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Reexamining the Conditional Effect of Foreign Direct Investment

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ABSTRACT

Reexamining the Conditional Effect of Foreign Direct Investment[*]

The prevailing consensus is that foreign direct investment (FDI) effects are *conditional*. At the macro level, they depend upon minimum levels of human capital or financial development, while at the micro level, they depend on type of linkage (forwards, backwards, or horizontal). This paper presents new evidence showing that these effects are substantially less "conditional". We use a meta-analysis on two data sets covering 549 micro and 553 macro estimates of the effects of FDI on performance. We find these effects tend to be larger in macro than in micro studies, and greater in low- than in high-income countries.

JEL Classification: C83, F23, O12

Keywords: foreign direct investment, economic growth, firm performance, meta-regression-analysis

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1. INTRODUCTION

Foreign direct investment (hereafter FDI) is one of the main facets of globalization. Scholars have devoted enormous time and effort to develop a satisfactory understanding of both the rationale (how multinational firms choose particular destinations over others) and the mechanisms through which the economic benefits of FDI take root. On the latter, for example, there is theoretical support for a positive impact: FDI increases total factor productivity and accelerates accumulation. Hence the expectation is that the payoffs (in terms of aggregate economic growth and individual firm performance) would not be difficult to identify empirically and that the debate would be instead about the size of these benefits. Interestingly, these positive effects turned out to be considerably more difficult to uncover than initially thought. Indeed, recent research has converged on the view that the effect of foreign direct investment on economic performance is *conditional*. That is, the prevailing view is that the effect at the macro level depends upon whether recipient countries have attained minimum levels of human capital, financial and institutional development, while studies focusing on the effects of FDI using firm-level data tend to find that the (micro-) effect is conditional upon the type of linkages (with backward linkages, that is, links between the firm and its suppliers, dominating over horizontal or forward linkages).[1] The objective of this paper is to take stock of the aggregate as well as firm level (in other words, micro as well as the macro) evidence so as to confront and re-assess these conclusions by carrying out a comprehensive systematic quantitative review of these two bodies of econometric evidence.

Historically, FDI concentrated in advanced economies (acting both as senders and recipients). The participation of developing countries in total worldwide FDI has risen substantially since the early 1990s and has become more pronounced after the 2007 financial

[1] Borensztein, Gregorio and Lee (1998) show that the effect of FDI is conditional on recipient countries reaching minimum levels of human capital. Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) interpret these thresholds in terms of minimum levels of financial development. Javorcik (2004) shows that backward linkages are the main transmission channel for the benefits of FDI at the micro-level. Havrenek and Irsova (2011) survey the micro evidence on vertical spillovers.

crisis. Recent UNCTAD figures show that developing countries now attract more than half of global FDI inflows (UNCTAD 2010). Note also that this occurred while FDI inflows become more widely distributed: it is not simply that developing countries that traditionally attract FDI (mainly Latin America, Asia and Eastern Europe) have since the crises done better, but instead that low income countries have also experienced a rather substantial increase in FDI inflows.

There is a voluminous empirical literature on the relationship between FDI and economic growth, investment and productivity.[2] Several studies document important effects -positive or negative- on host countries' growth and investment both at the aggregate and at the firm level. This literature has focused on the impact of FDI on the host country by focusing on the spillover effects from foreign firms to domestic firms, local suppliers and customers (e.g. Borensztein, Gregorio and Lee 1998 and De Mello 1997).

Aggregate level regression analyses carry a wider cross-country perspective, but encounter potential econometric problems in terms of, for instance, endogeneity and omitted variable biases. Firm-level evidence might be often restricted to a single country but tend to address such econometrics problems more forcefully. These econometric difficulties in analyzing macro data fueled increased interest in the investigation of the spillover effects of FDI on domestic firms (horizontal spillovers[3]) and backward and forward linkages (vertical spillovers) by exploiting firm-level or plant-level databases on firm productivity and performance. On the other hand, a clear drawback of micro studies is that they often have little to say in terms of the economy-wide effect of FDI.

With these relative advantages and disadvantages in mind, the view we take in this paper is that the two bodies of evidence (micro and macro) should receive equal attention

[2] For seminal works on FDI see Hymer (1960) and (1976); Vernon (1966); Caves (1974); Krugman (1981); Dunning (1988); Haddad and Harrison (1993).

[3] The four main channels are: a) movement of high skilled staff from MNCs to domestic firms; b) domestic firms learning to export from MNCs; c) demonstration/imitation effect by passing managerial, organisation and technological innovations from MNCs to domestic companies; d) competition effect into host countries forces domestic firms to use existing technology and resources more efficiently but can also crowd them out. On the latter see also Aitken and Harrison (1999).

because they can jointly potentially teach new lessons about FDI. We believe this paper makes four main contributions: (1) it covers *both* the micro and the macro evidence: the former can throws light on private returns and localized effects, while the latter can uncover important features of social returns and the net effects of FDI inflows; (2) it is based upon a substantially larger number of "data-points" compared to previous meta-analyses on FDI (Gorg and Strobl 2001; Meyer and Sinani 2009; Havrenek and Irsova 2010 and 2011); (3) it exploits a relatively wider set of moderator variables and controls than those used in previous studies (for a direct comparison see Wooster and Diebel 2010); and (4) it relies upon a sophisticated econometric model allowing the studies to be a random sample from the universe of all possible studies and hence assuming that there are real differences between all studies in the magnitude of the effect (Hedges, Larry V., Elizabeth Tipton, and Matthew C. Johnson. 2010; "robumeta" command in STATA[4]).

This paper examines the effects of FDI using meta-regression-analysis techniques. These are techniques for summarizing and distilling the lessons from a given body of econometric evidence. For this exercise, we construct a unique data set covering 549 micro (or firm-) and 553 macro or country-level estimates of the effects of FDI on performance, from 103 and 72 empirical studies, respectively[5]. It contains information on more than 30 features of these econometric estimations with respect to, among other things, sampling and methodology.

The main findings are as follows. *The first* is that the effect of FDI on economic performance and growth are significantly greater in low-income than in lower and upper middle-income countries (both at the micro and macro level). Note that a surprisingly extensive lack of data still remains regarding FDI in poorer countries.[6] One would expect

4 http://www.stata.com/statalist/archive/2011-03/msg01600.html.

