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Examining the Determinants of Foreign Direct Investment

Graeme O'Meara
Trinity College Dublin, gomeara@tcd.ie

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Abstract
The purpose of this paper is to identify the principal determinants of foreign direct investment on a cross-country basis. Using a large sample of both developed and developing countries, we find that traditional variables relating to the size and scale of economic activity in the host country are most significant in explaining foreign direct investment flows, while variables such as economic freedom, tax incentives and human capital are not at all significant. These findings are in line with similar research that shows market size, economic openness and quality of infrastructure to be key drivers of foreign direct investment, but are at variance with research that shows human capital and tax incentives to be key drivers.

Keywords
foreign direct investment, gross domestic product, multinationals, economic growth, economic freedom, corporation tax.

Cover Page Footnote
This study was completed during my Junior Sophister year at Trinity College Dublin.

1. Introduction

Policymakers are acutely aware that foreign direct investment is more conducive to long run growth and economic development than any other form of capital inflow. Arguments for this hypothesis are based on the belief that foreign direct investment brings with it foreign technology and management skills, which can then be adapted and emulated by the host country in other contexts. Furthermore, rapidly growing economies tend to absorb such investment to a greater extent than established economies. In recent years, many nations have launched an open door policy towards foreign direct investment in order to capture the growth enhancing effects on investment, employment, productivity and economic development. As *The Economist* notes: 'Local politicians love foreign direct investment (FDI) above almost all else. Nothing burnishes political fortunes quite so brightly as persuading some overseas investor that in the whole wide world, there is no better place to make his products than right here in our hometown.'[1] This is particularly relevant for the case of Ireland, which took a laissez faire approach to foreign direct investment and over a short number of years from 1995 to 2000 saw national income grow at a rate of close to 10% per annum.[2]

What makes a firm choose where to locate its operations abroad? Are there factors which corporations consider when planning overseas investment? Returning to the case of Ireland, empirical research has found its low rate of corporation tax to be a key instrument in attracting mobile FDI projects (Ruane, 2004). Tax considerations are only one of many variables that a foreign investor may consider. The purpose of this paper is to try to determine the principal determinants of foreign direct investment on a cross-country basis. Using a large sample of developed and developing countries, we find that traditional variables relating to the size and scale of economic activity in the host country are most significant in explaining foreign direct investment, while variables such as economic freedom, tax incentives and human capital are not very significant. These findings are in line with similar research that shows market size, economic openness and quality of infrastructure to be key drivers of foreign direct investment, but are at variance with research that shows human capital and tax incentives to be key drivers.

2. Background and related literature

The Foreign Direct Investment ("FDI") literature has continued to grow and capture the fascination of applied development economists (Quazi, 2010). Cross-border investment is considered to be one of the most striking features

[1] 'Wrong Way Round' 27/06/2005
[2] IMF Staff Country Report 02/170

of the global economy. The determinants, the growth enhancing effects, the motivations towards the formation of FDI as well as the undertaking and attraction policies, have been topics of intensive research in the last two decades (OECD 2006). The sizeable empirical literature converges on a number of key variables: market size, economic openness, exchange rate, rate of return, costs of production, quality of infrastructure, human capital and political stability. Blonigen (2005) gives a good overview of some of the variables included in previous studies.

Bhasin et al. (1994) as well as Morrissey and Rai (1995), claim that the size of the domestic market, as well as the growth prospects of the recipient economy are given high consideration when foreign investors relocate production into the host country. Similarly, Scaperlanda and Mauer (1969) put forth the hypothesis that an FDI inflow responds positively to the recipient country's market size once it grows beyond a threshold level that is large enough to allow economies of scale and efficient utilization of resources. This could be estimated by using GDP or its rate of growth as a proxy for market size or growth. Agarwal (1980) points out that FDI is considered to be a function of output or sales turnover of foreign firms in the host country. Multinationals may intend to sell output manufactured in the host country both domestically and internationally, and thus examine the performance of their counterparts that are already established in the host country. There may exist also an agglomeration factor in determining FDI: the presence of other firms and industries spur economies of scale and network effects come into force (Puga and Venables, 1996).

Agiomirgianakis et al. (2006) undertook a panel data study for OECD countries and included the following exogenous variables in the analysis: market size and growth, the level of development, urbanisation, human capital (secondary school enrolment ratio), agglomerations, economic integration, the trade regime, labour costs, exchange rate variability, political instability, and the interaction between foreign investor and domestic firms. Education and skills of the work force were found to be highly significant, as was infrastructure and market size.

