Research Article

Foreign Divestment and Technology in Developing Countries

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Purpose: The inflow of foreign direct investment is expected to yield benefits including technology transfer. What will happen to the benefit of technology in the presence of foreign divestment? To answer this question, this study assessed the effect of foreign divestment on technology in the host developing countries.

Design/methodology/approach: The data employed is an unbalanced panel of 73 developing countries spanning 1990 to 2022 fitted to fixed and random effects estimators.

Findings: Foreign divestment crowded out technology in developing countries but human capital enhanced technology in developing countries.

Research limitations/Implications: Managers of developing countries' economies must enhance the economic indicators to retain foreign direct investment and discourage foreign divestment. There must be a continual investment to improve access, participation, and education completion at all levels. The focus on quality generally, and in science, technology, engineering, and mathematics specifically, must be ensured.

Originality: Although the phenomenon of foreign divestment has remained largely a firm-level concept at inception, recent studies have presented a macroeconomic perspective of the concept. Whilst some explained foreign divestment others investigated the role of foreign divestment in some economic variables including domestic investment. What is missing in all these is divestment's role in technology, which this study provides.

1. Introduction

Developing countries have turned to inward foreign direct investment (IFDI) to augment domestic investment, increase employment and incomes, and attract improved technology[1][2][3][4][5][6].

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Technology is the outcome of investment in research and development aimed at creating new products, production methods, or both[7][8]. This can be acquired through indigenous development and transfer[8][9]. Indigenous development is minimal in developing countries. Technology transfer, dominant in developing countries, involves knowledge flows from a source to a recipient[7][8][9]. Whilst the source of transfer is the owner or holder of the knowledge, the recipient of the technology transfer becomes the beneficiary of the knowledge[7][8][9]. The technology can be embodied or unembodied[9]. The former involves "the flow of knowledge embodied in the new products, materials tools, machines and similar equipment"[9], p. 83], and the latter captures other forms of technical knowledge flows. Within the context of foreign direct investment, technology transfer includes exporting, establishing subsidiaries, licensing, and franchising, as well as strategic international alliances, joint ventures, consortia, and turnkey projects[9][10][11]. From the foregoing, foreign direct investment is an important channel for this transfer[5][9][12][13].

Notwithstanding the benefits of IFDI including technology transfer, the literature abounds in the evidence of divestment of IFDI[14][15][16][17][18][19][20][21][22][23][24][25][26][27]. Foreign divestment (FD) is an intentional strategy to scale down operations in whole or part[15][16][17][18]. Nevertheless, it is a delicate choice that has consequences for the growth and performance of multinationals (MNEs), their transnational collection of businesses, and stockholders' worth[25][28][29]. At the aggregate level, this could portend a reversal of IFDI's benefits[14][20][21][22][23][30][31]. As technology has been noted earlier as one of the benefits of IFDI, would foreign divestment crowd out technology?

The phenomenon of foreign divestment has remained largely a firm-level concept at inception[16][17][18][32][33][34]. However, recent studies have presented a macroeconomic perspective of the concept[14][20][22][23][35][36][37][38][39][40][41][42][43]. Whilst some explained foreign divestment[2][36][37][39][40][41][42], others investigated the role of foreign divestment in some economic variables[14][20][22][23][38]. Specifically,[20] addressed economic growth in agriculture whilst[22][23][38] focused on foreign divestment's role in domestic investment. This is right because augmenting domestic investment is one of the benefits of IFDI aside from technology transfer, employment, income, trade, and growth of the economy[1][2][30][44]. For the nexus between technology and foreign direct investment, some studies have provided some evidence[4][10][11][45]. What is missing in all these is divestment's role in technology. Thus, we investigate the crowding effect of foreign divestment on technology in the host developing countries, in which there is a technology deficit. Seventy-three developing countries'

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panel data spanning 1990 - 2022 was fitted to fixed and random effects estimators. Foreign divestment crowded out technology in developing countries but human capital enhanced technology. Managers of developing countries' economies must enhance the economic indicators to retain IFDI and discourage foreign divestment. There must be a continual investment to improve access, participation, and education completion at all levels. The focus on quality generally and in science, technology, engineering, and mathematics specifically, must be ensured.

Foreign direct investment and foreign divestment theories are reviewed in the first part of the next section. The second part of the section addresses empirical evidence of IFDI regarding technology. Section three captures the data, models and modelling whilst the results of the analyses and their interpretation are outlined in section four. Section five concludes the study with some recommendations.