5 Details on data collection are in Appendix 5.

6 The conventional wisdom about foreign direct investment in low income countries (LICs) is that the little FDI these countries receive is often concentrated in the natural resources sector, thus explaining its

that FDI is an area for which there is plenty of reliable quantitative evidence on developing countries, but that does not seem the case. Yet, available data provide stronger support for differentiating the effect of FDI on growth across levels of development rather than in terms of geographic regions. *The second* set of results relates to the distribution of the effects of FDI. We find that, in the micro studies, 44 percent of these estimates are positive and statistically significant, 44 percent are insignificant and 12 percent are negative and significant (see Figure 1). In the case of macro studies, 50 percent of the estimates are positive and statistically significant, 39 percent are insignificant and 11 percent are negative and significant. These effects tend to be large in macro than in micro studies. Our results also suggest that publication bias is not particularly severe in this body of evidence, especially when methodological differences are taken into account. *Thirdly*, regarding the reasons for the observed variation on the estimated effects of FDI, we show that the choice of econometric method and specification are most important factors. We find evidence that those empirical specifications that control for endogeneity and firm level unobserved heterogeneity tend to report significantly smaller effects of FDI (in micro studies), and the same for those that take into account the interaction of FDI with R&D expenditures, trade openness, human capital, and financial openness in macro studies. Finally, the FDI effects are larger for backwards than for any other type of linkages.

In light of these findings, a discrepancy emerges between the main lesson from the literature (namely that the effect of FDI is conditional on countries having reached certain thresholds, mainly with respect to human capital and financial/institutional development) with the finding that the effects are larger for countries often found much further below such critical thresholds (Cohen and Levinthal 1990; Acemoglu, Aghion and Zilibotti 2006). We argue that considerations of the gap between private and social returns, albeit largely missing in most of the current academic and policy discussions, may provide an explanation.

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perceived limited development impact. For example see Asiedu (2006); Buckley, Clegg, Cross, Liu, Voss and Zheng (2007); Spencer (2008).

Private returns to FDI are higher in low income countries, but because of institutional deficiencies, infrastructure problems, pervasive rent-seeking and/or generalized lack of competition, the benefits from these investments projects in poorer countries are highly localized. By localized we mean they are not widely spread and do not reflect in the social rates of returns (the estimates from macro studies.) This wedge (gap or difference) is important and has received little attention so far. It opens new avenues of research and re-focuses the policy debate. In terms of research, this finding creates incentives for research that examines the gap itself as opposed to the two individual parts separately. In terms of policy, it nudges the debate from attracting "any FDI" to policies that recognize that different types of FDI may have rather different social rates of return.

The paper is organized as follows. Section 2 presents a short and informal literature review on the effects of FDI. It is informal on purpose as the contrast with the more systematic review that follows is nothing but stark. Section 3 describes the database constructed for the meta-regression analysis and section 4 discusses in detail our econometric results. Section 5 has concluding remarks and some implications for policy and future research.

2. FOREIGN DIRECT INVESTMENT AND ECONOMIC PERFORMANCE

The purpose of this section is to provide a succinct survey of the literature based solely on some of the most widely cited papers so as to produce a review that is intentionally "unsystematic." The findings from this review are then to be compared to those of the more "systematic" review of the evidence we carry out in the remainder of this paper.

Why should we expect FDI to have a positive impact on economic performance? There is an extensive theoretical literature which provides multiple answers to this question. FDI is thought of as a direct, debt-free, way of adding to the capital stock of the host economy. This addition to the host economy's investment fuels growth directly and indirectly. FDI can increase overall employment and create new and possibly better jobs, FDI can provide access to up-to-date industrial technology, it can give firms from the host country greater access and exposure to international markets, and it can also demonstrate to host country firms the value of new management and export techniques.[7]

The fact that it is difficult to identify first-order effects of FDI on economic performance suggests that, despite all these alleged benefits, there must also be some non-negligible costs. What can those be? One source of such costs is that competition from foreign firms with superior technology and scale can damage domestic producers, with possible job losses. High rates of profits repatriation coupled with low rates of reinvestment in the host economy can also dampen the potential benefits of FDI. One can also imagine that if FDI concentrates in sectors with limited linkages to the rest of the economy, such as natural resources or maybe agriculture, then one should also expect smaller benefits.

What are the main findings from the macro/country and micro/firm bodies of empirical evidence? The macro evidence typically uses cross sections and panel techniques to examine the effects of FDI on GDP growth rates or, less often, on TFP rates across countries over time. Few would disagree with the statement that this body of evidence tends to identify relatively modest first-order effects of FDI on performance, which become much larger once thresholds are taken into account. The seminal contribution of Borenzstein, De Gregorio and Lee (1998) puts forward the notion that those countries that have sufficiently educated work forces are able to capture more fully the benefits from FDI. De Mello (1997 and 1999) identifies a different type of threshold: FDI significantly affects performance only in those countries in which we observe a strong complementarity between domestic and foreign capital. Finally, Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) argue that the benefits of FDI can better be seized in those countries that have reached a certain level of financial development, because this helps potential suppliers of the foreign

[7] Some of these benefits are usually studied under the broader term "spillovers". See also footnote 3.

firm to develop.

The micro-evidence on the effects of FDI on economic performance reaches similar conclusions. It typically uses longitudinal data techniques to examine the effects of FDI on output or TFP growth rates across firms and sectors over time. Few would disagree with the statement that this body of evidence also tends to identify relatively modest first-order effects of FDI on performance, which become substantially larger once specific types of effects are taken into account (especially vertical spillovers and backward linkages).

As far as the FDI direct effect is concerned (FDI brings capital to the host country) there is widespread consensus on the positive effect on the host countries' firms and the empirical literature provides quite robust findings (Blomstrom and Kokko, 1998; Eichengreen and Kohl, 1998; Holland et al, 2000; Navaretti and Venables, 2004). On the other hand, the unintended indirect impact (spillovers or externalities) on host countries has been characterized by less conclusive findings in the micro literature, depending on the economic growth and development effect, the employment and working conditions effect, the environmental effect, and finally the technology transfer potential towards domestic firms. It is widely documented that FDI inflows has the potential to upgrade the technological capabilities, skills, and competitiveness of established domestic firms in the host countries generating positive externalities. The channels through which FDI may spill-over from foreign affiliates to other firms in an economy have been analyzed in detail in a number of papers (Markusen and Venables, 1999; Javorcik, 2004; Blomström and Kokko, 1998, among others). The main channels identified by the literature are the imitation/demonstration, movement of workers and competition but intra-industry productivity spillovers are difficult to find. Javorcik (2004) shows that these difficulties in identifying intra-industry productivity spillovers from FDI are due to a wrong focus: the effects operate across industries and, specifically, through contacts between foreign affiliates and their local suppliers in upstream sectors, then it becomes possible to precisely estimate the effect.