In a paper from the IMF, Walsh and Yu (2010) employed the following exogenous variables: market size and growth, openness, the exchange rate, the extent of clustering behaviour (groups of foreign firms gather together due to linkages among projects or herding), political stability, financial market liberalisation, and the quality of institutions (taking account of government and the level of corruption). It was found that primary sector FDI is invariant to macroeconomic factors, while secondary FDI is strongly influenced by labour market flexibility and breadth of financial markets.

Biswas (2002) makes the point that much of the literature achieves very low R squared values through the use of traditional variables such as wage rates and infrastructure of the host country. Given the heterogeneity of FDI, it is therefore necessary to focus on *non-traditional* variables such as the

political regime type (e.g. democratic v. dictatorship) and the level of property rights. A large proportion of the literature surrounding FDI focuses its analysis on specific countries and regions, as well as circumstances idiosyncratic to some countries. In the case of developing countries, Mody and Wheeler (1992) found that political stability is a crucial factor and this is somewhat intuitive. Barro (1991) and Corbo and Schmidt-Hebbel (1991) argue that political instability creates an uncertain economic environment detrimental to long-term planning, which reduces economic growth and investment opportunities.

In Biswas' (2002) study of FDI from the US to 44 countries, a property rights variable was significant at the 1% level, which may imply that institutions that protect property rights are important to investors. Infrastructure, wages rates, duration of a political regime, and an environment of secured property and contractual rights were found to be the key drivers in attracting FDI from the US.

Gast and Hermann (2008) show that FDI can be horizontal or vertical. Market-searching, horizontal FDI establishes production facilities or distribution networks in order to serve the target market from within the partner country. Vertical FDI shifts part of the production chain into the host country receiving the FDI inflow in order to exploit differences in factor prices. In relation to trade in goods, it is often argued that horizontal FDI substitutes for exports while vertical FDI leads to increased trade with intermediate products (OECD 2006). In addition, there is a possible connection between exchange rate fluctuations and FDI. For example, Froot and Stein (1991) showed that Japanese FDI into the United States followed surprisingly close movements of the yen-dollar exchange rates in the 1980s. The results support the notion that horizontal FDI is more common than vertical FDI, as an increase in total market size proves to be a very significant promoter of FDI.

Finally, in a world where an increasing number of governments compete hard to attract multinational corporations, fiscal incentives have become a global phenomenon (Morisset and Pirnia: 2002). Agodo (1978) undertook econometric analysis on responsiveness of FDI to variations in tax rates, and like many other studies – tax concessions were found to be insignificant as a determinant of FDI in simple and multiple regressions. This is consistent with results of investor surveys which show that investors are more concerned with market and political factors than tax policy. However, as Morisset and Pirnia (2002) point out, it is certainly not a coincidence that FDI in tax haven countries in the Caribbean and South Pacific grew more than fivefold between 1985 and 1994, to over $200 billion. Including a tax variable is hence justified to observe the effect (if any) that fiscal incentives may have on FDI.

3. A First Look at the Data

In order to examine the empirical determinants of foreign direct investment, we collect an array of variables which proxy the attractiveness of a country from the perspective of a foreign investor. The key variables are illustrated in Figure 1 and a full list of variables is presented in Table 1. The data was obtained from a variety of sources including the World Bank, the OECD, the IMF World Economic Outlook database and the United National Conference on Trade and Development (UNCTAD) database.