2. Literature review

2.1. Theoretical review

Two strands of literature are related to this study: foreign direct investment theories and foreign divestment theories. The first strand relates to a set of three theories about technology-inducing foreign direct investment: internationalisation[46], oligopolistic industries[47][48] and the ownership, location and internationalisation (OLI) paradigm[49][50]. [46] noted that accessing external markets requires a choice between licencing and foreign direct investment. This choice is influenced by organisational control and the inability to license some aspects of knowledge (technology). The oligopolistic industries' key elements are interdependence, industry leadership, and followership[47]. Followers respond to internationalisation by following the industry leader. Generally, firms relocate to developing countries when developed markets become saturated[2][47][48]. The third, OLI states "... ownership, location, and internalisation explain the extent, spatial, and business composition of foreign manufacture embarked on by a multinational enterprise (MNE). This is the eclectic paradigm[49][50]. Whilst the ownership relates to technology, know-how, resources, or some other form of income-generating asset(s), the natural endowments or created assets in the foreign country that can be combined with the ownership advantages constitute the location advantages. The internalisation connotes owning or controlling these value-adding activities." [[2], p. 3]. The thread

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that runs through the foreign direct investment theories is the introduction of technology into the host country so that the MNE can prosecute its organisational goals.

The thoughts of[17][51][52] regarding the industrial organisation and Dunning's eclectic paradigm[17][49], constitute the second strand. Within the industrial organisation, divestment symbolises depressing exit obstacles. Within the context of the opposite of Dunning's eclectic paradigm, "…. foreign enterprise divests its operations if the enterprise. 1. No more has net reasonable merits over the enterprise of other countries. 2. Ceases to find it beneficial to use them itself rather than sell or rent them to foreign enterprises - that is, the enterprise no longer considers it profitable to 'internalise' these advantages. 3. Finds it no more profitable to utilise its internalised net competitive advantage outside its home country – that is, it is now more advantageous to serve foreign markets by home production, or to foreign and/or abandon foreign markets altogether."[22], p.2].

2.2. *Empirical review*

As there are no existing studies on the role of foreign divestment in technology, which is a gap in the literature, the empirical literature on the effect of IFDI on technology is presented.[4][11][53][54] are firm-level studies (in Japan, China, China, and Mexico), with[1][8][17][45][53] firms, whilst[10][45][55][56] are macro (national) and multi-country studies.[10][45] employed machinery import, and research and development expenditure (R&D) as measures of technology.[53][54][55] respectively employed total factor productivity (TFP) growth, TFP and the natural logarithm of TFP as the measure of technology. However,[4][11][56] measured technology respectively as patent citation, patent applications and the natural logarithm of patent applications. The estimators employed included ARDL[45] negative binomial[4], ordinary least squares (OLS)[53], Granger causality[11] and fixed effects (FE)[56].

[45] studied Malaysia, Thailand, Nigeria, China, and India. Whilst inward foreign direct investment encouraged technology in the case of Thailand and China, there were no significant effects in the case of Malaysia, Nigeria, and India. [4] split foreign direct investment into vertical and horizontal versions. Whilst the former reduced technology, the latter showed a positive effect. [11][55] found no significant effect of total IFDI on technology whilst[53][54] realised that IFDI had negative effects on technology. [56] however, reported a positive effect for both the current IFDI and the first lag of the IFDI. The finding of the positive effect of IFDI on technology is in line with theory[1][2][3][4][5]

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[6]. [55] found that domestic investment positively influenced technology. Trade's effect on technology is mixed. Trade had a positive effect on technology for Malaysia, Nigeria, and India[10][45], a discouraging impact on developing countries[56] and a neutral effect on Thailand and China[45]. Only[56] reported the effect of human capital on technology, a positive effect of human capital.

In the preceding review, there are more firm-level studies than macroeconomic-level studies on the effect of IFDI on technology in the host country. What is conspicuously missing is the role of foreign divestment on technology in the host country. This is the knowledge gap filled in this study.

3. Data, models, and modelling

3.1. Data and models

A panel data of 73 developing countries spanning 1990 to 2022 (Appendix A) was used. The panel is unbalanced because all 73 countries did not possess data spanning 33 years. All the data was sourced from the World Bank[57].