There is one recent piece of evidence that bridges the results from the macro and micro literatures discussed above. Blalock and Gertler (2008) study a panel of Indonesian firms between 1988 and 1996 and report that FDI benefits are conditional on firms having acquired certain capabilities. They focus the study of these capabilities in three areas: human capital, research and development and distance to the technological frontier and find that these thresholds are crucial in identifying FDI effects.

What are the main lessons from this brief yet unsystematic review? We argue the main lesson is conditionality: that firms, sectors or countries that are below certain "thresholds" (either in terms of human capital, financial development or institutional quality) are less likely to benefit from FDI. One unappreciated consequence is that low-income countries are those in which these minimum critical levels are less likely to have been reached and hence one should expect the effects of FDI on performance to be more difficult to identify or even much weaker than elsewhere. The policy implications are equally direct and, arguably, even dimmer. The implications for further research are somewhat brighter. Although the macro and micro literatures are often presented as supporting somewhat disjoint findings, the recent "unnoticed convergence" that firm capabilities (micro) and absorptive capacity (macro) can play similar roles deserves further consideration.

3. DATA

In the previous section we suggest that the conventional view of the effects of FDI on economic performance is well defined by the idea that it is "conditional." However, this is based on an assessment of the literature that is not as systematic and rigorous as it should be. For the latter, one need results that can be clearly replicated and, consequently, a data set and an explicit methodology. The objective of this paper is to provide such systematic assessment so in this section we present our data set and in the next we discuss our methodology and main results. Our point of departure is the view that cross-countries aggregate and firm level analyses are complementary. They are both included in our systematic review (but are analyzed separately) which comprises a meta-regression analysis of the full existing literature. The literature focuses on the conditions under which FDI are productivity (firm level) and growth (aggregate level) enhancing along different dimensions.

Meta-regression analysis is the methodology we use here. We build upon a fast expanding meta-analysis literature on FDI that has so far mostly focused on advanced and transition economies and it has concentrated either on the macro or on the micro literatures.[8] Here we focus on both the macro and micro evidence and pay special attention to the evidence from poorer countries.

3.1 Funnel Plots: A birds' eye view of the FDI-growth relationship

This section presents "funnel plots" to discuss results comparing the partial correlation coefficient and its precision in the 549 micro estimates and 553 macro estimates of the effect of FDI on economic performance.[9] In figures 3 and 4, the partial correlation coefficient (PCC) variable on the horizontal axis is defined as $\frac{t}{\sqrt{(t^2+df)}}$ with "t" being the t-statistic of the effect under study, "df" being the degrees of freedom, whereas the precision variable on the vertical axis is computed as the inverse of the standard error of the PCC, $\frac{1}{se_{PCC}} = 1/\left[\frac{1}{(t^2+df)}\right]$. This bird's eye view of our variable of interest (i.e. our dependent variable) in each single study *vis-à-vis* its precision entails a preliminary but informative assessment of both the existence and strength of the relationship between FDI and economic performance. The funnel plot (see Stanley and Doucouliagos 2010) provides a pictorial representation of

8 See among others e.g. Holland, Sass, Benacek and Gronicki (2000); Gorg and Strobl (2001); Wooster and Diebel (2006); Meyer and Sinani (2009); Hanousek, Koceda and Maurel (2010), Havrenek and Irsova (2010) and (2011).

9 Appendixes 1 and 2 list the papers initially included in the micro and macro studies, respectively. Appendixes 3 and 4 contain summary tables of all variables included in micro and macro datasets, respectively. Appendix 5 describes the criteria for the selection of individual studies.

the peak of the graph, i.e. the average effect of the relationship under investigation, and the scatter plot shows the dispersion around this mean effect. For the micro sample, we exclude outlier studies with coefficient's precision $\left(\frac{1}{se_{ij}}\right)$ above the 25000 threshold and for the macro set we exclude studies with precision above the 23000 threshold, se_{ij} being the standard deviation of the "ith" coefficient estimate in the "jth" study.[10]

There is a heterogeneous set of estimates clustered around the mean partial correlation coefficient value of 0.048 for micro and 0.170 for macro estimates, respectively. Notice that the macro papers we collected are a cross-section of developing countries or developing and developed countries.[11] Overall, we could tentatively infer that the net effect measured by macro studies might be somehow bigger than the gross effect measured by micro studies, which would be in line with an interpretation of a wedge between the social and private returns of FDI. Furthermore, from a preliminary review of the "non-symmetry" of the funnel plots in Figures 3 and 4, one can tentatively detect signs of potential publication bias (this is tested statistically below in section 4.3).

3.2 The selection of the variables from the quantitative studies

In order to explain the variation of the estimated effects of FDI on performance the methodology needs to identify, select and measure a range of variables that reflect different potential reasons for precisely that effect and therefore help isolate conflicting explanations. The choice of moderator variables to be included in meta-regression-analysis reflects these. These independent variables can be divided in three broad categories: variables on paper characteristics (e.g. publication year and affiliation of authors), variables on the papers'

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[10] The excluded micro estimates come from the following papers: Li, X., Liu, X., Parker, D. (2001) "Foreign direct investment and productivity spillovers in the Chinese manufacturing sector" *Economic Systems* 25 (4), pp. 305-321; Sarkar, S., Lai, Y.-C. (2009) "Foreign direct investment, spillovers and output dispersion - The case of India" *International Journal of Information and Management Sciences* 20 (4), pp. 491-503; E Torlak (2004), Foreign Direct Investment, Technology Transfer, and Productivity Growth in Transition Countries Empirical Evidence from Panel Data, CeGE Discussion paper 26.

[11] Cross countries studies are in fact often mixing advanced and developing countries data. See also Doucouliagos et al. (2010) for a comparison.

dataset and estimators (e.g. period analyzed, panel vs. cross section, sample of domestic vs. foreign firms, number of observations, estimator), and variables on the equation estimated in each study (e.g. definition of output variables and other controls).

The database assembled for this paper contains information on moderator variables for all selected papers at the micro and macro levels. Whenever a paper estimated different relationships (say one equation on the direct impact of FDI on firm's growth and one equation on the impact of FDI on firm's productivity) we coded both (or more) equations. Some studies include as independent variables different measures of FDI, for example a dummy for foreign presence as well as measures of foreign firm penetration in the market (e.g. a measure of horizontal spillover). In this, and other similar cases, we report the *t* statistics of both (or more) measures of FDI, which appear in the dataset as more than one observation.[12]

We classified all papers found with Google Scholar and Scopus using the "FDI + country name" keyword (for further details see Appendix 5). Once we classified all papers from this search, we cross-checked this list of articles with the articles used by previous meta-analyses. All the papers used by other meta-analyses, but not found through our searches, were added to our dataset. The list of papers used to build the database is provided in Appendixes 1 and 2 for the micro and macro studies, respectively.