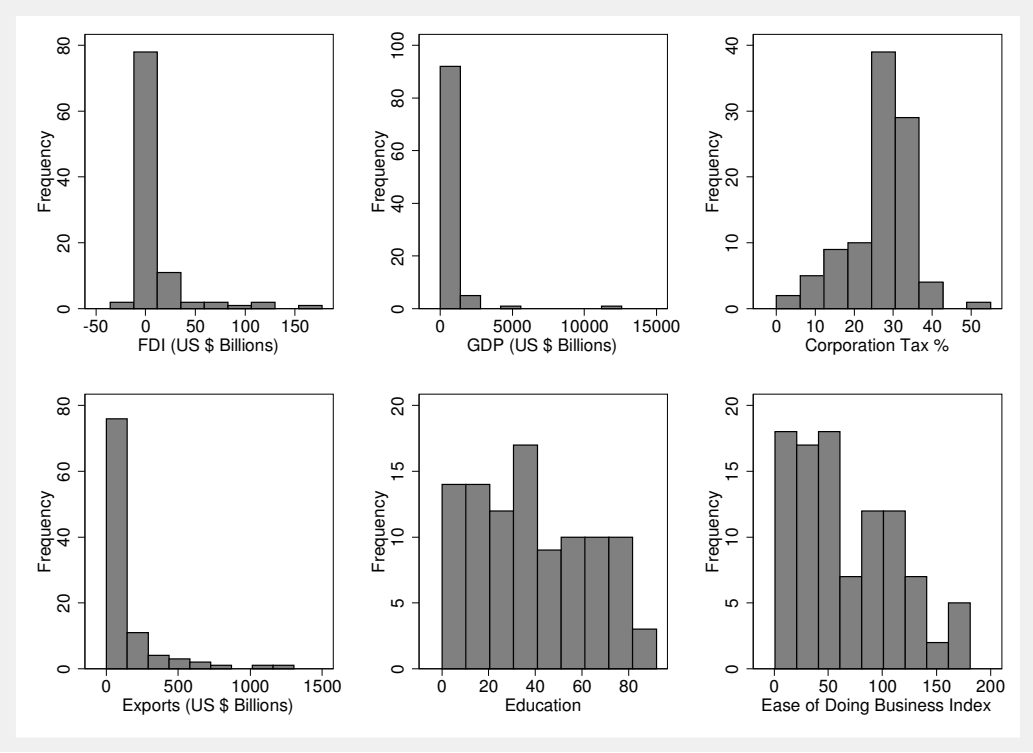

Figure 1: Histograms of key variables

To facilitate a cross-country analysis, a sample of 99 countries was selected for the year 2005. The justification for choosing 2005 is because it is likely to represent less bias in terms of business cycle fluctuations and global disorder, as compared with more recent years during which a global financial crisis was observed. It was a strong year for FDI: the OECD countries (one third of the sample) reported inflows of $622 billion - a 27% increase over 2004 (OECD, 2006). Similarly, total OECD outflows were estimated at $716 billion. This can be attributed to macroeconomic stability, strong corporate profitability, low interest rates and decent equity valuation – 'all of which imply that ample liquidity was available to those companies wanting to invest abroad' (OECD:

2006: 13). The data involving currency are denominated in US dollars (2005 value) to facilitate cross country comparison and accurate estimation. These dollar figures are converted from domestic currencies using single year official exchange rates.

Variable	Mean	Std. Dev	Min.	Max.	N
Broadband penetration (%)	6.1	8.1	0.0	27.9	99
CO2 Emissions (%)	7.1	8.4	0.1	64.1	97
Corporation tax	27.1	8.6	0.0	55.0	99
Developing country (dummy)	0.7	0.5	0.0	1.0	99
Ease of Doing Business Index	67.0	47.2	1.0	181.0	98
Economic Freedom (%)	63.2	10.2	35.2	89.5	93
Education (% Tertiary)	39.3	24.9	0.0	92.0	99
Education (% Secondary)	89.3	22.0	13.1	147.6	86
Exports (US$Billions)	123.4	224.0	1.0	1,305.1	99
FDI (US$Billions)	11.2	28.2	-35.6	177.4	99
GDP (US$Billions)	445.3	1,406.7	2.3	12,579.7	99
GDP per capita	15,248.2	17,248.8	164.6	80,959.4	99
HH final consumption (US$Billions)	268.1	950.4	1.6	8,819.0	99
Inflation rate (%)	8.4	30.5	-0.3	302.1	97
Interest rate (long term) (%)	14.3	26.2	1.7	235.7	85
IT Infrastructure (index)	5.9	1.9	2.3	12.1	66
Labour force (millions)	264.5	886.2	1.5	7,606.3	99
Labour force in tertiary industries (%)	26.6	13.5	10.2	83.2	49
Land area of host country (sq. km)	1,026,888.3	2,508,032.3	28.2	16,381,390.0	97
Market capitalisation (US$Billions)	481.9	1,898.3	0.0	16,970.9	88
Participation rate	62.5	8.0	47.7	86.2	99
Population (millions)	0.1	0.2	0.0	1.3	99
Public education (% spending)	14.7	4.2	8.8	25.0	51
R & D spending (% of GDP)	1.1	1.0	0.0	4.5	69
Trade (US$Billions)	99.1	61.9	26.5	428.5	98
Urban population (% of total population)	65.8	20.2	12.6	100.0	99

Table 1: Summary Statistics

FDI

FDI is officially defined as the net inflow of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in a country other than that of the investor. It is the sum of equity capital, reinvested earnings and other short/long term capital.