Following from the objectives,

$$TECH = f(FD)1$$

Where *TECH* is the technology and *FD* is foreign divestment. From the literature, other variables explain technology[4][11][53][54][55][56], hence,

$$TECH = f(FD, DI, TO, HC, INFRAS)2$$

Where *DI* is domestic investment, *TO* is trade openness, *HC* is human capital and *INFRAS* is infrastructure. Equation 2 is specified as

$$LNTECH_{it} = \alpha_0 + \alpha_1 FD_{it} + \alpha_2 IFDI_{it} + \alpha_3 DI_{it} + \alpha_4 TO_{it} + \alpha_5 HC_{it} + \alpha_6 INFRAS_{it} + \varepsilon_{it}3$$

The natural log of the total of patents registered by residents and non-residents is *LNTECH*[11][56][58][59][60]. The use of patents in measuring technology has some limitations[60]. Firstly, most value of patents arises from a few patents. Secondly, a large set of patents remain unregistered as the decision to patent is an act of choice from the innovator. Thirdly, since some technology is not codified, these may not be amenable to registration. These limitations notwithstanding, patents are employed here as data on it is available for most developing countries, unlike other measures such as expenditure on

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research & development and total factor productivity. Using the natural logarithm of the patent count diminishes the quantum of the values to be like other covariates in Equation 2. *FD* is the negative of the net *IFDI*. This recognition of *FD* has been employed in the literature[2][14][20][22][23][36][38][39][43][61][62]. The variable is defined as binary, 1 if FD occurs and 0, otherwise. Following from the theory, FD's coefficient should be negative *a priori*. Domestic investment (*DI*) includes capital injection into businesses in the domestic economy by investors in the domestic economy. Aside from specific investments in research and development that can lead to the registration of patents, some of these could be used as domestic partnerships with foreign firms recognised either as foreign-owned or locally owned depending on the shareholdings. *DI* is the gross fixed capital formation in terms of the gross domestic product and the coefficient is expected to be positive[55]. One of the modes of internationalisation is through trade (*TO*), the twin of foreign direct investment. Foreign firms could export technology into an economy (non-resident patent registration) whilst firms in the domestic economy could export technology already registered in the domestic economy. In either case, there is a relationship between trade and technology[56]. *TO*'s coefficient's sign could be either positive or negative. *HC* is measured as secondary school enrolment as a percentage of the gross enrolment. Knowledge is crucial to the development of technology to be registered as patents. The use of technology is also dependent on knowledge. Thus, human capital is expected to influence technology positively. Infrastructure can be viewed as the backbone of an economy[30][63]. Thus, it is expected to support domestic technology production and facilitate the use of foreign technology brought into the domestic (host) economy. *INFRAS*'s coefficient's sign is positive *a priori*. Whilst the α_k must be estimated, country and year respectively, represent *i* and *t*. The idiosyncratic error term is ε_{it}.

3.2. Modelling

Linear fixed and random effects estimators were used because the large number of countries (73) exceeded the small years, 33. The Hausman test informed the choice between the two estimators[64]. As the panel leaned more towards cross-sectional than time series, heteroskedasticity was tested in fixed effects (FE) and random effects (RE) estimations[65][66][67][68]. In recognition of the time dimension, autocorrelation was explored[69][70]. The outcome of the tests determined the appropriate ameliorations. The literature suggests that *IFDI* and *DI* are complementary, opposite or have no significant effect[2][5][22][23][35]. For these and possible interrelationships among all the explanatory variables, both pairwise linear correlation (Appendix C) and variance inflation factor (Appendix D) were computed.

4. Results and discussions

4.1. Results

The natural logarithm of the sum of resident and non-resident patent registrations, LNTECH, ranged from 0 to 13.4, with a mean of 6.0 (Table 1). With a standard deviation of 2.5, the variance is below the mean slightly, showing a minimal underdispersion. LNTECH was split into non-resident patent registrations (LNTECH1) and resident patent registrations (LNTECH2). Although the mean of LNTECH1 is higher, it has both a lower standard deviation and maximum values, unlike LNTECH2 which shows a lower mean, higher standard deviation, and higher maximum values. As FD is a binary variable, 4% of the 1,785 observations constituted foreign divestment. The seemingly low proportion is adequate in capturing the effect of FD in the dataset. The standard deviation is far higher than the mean. This shows a substantial overdispersion of the FD.