The micro dataset is composed of 549 observations from 103 papers[13], published between 1983 and 2010.[14] The period analyzed in these papers ranges from 1965 to 2007. The countries analyzed in the selected papers are the low and middle income countries according to the World Bank definition. Most of the observations (189) are on China.

[12] We have an average of 5.3 estimates per paper in the whole micro sample (549/103), 4.8 for all countries excluding China (360/75) and 6.8 for China (189/28). In the macro data we have 7.7 estimates per paper (553/72).

[13] Our initial data included 570 estimates from 105 papers. We dropped the top and bottom centile of the "t" value variable distribution (i.e. t>30 and t<-6) and, because of our focus on developing countries, we also dropped papers on countries recently become high income (such as Czech Republic, Poland and Hungary).

[14] 50% of the studies are published or released after 2007. Appendix 1 reports the whole list of studies, also including two outliers.

There were surprisingly only a few observations on India and other emerging markets. The type of data used is either cross-sectional or panel data (see Appendix 3 for further details). Out of our 549 estimates-observations, 48% use cross-sectional and 52% panel data. All selected papers contain one or more equations which estimate the direct or indirect effect of FDI on one of the following variables: a measure of firm efficiency (such as TFP), firm output, value added, or labor productivity. The direct effect of foreign firms is defined as the impact of foreign ownership on the performance of acquired firms. On the other hand, the indirect effect is defined as the foreign firm spillover on domestic firms, and this may be vertical (forwards or backwards inter-sectors) or horizontal (intra-sectors). This effect may be measured as a dummy variable for foreign presence or as the percentage of foreign presence in the domestic firm. In 12% of estimates, the focus is on the "direct" effect on FDI on the firm and/or sector, while for 88% of the observations the focus is on the indirect effects (with the latter divided as follows: 129 focus on vertical spillovers and 306 on horizontal spillovers).

The dataset of estimates of the effect of FDI on growth from macroeconomic studies is composed of 553 observations from 72 papers, published between 1973 and 2010.[15] Appendix 2 reports the list of these studies. The period analyzed in these papers ranges from 1940 to 2008. The countries analyzed in the selected papers are developing countries only or mixed developing and developed countries, if the latter are included in the same cross country study and cannot be disentangled. Overall, 67% of the estimates are for developing countries only and 33% for mixed cases[16] (Appendix 5.4 presents details on paper selection and coding of their main characteristics). In terms of type of data, out of 553 observations, 87% are based on cross-sections and only 13% on panel data. About 82% of the estimates control for some sort of interaction effect of FDI with other macro variables,

[15] Note that 50% of the studies were published or released after 2003.

[16] This does not hold for the papers, the reason being that some of them include separated regressions for mixed and developing countries only.

and 63% of the estimates combine both a "pure" FDI and interaction effects.[17]

4. REASSESSING THE CONDITIONAL EFFECT: ECONOMETRIC RESULTS

4.1 Meta Regression Analysis: Unconditional regressions using Micro data

We first report results focusing on the micro data, that is, on the effect of FDI on firm (not country which we address later) performance. We estimate the following Robust Random Effect Meta Regression[18] model, allowing for residual heterogeneity (between study variance not explained by covariates) and weighting each observation with the inverse of the overall standard error (Harbord and Higgings 2008):

$$r_{ij}^{micro} = \beta_0 + v_{ij} + \varepsilon_{ij} \qquad (1)$$

where r_{ij} is the partial correlation coefficient for the "jth" estimation in the "ith" paper. Respectively β_0, v_{ij} and e_{ij} are the average effect, the idiosyncratic (in this case, paper-estimate specific) sampling error and the between study error.[19]

There are two main reasons for the choice of the partial correlation coefficient: one is that it allows a direct comparison between the micro and the macro results (section 4.2). Second, there is an important heterogeneity in empirical models' specification for firm level studies and hence it is not possible to obtain a comparable measure which could easily be interpreted as an elasticity or semi-elasticity coefficient for all estimates. In other words, had we restricted the reported estimates to a fully comparable set of specifications we would have excluded too many studies and therefore we would have based the findings on a very small number of observations (which would raise selection issues). For completeness, we also estimate the same model on a different specification:

$$coeff_{ij}^{micro} = \beta_0 + u_{ij} + \varepsilon_{ij} \qquad (2)$$

[17] There are also standard cases, that is, only interaction effect or only pure effect.
[18] Implemented using the STATA command 'robumeta' from Hedges, Tipton and Johnson (2010).
[19] We correct for robust SE clustered at the level of the papers, i.e. we do take into account that more than one estimates come from the same paper and this might induce the errors not to be independent.

Now the response variable $coeff_{ij}$ is the actual reported coefficient in the estimate, $u_{ij} \sim N(0, \tau^2)$ the idiosyncratic sample error, $e_{ij} \sim N(0, \sigma^2)$ the between study error and the τ^2 is the between estimates variance to be estimated from the data.[20]

The results from the regression on the mean (unconditional) are presented in Table 1. In the reported six columns all meta-regressions are weighted by precision, i.e. the inverse of the standard error of the PCC, $\frac{1}{(t^2+df)}$, for columns 1-4 (equation 1) and the inverse of se_{ij}, the standard error of the coefficient of FDI in the "jth" estimate and "ith " paper, for columns 5-8 (equation 2), respectively.

The Meta-regression Analysis literature tends to regard the effect size in three main ranges: 0.0 to 0.20 would be considered *trivial*, 0.20 to 0.50 *moderate* and 0.50 or above *high* (Borestein, Hedges, Higgings and Rothstein, 2009). How does this compare with our results? The average *effect size* of FDI on growth is statistically significant and its magnitude is 0.048 when measured as partial correlation coefficient for the entire sample[21], i.e. a face value *trivial* effect. On the contrary we do regard this as very important and not-trivial result per se: 1) it shows a non dubious positive effect of FDI on growth (still debated point in the literature) 2) when the sample is split in three parts the LI countries effect is much higher 0.080 (column 2), where 0.064 Tau (the estimated standard deviation of underlying effects across studies showed in the last row of the table) signals that the effect can be up to 0.144 (0.08+0.064), on the upper end of the interval and closer to the *moderate* effect: In fact, more specifically, columns 2, 3 and 4 examine the differential impact by examining low income (LI), lower middle income (LMI) and upper middle income (UMI) country groupings separately: 0.080, 0.054 and 0.044 are the respective effect sizes and are again all statistically significant and positive. The effect of FDI on LI performance seems much stronger then in

[20] Observations with |t|>40 and (1/seij) > 25000 are excluded from the sample.

