FDI. On the contrary, we find that outward FDI has a statistically significant negative impact on the production of countries investing abroad. The results are very robust to changes in the model specification.

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Appendix

Data description

The estimations have been carried out on the basis of data on ten manufacturing industries in the 17 countries Canada, Czech Republic, West Germany, Germany, Denmark, Finland, France, Italy, Japan, Korea, Netherlands, Norway, Polen, Spain, Sweden, the United Kingdom, and the USA. The data were taken from the OECD databases ANBERD and STAN and the IMF database IFS.

The time series are available for the years 1973 to 2001 in ISIC Rev. 3 classification. Due to data constraints, the length of the available time series differ across countries. The panel is therefore unbalanced.

The data was deflated to constant 1995 prices using the OECD value-added deflator for the manufacturing sector and was then converted into USD using 1995 exchange rates. To this end, euro data was converted back into national currencies. From this data, output Q is measured as gross production. All stocks, i. e. the physical capital stock, the R&D capital stock, and the FDI stocks, are calculated using the perpetual inventory method, where a depreciation rate of ten percent is assumed. The FDI stocks are weighted according to the fomulas given in the main text. Labor L is measured as the number of employees, and material/intermediate inputs M are calculated as the difference between gross output and value added.

Unit root test

The panel is unbalanced since data are missing for a few sectors in some years. Thus, the Fisher method, which was proposed by Maddala and Wu (1999), appears suitable. Another benefit of it is its flexibility regarding the specification of individual effects, individual time trends, and individual lengths of time lags in the ADF regressions (Baltagi, 2001, p. 240). The P_λ-statistic is distributed chi-square with $2 \cdot N$ degrees of freedom, where N is the number of panel groups. As Table A1 shows, the tests do not indicate evidence of unit roots, either in the output series $\ln Q_{it}$ or in the factor input series $\ln K_{it}$, $\ln L_{it}$, $\ln M_{it}$, or $\ln W_{it}$.[15]

Table A1: Results for the Fisher-type Unit Root Test for Panel Data

Variable	P_λ-statistic	p-value
$\ln Q$	592.4	0.0000
$\ln K$	443.6	0.0000
$\ln L$	385.8	0.0068
$\ln M$	496.3	0.0000
$\ln W$	659.1	0.0000

Exogeneity tests

With exception of labour and intermediate/material inputs all other production factors are stock variables. The latter have been constructed by using the perpetual inventory method with a constant depreciation rate of ten percent. This implies that depreciation of investments takes longer than 20 years and thus investments remain in the stock variable for that time. Thus, endogeneity is unlikely to be an issue for the used stock variables.

Therefore, the only suspicious variables are labour and intermediate/material

[15]Note that since S_{it}^D and S_{it}^F are constructed as linear combinations from $W_{it}^{''}$, this also automatically leads to a rejection of the unit roots hypotheses for $\ln S_{it}^D$ and $\ln S_{it}^F$.

inputs. To test for exogeneity of these two variables we apply a General Method of Moments (GMM) regression using lagged values of labour and intermediate/material inputs as instruments. We prefer the use of GMM over instrumental variable (IV) estimation because the latter is not consistent in the presence of heteroskedasticity. As pointed out in the main text the latter is an issue in our data. The results of the exogeneity tests are reported in Table A2. In all cases the hypothesis of exogeneity of the suspicious regressors cannot be rejected. Note that the tests for endogeneity in the level regressions Variants A, B and C, are valid for the estimations in first differences as well.

Table A2: Exogeneity tests for *ln L* und *ln M*

Test statistic	Variant A	Variant B	Variant C	Variant G	Variant H	Variant I
			Test of predictive power of instruments			
Instruments *ln L*						
F-Test	64.58	49.21	64.03	66.25	58.87	31.51
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Instruments *ln M*						
F-Test	63.79	49.95	63.13	66.11	58.14	30.59
P-value	0.000	0.0000	0.0000	0.0000	0.0000	0.0000
			Test of orthogonality of instruments			
Hansen J-Statistic	4.594	3.521	3.638	4.406	2.469	2.559
P-value	0.3316	0.4748	0.4572	0.3538	0.6502	0.6341
			Test of orthogonality of unrestriced model			
Hansen J-Statistic	1.430	1.070	1.300	1.182	0.527	0.619
P-value	0.4893	0.5856	0.5220	0.5539	0.7683	0.7338
			Test for exogeneity			
C-statistic	3.164	2.450	2.338	3.225	1.942	1.940
P-value	0.2055	0.2937	0.3110	0.1994	0.3788	0.3791
Exogeneity rejected	no	no	no	no	no	no