GDP

Gross Domestic Product, the economist's yardstick by which to evaluate economic performance, is the market value of all goods and services produced in the geographic borders of a country in a year. GDP is considered a key variable to explain variation in FDI – foreign investors are likely to consider the target country's income, output and production capacity. These factors will unduly affect market size (Bhasin et. al, 1994).

Corporation Tax

The tax variable was chosen to examine the effect of corporation tax on FDI. Generally, low or competitive rates of corporate taxes act as an incentive for foreign investors – the prospect of having to pay a smaller proportion of taxes reduces cost of production. This is particularly evident in the case of Ireland: its consistent low rate at 12.5% has attracted vast sums of FDI, many of which use Ireland as a platform to serve the European market. The tax rates were compiled using data from the World Bank and the OECD, and were then crosschecked with data from the IMF and domestic countries' fiscal authorities.

Exports

The third control variable selected was exports of goods and services – a measure of the targeted country's exporting capacity and global demand for its output. This includes the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. It excludes compensation of employees and investment income (formerly called factor services) and transfer payments. Investors may plan on exporting manufactured output from the host country (as in the case of US multinationals established in Ireland), and only sell a small proportion of output to the local market. A prime example is the relocation of many blue chip companies to the Middle East to take advantage of cheap labour and export much of the production back to its origin market. This has its advantages and disadvantages – productivity spillovers and boosted economic growth but often at the expense of unsound labour practices and excessively low wages that do not eliminate subsistence living.

Education

The education variable is the number of individuals enrolled in third level education, as a percentage of the gross enrolment ratio: the ratio of enrolment in education to the total number of people in that age category eligible or likely to be in education. Due to data limitations, this variable serves as a proxy measure of how skilled and educated the workforce of the reporting country is. As is clear from the histogram, the numbers of individuals enrolled in third level education varies widely across countries. We also obtain data on the number of individuals who have attained secondary level education as a further proxy for human capital.

Household Final Consumption Expenditure

As a measure of aggregate demand – a control was made for total household final consumption for the year 2005. It is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings and includes payments and fees to governments to obtain permits and licenses. The reasoning here is that foreign investors may consider aggregate demand to be a strong prerequisite for establishing an enterprise, as indicated by Agarwal (1980).

Other variables in the dataset

A range of additional varies were collected in assembling a broad set of data to determine FDI flows. These include population, the (long term) rate of interest, the labour force, the participation rate, inflation (i.e. cost of living in the host country), public spending on education as a % of GDP, broadband penetration rates, CO2 emissions, land area of the host country, the Economic Freedom Index and the Ease of Doing Business Index. These variables are considered in subsequent regressions.

While the World Bank maintains arguably one of the most extensive databases, much of the data contains gaps and missing observations: for example, Somalia was omitted from the sample due to not counting GDP. It was necessary to cross check estimates and fill in various gaps in the data with other sources. Similarly, FDI inflows were cross-checked with data from UNCTAD.

4. Empirical Results

This is a cross sectional study, using characteristics of countries in a static time period. The basic ordinary least squares approach is applied to the data, where the dependent variable y is Foreign Direct Investment, and $x_1, x_2 \ldots\ldots\ldots x_n$ are independent (explanatory) variables; ε represents a disturbance or error term which includes all other factors affecting *y*. We assume the errors are normally distributed with mean zero and unit variance. The estimated model is given by:

$$FDI = \beta_0 + \beta_1 POP + \beta_2 GDPPC + \beta_3 HHCON - \beta_4 TAX + \beta_5 EDUC + \varepsilon \quad (1)$$

where *POP* denotes population; *GDPPC* denotes GDP per capita; *HHCON* denotes household final consumption; *TAX* denotes the rate of corporation tax; and *EDUC* denotes education attainment. We subsequently present regressions that are variations on equation (1) with some of the other variables in the dataset. All variables are given in log form with the exception of those given in percentage form.