[21] Ranging in the [-1,1] scale.

LMI and even more so with respect to UMI (for a comparison see Mayer and Sinani 2009). In other words, the coefficients for the three groups of countries are statistically different[22] and strongly support the hypothesis of a significant effect of FDI on economic performance.

We do not this to be the only way to look at the data and for this purpose in columns 5-8 we report the results of the effect size ($coeff^{micro}$ in equation 2) when not measured as Partial Correlation Coefficient. We are aware that we cannot fully interpret their magnitude (0.005 has no economic meaning), due to the heterogeneous nature and unit of measure of the coefficients in different studies, but we can still confirm an overall positive effect drive by the upper middle income countries group. In other words we cannot see any contrasting evidence between column 1-4 and 5-8, given the different nature of the two measurements. It would have been problematic to see a change in sign in the separate parts of table 1, which is not the case.

4.2 Meta Regression Analysis: Unconditional regressions using Macro data

In order to analyze the effect of FDI on economic performance at the macro level (that is, in terms of economic growth rates) , we estimate two separate Robust Random Effect (RE) models. Firstly:

$$r_{ij}^{macro} = \beta_0 + v_{ij} + \varepsilon_{ij} \qquad (3)$$

where r_{ij} is the partial correlation coefficient, defined above, for the "jth" estimation within the "ith " paper. The Robust RE Meta regression model weights each observation with the inverse of the standard error of the partial correlation coefficient from its corresponding t statistic. β_0 , vij and e_{ij} are the average effect, the idiosyncratic (paper-estimate specific) error[23] and the between study error, as in the micro dataset analysis above for convenience.

[22] The poolability test on the coefficients ($\beta_{LI} = \beta_{LMI} = \beta_{UMI}$) it's rejected at the 1% level. The poolability test on the standard errors [$Se(\beta_{LI}) = Se(\beta_{LMI}) = Se(\beta_{UMI})$] it's also rejected at the 1% level.

23 We correct for robust SE clustered at the level of the papers in the sample, i.e. we do take into account that more than one estimates come from the same paper and this might induce the errors not to be independent.

We also estimate:

$$coeff_{ij}^{macro} = \beta_0 + u_{ij} + \varepsilon_{ij} \qquad (4)$$

The response variable $coeff_{ij}$ is the actual reported coefficient in the estimate, $u_{ij} \sim N(0, \tau^2)$ the idiosyncratic sample error, $e_{ij} \sim N(0, \sigma^2)$ the between study error and the τ^2 is the between estimates variance to be estimated from the data.[24]

The results from the regression on the mean (unconditional) are presented in Table 2 and 3. The partial correlation coefficient in columns (1-3) can be compared to those from the micro evidence =: the average partial correlation coefficient is now 0.170[25], threefold the result shown in the micro sample of Table 1. The effect is also characterized by an estimated standard deviation of underlying effects across studies (Tau) of 0.203 and this means that we are considering an upper bound 0.373, well within the of moderate effect range described by Borestein, Hedges, Higgings and Rothstein, 2009. When we restrict the sample to cross-countries studies for developing economies the average is marginally bigger, 0.173[26] and Tau smaller (0.108), whereas for mixed samples the opposite is true, lower effect (0.150) and higher estimated standard deviation (0.392).

The interpretation of these new findings *vis-a-vis* the micro effect in Table 1 is key. Why we observe such a stark difference between micro and macro? What could be possible the reason for a micro-macro gap? We believe this is one of the main finding of our analysis: it not surprising that micro effect is lower than the macro when the former is a net and the latter a gross measure of the FDI-performance relationship. Face value we are able to assess that 0.170-0.048=0.122 is the un-accounted economy wide spillovers the macro studies pick up above and below micro ones when looking at aggregated data, due to the encompassing

[24] Observations with |t|>40 and (1/seij) > 23000 are excluded from the sample.

[25] This is in line with a recent study by Doucouliagos, Iamsiraroj and Ulubasoglu (2010) which shows that at macro level the relation is both statistically significant and quite strong, with effects averaging around 12 to 15% when the partial correlation coefficient is used as dependent variable.

[26] These numbers have to be interpreted within the [-1,1] partial correlation coefficient scale and, as discussed above, have no direct economic interpretation.

nature of country level estimates. Micro studies are not (and should not) account for these, precisely because they are designed to dissect the various channels of the FDI-growth relationship and are much better equipped in terms of empirical models to do so. The drawback is the screaming off the effect and the much reduced estimates. In other words micro and macro are focusing on different "potential beneficiaries" of the FDI spillovers, the former being a clear subset of the latter, and therefore a clear underestimation of the wide economy impact. This is some-how overlooked by FDI scholars concentrating the one or the other data. Columns 4 to 6 replicate the analysis for the coefficient effect. The results are qualitatively unchanged. So far we have looked at the pure statistical magnitude of the effect. We did not say anything about economic interpretation. As far as the economic interpretation is concerned, we proceed as follow. There is much smaller variation in the choice of specifications in the macro literature than in the micro studies, the reason being that many empirical models investigate the same "augmented growth regression". Therefore we can create a "Homogenous sample" database by including studies that report exactly the same consistent specification of left hand side (LogGDP-LogGDP(-1) log growth of GDP) and right hand side variables (FDI/GDP, % FDI on GDP). The results are in table 3.

In Table 3 the results of the left hand side panel (columns 1 to 3 based on a reduced sample) is reassuringly very close to the same panel in table 2 (based on the total sample). This confirms the genuine quality of the whole sample estimates. More interestingly the right hand side panel gives an economic rationale to the analysis. Columns 4-6 of table 3 can be interpreted as semi-elasticity: in the entire sample a 10% increase in foreign presence as a percentage of GDP increases growth on average by approximately 0.83%, in the developing countries sample, 10% increase in foreign presence as a percentage of GDP increases growth on average by approximately 0.2% and finally in the mixed database sample a 10% increase in foreign presence as a percentage of GDP increases growth on average by approximately 2.95%. Summing up the effect is bigger (albeit barely statistically significant) for samples with developing and developed countries (i.e. mixed group). [27]