Table 1: FGLS Estimation Results for Levels

Indep. var.	Variant A	Variant B	Variant C
	dependent variable is $\ln Q$		
$\ln S^d$	0.0431***	0.0335***	0.0419***
	(0.0053)	(0.0054)	(0.0056)
$\ln S^{fm}$	0.0198***	0.0159***	0.0112**
	(.0049)	(0.0049)	(0.0050)
$\ln S^{ff}$		0.0107***	0.0114***
		(0.0013)	(0.0013)
$\ln S^{ft}$			-0.0083***
			(0.0022)
$\ln K$	0.0308***	0.0308***	0.0292***
	(0.0032)	(0.0031)	(0.0031)
$\ln L$	0.1670***	0.1710***	0.1715***
	(0.0047)	(0.0044)	(0.0046)
$\ln M$	0.7918***	0.7892***	0.7901***
	(0.0038)	(0.0038)	(0.0038)
Wald χ^2 (df)	9.89e+07 (59)	1.16e+08 (60)	1.18e+08 (61)
p-value Wald χ^2	0.0000	0.0000	0.0000
Obs.	3220	3220	3220

Remarks: The dependant variable is log output. Country-, industry- and time-specific effects are included and groupwise significant at the one-percent level. Consistent standard errors are in parentheses. ***, **, * indicate a significance at the 1%, 5% and 10% levels, respectively.

Table 2: FGLS Estimation Results in First-Differences

Indep. var.	Variant D	Variant E	Variant F
	dependent variable is $\triangle \ln Q$		
$\triangle \ln S^d$	0.0257***	0.0227***	0.0254***
	(0.0073)	(0.0072)	(0.0072)
$\triangle \ln S^{fm}$	0.0233***	0.0210***	0.0205***
	(0.0049)	(0.0049)	(0.0048)
$\triangle \ln S^{ff}$		0.0058***	0.0059***
		(0.0014)	(0.0014)
$\triangle \ln S^{ft}$			-0.0044*
			(0.0023)
$\triangle \ln K$	0.0127***	0.0130***	0.0102***
	(0.0036)	(0.0035)	(0.0031)
$\triangle \ln L$	0.1570***	0.1579***	0.1607***
	(0.0049)	(0.0049)	(0.0047)
$\triangle \ln M$	0.7972***	0.7964***	0.7963***
	(0.0040)	(0.0040)	(0.0039)
Wald χ^2 (df)	334240.90 (33)	319679.11 (34)	1489256 (35)
p-value Wald χ^2	0.0000	0.0000	0.0000
Obs.	3050	3050	3050

Remarks: The dependant variable is $\triangle$ log output. Time-specific effects are included and groupwise significant at the one-percent level. Consistent standard errors are in parentheses. ***, **, * indicate a significance at the 1%, 5% and 10% levels, respectively.

Table 3: FGLS Estimation Results Distinguishing G7-countries

Indep. var.	**Variant G**	**Variant H**	**Variant I**
	dependent variable is $\ln Q$		
$\ln S^d$	0.0512***	0.0367***	0.0542***
	(0.0060)	(0.0067)	(0.0068)
$\ln S^d * G7$	-0.0314***	-0.0248***	-0.0480***
	(0.0077)	(0.0085)	(0.0091)
$\ln S^{fm}$	0.0110*	0.0042	0.0056
	(0.0062)	(0.0061)	(0.0064)
$\ln S^{fm} * G7$	0.0165***	0.0216***	0.0126**
	(0.0052)	(0.0056)	(0.0061)
$\ln S^{ff}$		0.0143***	0.0208***
		(0.0027)	(0.0028)
$\ln S^{ff} * G7$		-0.0052*	-0.0120***
		(0.0030)	(0.0031)
$\ln S^{ft}$			-0.195***
			(0.0027)
$\ln S^{ft} * G7$			0.0205***
			(0.0038)
$\ln K$	0.0313***	0.0308***	0.0273***
	(0.0032)	(0.0030)	(0.0030)
$\ln L$	0.1697***	0.1719***	0.1751***
	(0.0047)	(0.0045)	(0.0045)
$\ln M$	0.7904***	0.7886***	0.7899***
	(0.0038)	(0.0038)	(0.0038)
Wald χ^2 (df)	9.76e+07 (61)	1.12e+08 (63)	1.22e+08 (65)
p-value Wald χ^2	0.0000	0.0000	0.0000
Obs.	3220	3220	3220

Remarks: The dependant variable is log output. Country-specific, industry-specific and time-specific effects are not reported. Standard errors are in parentheses. ***, **, * indicate a significance at the 1%, 5% and 10% levels, respectively.

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