From the outset, a positive relationship between *FDI* and *GDP*, *HHCON* and *EDUC* is expected, while a negative relationship is expected between *FDI* and *TAX*. Initial regressions are presented in the Table 2 (robust standard errors in parenthesis). Column 2 presents the estimation of equation (1). We find that population, GDP per capita and household final consumption are statistically significant in explaining FDI, while neither education nor the rate of corporation tax are significant, with a negative coefficient on education which is at odds with economic intuition. The coefficient on household consumption suggests that a 1% increase in household consumption will raise FDI by about 0.11%, all else equal. Our a priori reasoning is that foreign investors may plan to sell output domestically, as well as export it. Hence domestic and international demand for output of a country may be strong determinants of FDI. The R squared suggests that about 40% of the variation in FDI is explained by the model.

The negative sign on the education variable is rather surprising, since increased numbers in third level education would improve human capital by boosting the skills of the labour force, thus attracting inward FDI. However, this inverse statistical relationship is consistent with Walsh and Yu (2010) who found enrolment figures to be an inadequate proxy for educational attainment. It is possible however (ceteris paribus), that as FDI increases, enrolment in tertiary education falls off: for example, if a multinational opened a new plant in an LDC, local individuals may no longer enrol in college due to greater employment opportunities provided by the multinational.

In columns 3 and 4, we replace population with the size of the labour force in the host country. Similar to population, labour force is statistically significant, while both education and the rate of corporation tax are statistically insignificant. It is interesting that the Ease of Doing Business index is also insignificant, and the negative relationship between the index and FDI is expected as a one point rise in the index (a higher index value indicates a more difficult country to do business in) should reduce FDI, all else equal.

	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI
Population	34.224**	30.578**			
	(13.89)	(14.19)			
GDP per capita	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
HH final consumption	0.110***	0.110***	0.110***	0.110***	0.120***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Corporation tax		0.105	0.110	0.152	0.232
		(0.28)	(0.27)	(0.29)	(0.32)
Education (Tertiary)		-0.142	-0.145	-0.177	
		(0.11)	(0.11)	(0.12)	
Labour force			0.007**	0.007**	-0.001
			(0.00)	(0.00)	(0.01)
Ease of Doing Business				-0.048	-0.044
				(0.07)	(0.08)
Education (Secondary)					-0.244
					(0.17)
Constant	-2.049	-0.582	-0.593	3.490	15.985
	(3.21)	(8.99)	(8.92)	(10.46)	(18.52)
N	99	99	99	98	85
R-sq	0.380	0.394	0.402	0.405	0.371
adj. R-sq	0.361	0.361	0.370	0.366	0.323
Robust standard errors in parenthesis					
* p<0.10, ** p<0.05, *** p<0.01					

Table 2: Regression results

In Figures 7 and 8, we show a line fit of the postulated negative relationship between GDP and FDI and rates of corporation tax and FDI. GDP accounts for approximately 28% of the variation in FDI, ceteris paribus.

The coefficient on TAX is insignificant and bears the wrong sign, hence not giving evidence to the idea that higher corporation tax rates should reduce the level of inward FDI.