4.3 MRA and Publication/Reporting Selection

Following Card and Kruger (1995), Gorg and Strobl (2001), Doucouliagos and Stanley (2009) and Stanley and Doucouliagos (2009) we also investigate publication selection bias. Following the methods developed by Doucouliagos and Stanley (2009) –Funnel Graph Asymmetry Test (FAT) and Precision-Effect Estimate with Standard Error (PEESE) –, we test the null hypothesis that the constant in the FAT test β_0 is equal to zero in absence of publication bias. For this purpose, we estimate the following study level - φ_j-Random Effect models:

FAT-MRA:

$$t_{ij} = \beta_0 + \beta_1 \left[\frac{1}{se_{ij}}\right] + \varphi_j + v_{ij} \qquad (5)$$

PEESE-MRA:

$$t_{ij} = \beta_0 se_{ij} + \beta_1 \left[\frac{1}{se_{ij}}\right] + \varphi_j + v_{ij} \qquad (6)$$

Card-Kruger bias test (1995):

$$\log\left|t_{ij}\right| = \beta_0 se_{ij} + \beta_2 \log\sqrt{df_{ij}} + \varphi_j + v_{ij} \qquad (7)$$

The results are presented in Tables 4 and 5. The null hypothesis is clearly rejected at 1% in both micro and macro studies. However by looking at the PEESE results, more appropriate than the FAT when *there is* a true effect, we note that the true effect (β_1 coefficient on $\frac{1}{se_{ij}}$) is positive and significant in developing countries for macro studies and in low income countries in micro studies. In other words, even when controlling for publication bias the evidence supports a "genuine" effect of FDI on economic performance in emerging countries.

[27] The effect for the "Mixed countries sample" is somewhat bigger but is barely significant. Yet this might be caused by a composition effect, the reason being that we do not observe the relative weights of developing and developed economies in most of the 14 homogenous mixed studies (the list of countries is rarely reported in papers).

Alternatively, we also follow Card and Kruger (1995) publication bias test and assess whether the β_2 in equation (6) -now the coefficient to the $\log\sqrt{df_{ij}}$- is statistically different from 1, H_0: $\beta_2 = 1$, H_a: $\beta_2 \neq 1$. The key independent variable, the log of the square root of the degrees of freedom, is predicted by sampling theory to have a coefficient of one in absence of publication bias. We reject the null hypothesis in all micro and macro samples but we report a positive relationship between t-ratios and degrees of freedom, indicating a mild publication bias.

However we would be cautious in interpreting these results: the "publication" bias could originate from very different sources and the conclusion from this set of results is that we do observe the same sort of bias, yet we are not able to identify its precise source. Our test for publication bias is controlling for study random effects *only*. In other words we are able to point that the literature has been affected by a certain level of bias, probably due to econometric models misspecification. More importantly, when running the same tests and controlling for other studies characteristics (for a comparison with the original FAT see Doucouliagos and Stanley 2009) there remains little statistical evidence left for such a bias.

4.4 Meta Regression Analysis on Studies Characteristics

In this section the specification presented in model (1) is modified by adding moderator variables :

a) definition of FDI (e.g. as % of GDP, as flow, as investment);
b) definition of performance (e.g. GDPpc growth, TFP growth, etc.);
c) sample characteristics (e.g. firm versus sector, size, etc.);
d) type of FDI-growth relationship analyzed (with or without interaction);
e) controls on the econometric methodology/specification (OLS, IV, GMM, etc.);
f) geographical areas/countries (in micro studies country dummies, in the macro studies, regional dummies);

g) time period of analysis;

h) median year of the database.

The specification of the new estimation equation is:

$$r_{ij} = \beta_0 + \boldsymbol{B}Z + v_{ij} + \varepsilon_{ij} \qquad (8)$$

where the $\boldsymbol{B}$ and $\boldsymbol{Z}$ denotes a 1 x k vector and k x N matrix, respectively. The results reported in tables 6 for micro studies and 7 and 8 for the macro evidence. We discuss each of these in turn below.

4.4.1 Micro Level Results

In order to assess whether the results for the whole sample might be the effect of the composition of different type of countries, level of development and time periods, in Table 6 we report four columns, corresponding to the specifications including different control sets:

(1) country dummies;

(2) time period dummies;

(3) regional area dummies;

(4) level of development dummies measured by per capita GDP.[28]

All regressions report clustered standard errors at the level of the paper applied by the Robust Random Effect model (the weight being determined by the precision of the partial correlation coefficient).[29] We study a wide range of possible explanatory factors of the variance of the estimated FDI effect on performance. In MRA is important to try to correct for omitted variable bias. In other words, estimates might control for specific variables and therefore obtain different results precisely because of different specification/inclusion of

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[28] From www.data.worldbank.org/country: Ghana, Kenya, Tanzania, Zambia, Zimbabwe and Vietnam are Low income countries; Morocco, Ukraine, Thailand, Indonesia, India and China are Lower Middle income countries; Argentina, Chile, Mexico, Uruguay, Venezuela, Belarus, Bulgaria, Lithuania, Poland, Romania, Russia, South Africa and Malaysia are Upper Middle income countries.

[29] For the sake of space, we do not report country and median year of study dummies in the tables but these are available upon request.

control variables.

The moderator variables analysis try to assess whether the partial correlation coefficient is affected by estimation factors, such as sample choice, type of estimator, inclusion/exclusion of control, variables definitions. Which are key ? Firstly, larger data sets tend to report systematically lower effect of FDI and this is highlighted by the negative and consistently significant coefficient on the Log of the square root degrees of freedom coefficient. Secondly, the *direct* effect of FDI seems to dominate the *indirect* spillovers but no difference between vertical compared to the horizontal. Studies controlling for endogeneity tend to report systematically lower effect of FDI. We also do not detect statistically significant differences when using domestic or foreign firms' data sample (with respect to both types of samples together)[30] but firm level data are associated to lower estimates. We also analyzed the potential role of human capital, capital intensity, export, competition and R&D. None of these variables is significant.[31] Finally, and importantly, all specifications report a consistent and positive effect of FDI on firm performance. This is because the constant is positive and significant regardless the type of controls.

On the one hand, these findings appear to be in line with the interpretation that more "accurate" data and sophisticated econometric techniques are possibly responsible for weaker results *vis-à-vis* cross sectional and higher level of aggregation data. On the other hand, the fully consistent and positive constant coefficient corroborate the unconditional results commented in section 4.1. This is an important result per se.

4.4.2 Macro Level Results

We now turn to cross-country (macro) results. As described above, we again use the

[30] This would mix direct and indirect effects.

[31] We also run some robustness checks exploring different estimators, such as RE, FE probit and Ordered Probit in order to corroborate the results reported in the RE Robust SE model (available upon request). All regressions exclude estimates for which the precision (1/se) is above the 25000 threshold. The comparatively important effect of direct spillover vis-à-vis indirect remains. A similar consideration is valid for the use of firm level data (as opposed to industry level): regardless of the estimator, the use of firm level data is associated with statistically lower partial correlation coefficients between FDI and growth.