Equation 3 was estimated using FE and RE (models A1 and A2 respectively), in Appendix B. Following the Hausman test for specification, variance and serial correlation tests, a pooled ordinary least square (POLS) estimation with[71] standard errors is presented in Table 2, model 1. To assess the consistency of the estimates, models 2 – 6 were estimated as well. Recognising the coefficients to one decimal place, the coefficient of FD is around 1.0. That notwithstanding, the coefficients are slightly lower in models 1 and 5. It can be observed that these lower coefficients of FD are associated with the presence of *HC*, human capital, in the models. These seemed to have drawn some strength in the magnitude of FD. It was suspected that HC could be correlated with FD. However, an inspection of the pairwise correlations in Appendix C and the variance inflation factor in Appendix D did not confirm the suspicion. The outcome suggests a strong effect of HC on technology. Comparing model 1 with models 2 – 6, it would be observed that the coefficient of HC is the only consistent and statistically significant coefficient control variable.

Additional estimations are presented in Table 3. Model 7 is a re-estimation of model 6 with year-fixed effects. The LNTECH, is split into the components, LNTECH1 for non-residents and LNTECH2 for resident patent registrations. The former arises from purely foreign sources and represents foreign technological sources whilst LNTECH2 could be due partly to foreign firms’ residence in the host

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country. The initial models are presented in Appendix B, models A3 - A6. In the case of LNTECH2, the Hausman test favours FE whilst the RE model is favoured for LNTECH1. Estimations with corrections for heteroscedasticity and serial correlation are presented in models 8 and 10 (Table 3). In models 6 – 9, the coefficients range from -0.4 to -0.7. That of model 10 is markedly different in magnitude. This could have arisen from the different estimator, RE, unlike the FE for the others, although determined by the specification test. Although the magnitude of FD is statistically indifferent from zero, the sign is consistent with those of models 6 – 9. It can be established that FD hurts technology, measured as the aggregate or in its components. The coefficients of HC are consistent across models 6 – 10. Coupled with the consistency found in Table 2, HC has emerged as a significant driver of technology.

4.2. Discussions

Since the foreign divestment was measured as a dummy variable, 1 if foreign divestment occurred and 0, otherwise, FD's negative coefficient means the level of technology associated with foreign divestment is less than that associated with no foreign divestment. This shows that during the years and in countries where foreign divestment occurred, technology was reduced. There are two perspectives on this result. First, the absence of foreign divestment, that is, the presence of positive levels of IFDI is associated with high technology. This is consistent with theory[1][2][3][4][5][6]. Indeed, one of the benefits of attracting foreign direct investment is technology transfer[1][2][22][23][44]. Beyond the theory, the empirical literature showed that foreign direct investment is associated with technology[45] for Thailand and China and[56] for developing countries. Whilst[54] found a negative effect of technology in China,[45] in the case of Malaysia, Nigeria and India,[10][55] for developed countries, as well as[11] in the case of Mexico, found neutral effects of foreign direct investment on technology. The second perspective, which derives from the first, is that, during times of foreign divestment, technology was lower than during times of no foreign divestment. Since the proxy for technology in this study is patent registration by non-residents and residents, during foreign divestment, foreign business residents in developing countries pursuing a divestment strategy would not register new patents in the hosting economy.[35][36][42][43] have shown that some macroeconomic factors necessitate divestment. So, as these drive foreign divestment, the environment would not be conducive to attracting non-residents to register patents in developing countries. Combining the two perspectives, foreign divestment crowds out technology.

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Human capital enhances technology based on the positively significant coefficient of human capital. This can be viewed in two ways. First, human capital in developing countries is needed to develop the technology that can be patented. Second, human capital is needed to use technology in production and consumption. The first is relevant in the case of model 9 (Table 3) whilst the second applies to model 8. The two perspectives explain the role of human capital in models 6 and 7. This finding is consistent with[56].

Although domestic investment's sign is positive, the size is not insignificant in all models in Table 3. Research and development expenditures in developing countries are minimal and non-existent in some cases. Thus, it is unsurprising that domestic investment has no discernible effect on technology in mode 10. For model 9, developing countries do not contribute to research and development expenditures outside the group. Therefore, an insignificant effect is expected. Since the effect of domestic investment is insignificant in models 9 and 10, one cannot expect a different result in the case of models 6 and 7.[55], however, found a positive effect of DI on technology for 13 developing countries. The departure from this finding can be attributable to the few developing countries in the study of[55] and the time. A large sample in the current study involving more developing countries and recent data must have provided more efficient econometric estimates for DI.