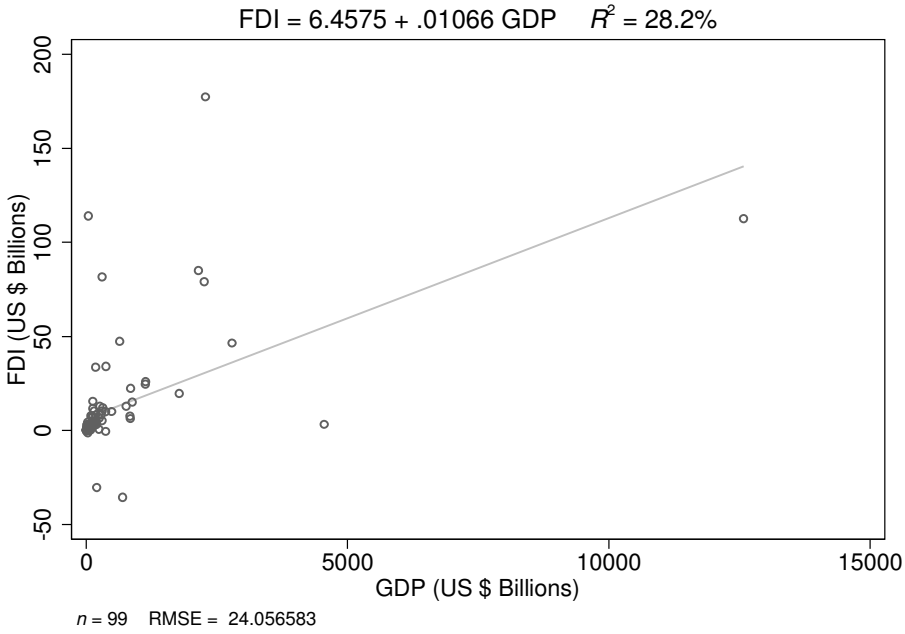

Figure 7: Relationship between FDI and GDP

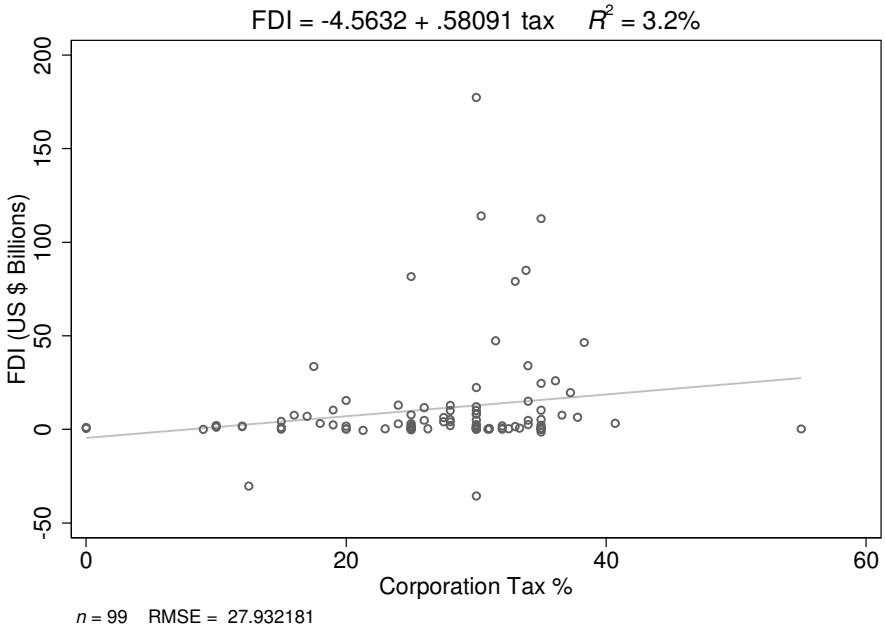

Figure 8: Relationship between FDI and Corporation tax

4.1 Diagnostics

Ramsay Reset Test				
Regression	(2)	(3)	(4)	(5)
F statistic	1.88	2.17	2.26	2.33
p value	0.1379	0.0968	0.0872	0.0799
Shapiro Wilk Test for Normal data				
Z statistic	7.381	7.262	7.287	7.267
p value	0	0	0	0
Variance Inflation Factor				
	1.14	1.27	1.26	1.45

Table 3: Diagnostic tests

We perform a number of diagnostic tests on regressions 2 – 5 in Table 2. The Ramsey Reset test for functional form misspecification tests for omitted variable bias by testing if non linear combinations of the explanatory variables explain the dependent variable. If this is not the case, the model is misspecified. We fail to reject H_0 for all four models - there is no evidence of functional form misspecification. We apply the Link test by regressing the fitted values and squared fitted values on the dependent variable; as these are not significant, this suggests that the model is not misspecified. Finally, the low average Variance inflation factor (vif) values are reassuring – multicollinearity does not appear to be a problem. When there exists a perfect linear relationship among the regressors, the estimates for a regression model cannot be uniquely computed.

4.2 Other models

In this section, we present some alternative models having experimented with some of the other variables in the dataset. The regressions results are presented in Table 4.