Random Effect Robust SE model where the response variable is the partial correlation coefficient and where the response variable is the estimated mean effect: [32]

$$r_{ij} = \beta_0 + \boldsymbol{B}Z + v_{ij} + \varepsilon_{ij} \qquad (9)$$

$$coeff_{ij} = \beta_0 + \boldsymbol{B}Z + u_{ij} + \varepsilon_{ij} \qquad (10)$$

$\boldsymbol{B}$ is a 1 x k vector of coefficients and the k x N Z matrix contains the moderator variables for each estimate "i^{th}" in the paper "j^{th}".

It is not possible to directly compare the results of the regressions by level of development or geographical area in this macro sample, as for the micro data (table 6). As far as the macro data are concerned we can distinguish studies including only developing countries (373) from the studies with a mixed sample (180). Table 7 gives an overview on the entire sample (553) in column 1, on the developing country sample only in column 2 and the all sample with a dummy for mixed studies (omitted developing countries) in column 3. We find that: the longer the time-span used by the studies the higher is the effect; the interaction effect of FDI with absorptive capacity variables is always significant (and negative.) In other words those studies which control for absorptive capability (such as R&D or human capital, financial development, trade openness and quality of institutions) interaction with FDI tend to report a statistically lower partial correlation coefficients. This highlights important potential channels through which FDI may affect growth. For poorer countries the financial deepness control in the regressions dampens the direct effect of FDI on performance. The constant is not statistically significant but positive.

Table 8 uses the data for the estimated coefficients in the regressions instead of the PCC and "proves" the absorptive capacity point even more convincingly. Studies using data

[32] We also run RE meta regression estimation with study specific dummies. The fit is much higher and the I2 (%) residual variation due to heterogeneity as well as Tau2, the "between study variance", are further decreased, which is a sign of much improved fit in a RE Meta Regression (Harbord Higgins 2008). In other words, the over controlled model of study fixed effects would further explain the heterogeneity but it would not allow us to understand the effect of single covariates. In fact covariates selected in different estimates within the same study are often invariant and cannot therefore be included with study FE for collinearity. We thank Gaia Narciso for this suggestion.

with higher number of countries report lower FDI-performance link, whereas the opposite is true for the number of years. The interaction effect of FDI with absorptive capacity variables is negative and statistically significant and this is in line with finding of table 7. Further, whenever regressions control for trade openness and/or time trends the FDI-performance effect diminishes. Samples with poorer countries have more significant results in the last decade of data.

Let us analyze these finding when compared with the micro data. We can posit the much weaker power of macro studies to dissect the relative role of moderators' variables, i.e. few variables capture the heterogeneity. This might be due two main reasons: first there is much less heterogeneity to account for; second the aggregate data are less suitable for this type of exercise. Furthermore, the only consistently significant moderator variable in the MRA is the interaction with absorptive capacity: macro data are apt to capture the deficiencies of the country to benefit from the potential spillover of FDI, precisely because these data look at the impact from a "gross impact" angle. These results somehow confirm the Cohen and Levinthal (1990) hypothesis that controlling for absorptive capacity variables is key in developing countries, where the technological capability is lower than in advanced countries.

On a final note, studies based on mixed cross-countries data do not show a much different effect of FDI on performance once controlling for study design (columns 3 in both table 7 and 8). This is probably an indication of the need of further investigation on low and middle income countries databases in the future.

5. CONCLUSIONS

Are inflows of foreign direct investment (FDI) beneficial in triggering economic growth and development? This paper examines this question using meta-regression-analysis techniques. These are techniques for summarizing and distilling the lessons from a body of econometric evidence. For this exercise, a unique data set was constructed containing 549 estimates of the micro and 553 estimates of the macro effects of FDI on growth, from 103 different (published and unpublished) micro and 72 macro studies, respectively. The data set also contains information on more than 30 important variables covering sampling, design and methodological differences across studies and models.

The main finding is that 44 percent of these estimates are positive and significant, 44 percent are insignificant and 12 percent are negative and significant for micro studies; while 50 percent of these estimates are positive and significant, 39 percent are insignificant and 11 percent are negative and significant in the case of the macro evidence. The results also suggest that reporting or publication bias is not particularly severe in this body of evidence, especially when controlling for moderator variables. More importantly, this body of evidence suggests that the effect of FDI on economic growth is substantially greater in low-income than in middle-income countries.

Our findings suggest that a large share of the partial correlation coefficient variation can be accounted for when controlling for FDI and growth variables, type of measurement, sample characteristics, type of FDI-growth relationship analyzed, various potential controls in the original estimates, econometric methodology, geographical areas/countries and time period of analysis. We find that there is a statistically significant positive effect of FDI on growth in low and middle income countries at the firm level, but of a relatively low magnitude when compared with macro results. In line with the literature we do find that study design affects the results in many dimensions. Finally, those studies which control for absorptive capacity (such as R&D or human capital, financial development and quality of institutions) and *interaction* with FDI tend to report statistically lower partial correlation coefficients of FDI on growth. These results highlight important potential channels through which FDI may affect growth and are broadly consistent with previous findings on thresholds and absorptive capacity requirements.

What are the main implications from these findings for future research? Firstly and foremost, this study identifies something of a paradox. How to reconcile the main broadly agreed upon lesson from the literature (namely, that the FDI effect emerges only once countries have reached certain thresholds, mainly with respect to human capital and financial development) with the finding here that these effects are larger for counties much further below those same critical thresholds? We think that considerations of the gap between private and social returns, albeit missing in most of the current academic and policy discussions, may provide the key and should be the central focus of future research.