5. Conclusions and recommendations

In departing from the existing literature, the contribution of this study lies in the assessment of the role of foreign divestment on technology in developing countries. The data employed is an unbalanced panel of seventy-three developing countries from 1990 - 2022, fitted to fixed and random effects estimators. Foreign divestment crowded out technology in developing countries but human capital enhanced technology in developing countries. Managers of developing countries' economies must enhance the economic indicators that are also determinants of IFDI and foreign divestment, to retain foreign direct investment and discourage foreign divestment. There must be a continual investment to improve access, participation, and education completion, at all levels. The focus on quality must be key. Additionally, attention to programmes in science, technology, engineering, and mathematics would boost technology production and utilisation.

This study is limited to the total or aggregate economy of developing countries. Further study can consider the role of agricultural foreign divestment on agricultural technology as the sector is important for developing countries.

Appendix A. List of developing countries used in the analysis.

Algeria	Ecuador	Lao PDR	Samoa
Argentina	Egypt, Arab Republic	Macao SAR, China	Saudi Arabia
Bahamas, The	El Salvador	Madagascar	Seychelles
Bahrain	Ethiopia	Malaysia	Singapore
Bangladesh	Gambia, The	Mauritius	South Africa
Barbados	Ghana	Mexico	Sri Lanka
Belize	Guatemala	Mongolia	Sudan
Bhutan	Honduras	Morocco	Syrian Arab Republic
Brazil	Hong Kong SAR, China	Namibia	Thailand
Brunei Darussalam	India	Nepal	Tunisia
Burundi	Indonesia	Nicaragua	Turkey
Cambodia	Iran, Islamic Republic	Oman	Uganda
Chile	Iraq	Pakistan	United Arab Emirates
China	Israel	Panama	Uruguay
Colombia	Jamaica	Paraguay	Venezuela, RB
Congo, Republic	Jordan	Peru	Viet Nam
Costa Rica	Kenya	Philippines	Yemen, Rep.
Djibouti	Korea, Republic	Rwanda	Zimbabwe
Dominican Republic			

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Appendix B. Initial estimations

	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)
VARIABLES	LNTECH3	LNTECH3	LNTECH1	LNTECH1	LNTECH2	LNTECH2
FD	0.3346***	0.3288***	0.2826***	0.2760***	0.3656***	0.3600***
	(0.0932)	(0.0933)	(0.1010)	(0.1012)	(0.1065)	(0.1065)
DI	0.0118***	0.0114***	0.0148***	0.0143***	0.0013	0.0012
	(0.0038)	(0.0038)	(0.0041)	(0.0041)	(0.0043)	(0.0043)
TO	-0.0028***	-0.0028***	-0.0018*	-0.0018*	-0.0036***	-0.0039***
	(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0011)	(0.0011)
HC	0.0123***	0.0130***	0.0094***	0.0104***	0.0151***	0.0156***
	(0.0019)	(0.0019)	(0.0021)	(0.0021)	(0.0022)	(0.0022)
INFRAS	0.0050***	0.0048***	0.0044***	0.0042***	0.0044***	0.0043***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0006)
CONSTANT	4.6907***	4.3081***	4.4066***	4.0217***	2.8101***	2.3940***
	(0.1509)	(0.3023)	(0.1635)	(0.3099)	(0.1725)	(0.3405)
Observations	1,785	1,785	1,785	1,785	1,785	1,785
R-squared	0.2527	-	0.1741	-	0.2053	-
Countries	73	73	73	73	73	73
F test/ Wald	115.47***	584.54***	71.98***	366.57***	445.77***	88.20***
Estimator	FE	RE	FE	RE	FE	RE
Hausman test	13.31**	24.33***	7.82			
Variance test	2.6e+05***	-	2.1e+05***	-	-	15242.12***
Autocorrelat-ion test	56.956***	-	86.742***	-	-	22.379***

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*Notes: 1. Standard errors in parentheses. 2. *** p<0.01, ** p<0.05, * p<0.1. 3. FE – Fixed effects. RE – Random effects. 4. The Hausman test applies to both FE and RE estimations. 5. Variance test is the modified Wald test for groupwise heteroskedasticity in fixed effect regression model applies to models 1 & 3. 6. Variance test of random effects applies to only model 6. 7. Autocorrelation test is Wooldridge's test for autocorrelation in panel data and applies to models 1, 3 and 6.*