In general, there is litle improvement over the models presented in Table 2. We find population, GDP per capita and HH final consumption to be significant, while most oher variables such as trade, inflation and interest rates to be insignificant. It is hard to deduce that these variables are not considered by prospective foreign investors and the high negative intercepts would suggest that there are structural issues with the models. The dummy variable, set equal to 1 for a developing country is insignificant and bears the wrong

sign – we would expect a developing country to reduce the size of FDI flows as it is unlikely to be attractive to a prospective investor. This was compiled according to the IMF's *World Economic Outlook Report*, which was the latest classification available of developing/developed economies. The 'Economic Freedom Index,' a product of *the Heritage Foundation* and the *Wall Street Journal* gives 183 countries an overall score (out of 100) based on business/trade freedom, property rights, freedom from corruption, financial efficiency and government size/spending. The coefficient on this variable is insignificant and the simple correlation between FDI and economic freedom is also found to be very low at 0.25. Interestingly, we find that the level of broadband penetration is statistically significant at the 5% level – a one per cent increase in broadband penetration is expected to increase FDI inflows by about 0.9%, all else equal.

	(1) FDI	(2) FDI	(3) FDI	(4) FDI	(5) FDI
Population	32.634*	16.303			
	(18.29)	(17.16)			
GDP per capita	0.001**	0.000	-0.000		
	(0.00)	(0.00)	(0.00)		
HH final consumption	0.012***	-0.020	0.014***	0.035**	0.030
	(0.00)	(0.05)	(0.00)	(0.01)	(0.02)
Corporation tax	0.232		0.191		
	(0.20)		(0.18)		
Education	-0.107				
	(0.09)				
Trade	0.065*	0.031			
	(0.04)	(0.08)			
Exports		0.073			
		(0.06)			
Market capitalisation		0.011		-0.011	-0.009
		(0.02)		(0.01)	(0.01)
Urban population			0.150		
			(0.09)		
Interest rate (long term)			-0.175		
			(0.11)		
Inflation rate			0.123		
			(0.08)		
Ease of Doing Business				0.002	
				(0.06)	
Economic Freedom Index				0.527	
				(0.45)	
Land area of host country				-0.000	
				(0.00)	
Dummy (=1 if Developing country)					0.517
					(9.06)
Broadband penetration					0.916**
					(0.35)
Participation rate					-0.224
					(0.27)
Constant	-10.996	-5.459	-8.600	-26.022	15.244
	(6.71)	(9.92)	(8.46)	(29.74)	(21.85)
N	98	87	84	84	88
R-sq	0.409	0.457	0.354	0.287	0.323
adj. R-sq	0.370	0.416	0.304	0.241	0.282
Robust standard errors in parenthesis, * p<0.10. ** p<0.05, *** p<0.01					

Table 4: Other models

5. Conclusions

This paper has attempted to examine the principal determinants of FDI on a cross-country basis using a large sample of both developed and developing countries. By controlling for factors such as corporate tax rates, skills of the labour force, population, ease of doing business and market size, it has been shown that these variables accounted for about 40% of FDI inflows across 99 countries in 2005. In most regressions, GDP per capita, household final consumption and the size of the labour force were found to be statistically significant. This indicates that domestic demand and economic activity are key drivers of FDI, in line with Blonigen and Piger (2011). An interesting finding was that broadband penetration was found to be statistically significant and FDI appears to increase almost one for one with an increase in the level of broadband penetration, all else equal. Surprisingly, in this sample, education (human capital) and corporation taxes played no significant role in explaining FDI – which is consistent with work by Agodo (1978) but at variance with Morisset and Pirnia (2002). It appears that fiscal incentives in the form of corporation taxes may be unique to some countries such as Ireland.

An innovation of this paper has been the attempt to harmonise determinants across countries by including a mixed sample of developing and developed economies. Unfortunately, as the tenor of this paper has indicated, it remains an open question as to the specific factors that draw FDI into countries. What can be deduced from this research is that traditional factors such as market size and growth are the most prevalent considerations which foreign investors mull over.

There are several conceivable paths for further research in this area. Firstly, an interesting extension could be to estimate the model using data from the year 2000 and from the year 2010, this way capturing the behaviour of the response variables in an earlier period before global FDI took off, and also at a time when the global economy contracted due to the onset of the financial crisis. Second, an alternative modelling strategy could be to employ time series analysis, looking at the behaviour of the response variables to FDI over a long period of time – possibly several decades. However, given data limitations, it would mean curtailing the breadth of countries to be included in the analysis as data for many developing countries does not extend sufficiently far back in time. Finally, an alternative analysis could employ firm level data and examine FDI flows to firms and the impact of the response variables on the expansion of domestic firms within the host country receiving the FDI inflows.

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