Appendix C. Correlation matrix

	LNTECH1	*LNTECH2*	*LNTECH3*	*FD*	*TO*	*DI*	*HC*	*INFRAS*
LNTECH1	1.0000							
LNTECH2	0.7952	1.0000						
LNTECH3	0.9662	0.8996	1.0000					
FD	-0.1100	-0.0690	-0.1007	1.0000				
TO	0.0975	-0.0621	0.0557	-0.0479	1.0000			
DI	0.1554	0.1872	0.1726	-0.1454	0.1842	1.0000		
HC	0.4711	0.3503	0.4609	-0.0989	0.2767	0.1929	1.0000	
INFRAS	0.2682	0.1433	0.2634	-0.0481	0.3903	0.1064	0.6635	1.0000

Appendix D. Variance inflation factor

Variable	Model 6	Model 8	Model 10
INFRAS	1.96	1.96	1.96
HC	1.84	1.84	1.84
TO	1.21	1.21	1.21
DI	1.08	1.08	1.08
FD	1.03	1.03	1.03

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
LNTECH	1,785	6.0096	2.5344	0	13.3890
LNTECH1	1,785	5.6204	2.6041	0	11.6739
LNTECH2	1,785	3.9791	2.6975	0	13.1906
FD	1,785	0.0443	0.2057	0	1
TO	1,785	81.2553	62.5479	0.0210	442.6200
DI	1,785	22.9506	7.3541	0.7345	69.3948
HC	1,785	71.4784	24.7054	4.7208	141.2027
INFRAS	1,785	76.7180	66.5582	0	437.4280

Table 1. Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	***LNTECH***	***LNTECH***	***LNTECH***	***LNTECH***	***LNTECH***	***LNTECH***
FD	-0.5548**	-1.2411***	-0.9519***	-1.2110***	-0.6862***	-1.0876***
	(0.2068)	(0.1878)	(0.2887)	(0.1818)	(0.1280)	(0.1647)
DI	0.0315		0.0556*			
	(0.0280)		(0.0306)			
TO	-0.0034**			0.0021***		
	(0.0014)			(0.0007)		
HC	0.0501***				0.0467***	
	(0.0027)				(0.0022)	
INFRAS	-0.0015					0.0099***
	(0.0013)					(0.0010)
CONSTANT	2.1193***	6.0645***	4.7754***	5.8952***	2.7004***	5.3007***
	(0.5104)	(0.0711)	(0.7109)	(0.0556)	(0.1765)	(0.1563)
Model diagnostics						
Observations	1,785	1,785	1,785	1,785	1,785	1,785
R-squared	0.2303	0.0101	0.0356	0.0127	0.2155	0.0771
Countries	73	73	73	73	73	73
F statistics	605.73***	43.68***	33.07***	22.46***	257.32***	54.75***

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Table 2. Pooled OLS estimations with the sum of resident and non-resident patent registrations

*Notes: 1. Driscoll-Kraay standard errors in parentheses. 2. *** p<0.01, ** p<0.05, * p<0.1. 3.*

	(6)	(7)	(8)	(9)	(10)
VARIABLES	*LNTECH*	*LNTECH*	*LNTECH1*	*LNTECH1*	*LNTECH2*
FD	-0.5548**	-0.4244**	-0.7041**	-0.5655**	-0.0678
	(0.2068)	(0.1956)	(0.2601)	(0.2353)	(0.0521)
DI	0.0315	0.0436	0.0222	0.0360	0.0047
	(0.0280)	(0.0290)	(0.0251)	(0.0256)	(0.0042)
TO	-0.0034**	-0.0067***	-0.0013	-0.0052**	-0.0015*
	(0.0014)	(0.0019)	(0.0016)	(0.0020)	(0.0009)
HC	0.0501***	0.0442***	0.0532***	0.0463***	0.0164***
	(0.0027)	(0.0026)	(0.0032)	(0.0033)	(0.0024)
INFRAS	-0.0015	0.0109***	-0.0025*	0.0118***	0.0031***
	(0.0013)	(0.0026)	(0.0013)	(0.0027)	(0.0009)
CONSTANT	2.1193***	2.5300***	1.6404***	2.1755***	3.0152***
	(0.5104)	(0.5049)	(0.4160)	(0.4146)	(0.2140)
Model diagnostics					
Observations	1,785	1,785	1,785	1,785	1,785
R-squared	0.2303	0.2762	0.2333	0.2895	-
Countries	73	73	73	73	73
F/Wald statistics					
Estimator	FE	FE	FE	FE	GLS
Country effects	Yes	Yes	Yes	Yes	No
Year effects	No	Yes	No	Yes	No

Table 3. Complete model plus segregation of technology into components

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*Notes: 1. Driscoll-Kraay standard errors in parentheses. 2. *** p<0.01, ** p<0.05, * p<0.1. 3.*

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