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Figure 1. Percentage of Significant and Insignificant coefficients by sample, Micro Studies

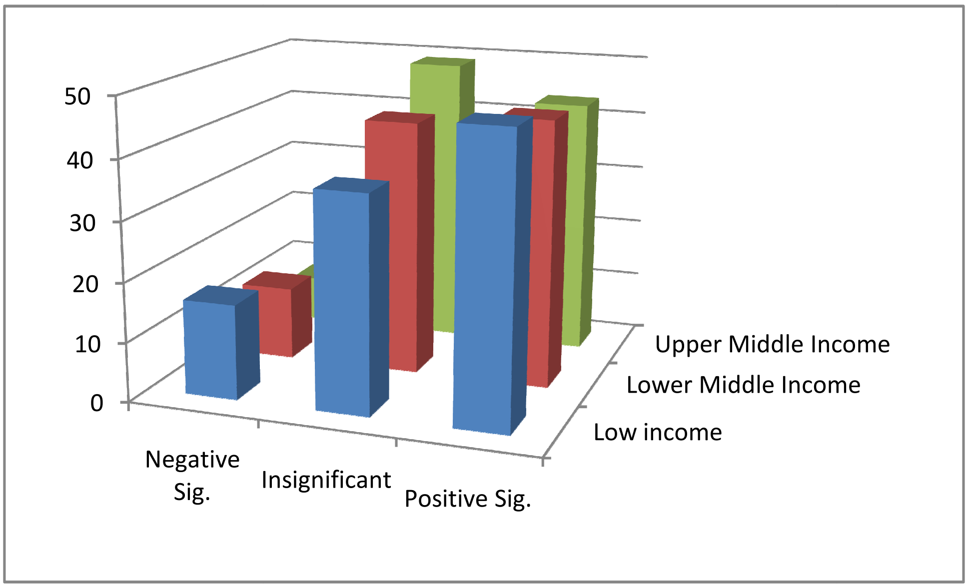


Figure 2. Percentage of Significant and Insignificant coefficients by sample, Macro Studies

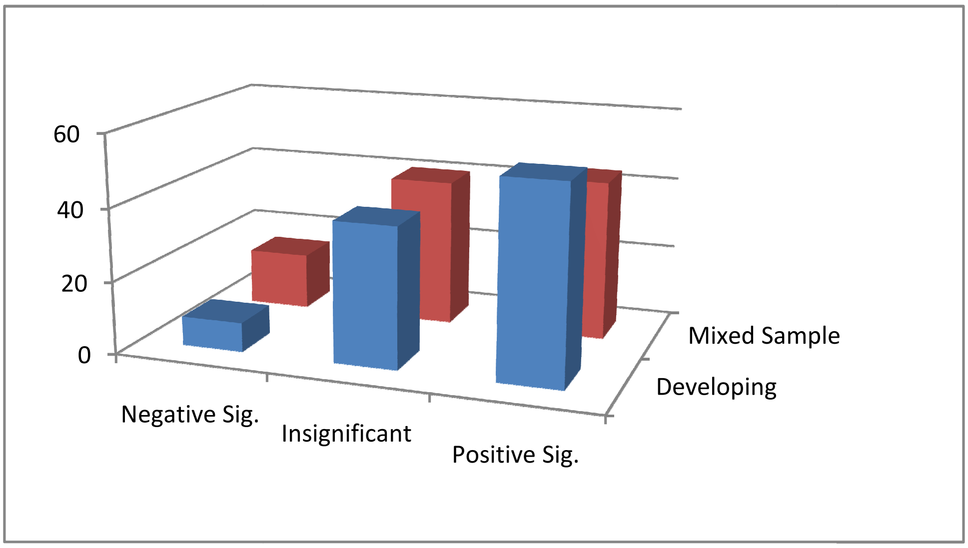


Table 1 Regressions on the mean. Micro Level data.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dep. Variable: Partial Correlation Coefficient				*Dep. Variable: Coefficient*			
	All Countries Robust RE	*Low Income Robust RE*	*Lower Middle Income Robust RE*	*Upper Middle Income Robust RE*	*All Countries Robust RE*	*Low Income Robust RE*	*Lower Middle Income Robust RE*	*Upper Middle Income Robust RE*
Constant	0.048***	0.080*	0.054***	0.044***	0.005**	0.038	0.002	0.050**
	(0.007)	(0.036)	(0.012)	(0.09)	(0.002)	(0.11)	(0.001)	(0.011)
Observations	549	94	251	204	549	94	251	204
N. Cluster	103	10	51	42	103	10	51	42
Tau^2	0.0001	0.00413	0.0000676	0.000212	0.00000641	0.0397	0.0000351	0.000798
Tau	0.010	0.064	0.008	0.015	0.003	0.199	0.006	0.028

Robust Random Effect Meta-regression model (*'robumeta' STATA command rho=0.8*) regression model. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Tau^2 is the "between study variance", Tau is the estimated standard deviation of underlying effects across studies (Harbord Higgins 2008).. Papers with |t|>40 and [1/se]>25000 excluded from the sample.

Table 2 Regressions on the mean. Macro Level data.

	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. Variable: Partial Correlation Coefficient			*Dep. Variable: Coefficient*		
	All Countries Robust RE	*Developing Robust RE*	*Mixed Robust RE*	*All Countries Robust RE*	*Developing Robust RE*	*Mixed Robust RE*
Constant	0.170***	0.173***	0.150***	0.043***	0.020***	0.120
	(0.022)	(0.022)	(0.048)	(0.014)	(0.006)	(0.072)
Observations	553	373	180	553	373	180
N. Cluster	72	53	24	72	53	24
Tau²	0.0413	0.0116	0.154	0.000631	0.000261	0.00340
Tau	0.203	0.108	0.392	0.025	0.016	0.058

Table 3 Regressions on the mean: Homogenous Sample in Macro Level data.

	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. Variable: Partial Correlation Coefficient			*Dep. Variable: Coefficient*		
	All Countries Robust RE	*Developing Robust RE*	*Mixed Robust RE*	*All Countries Robust RE*	*Developing Robust RE*	*Mixed Robust RE*
Constant	0.180***	0.178***	0.168**	0.083**	0.020**	0.295*
	(0.031)	(0.027)	(0.073)	(0.039)	(0.007)	(0.138)
Observations	291	203	88	291	203	88
N. Cluster	39	26	14	39	26	14
Tau²	0.0864	0.0133	0.241	0.00156	0.000289	0.104
Tau	0.294	0.115	0.491	0.039	0.017	0.322

Robust Random Effect Meta-regression model (*'robumeta' STATA command rho=0.8*). Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Tau² is the "between study variance", Tau is the estimated standard deviation of underlying effects across studies (Harbord Higgins 2008). Papers with |t|>40 and [1/se]>23000 excluded from the sample.

Table 4: MRA test for Publication Selection Bias, Random Effect model: Micro Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All Countries			Low Income Countries			Lower Middle Income Countries			Upper Middle Income Countries		
VARIABLES	FAT	PEESE	Card-Kruger	FAT	PEESE	Card-Kruger	FAT	PEESE	Card-Kruger	FAT		Card-Kruger
1/se (True)	0.000	0.000**		0.035***	0.042***		-0.000	0.000		0.000	0.000***	
	(0.000)	(0.000)		(0.004)	(0.007)		(0.000)	(0.000)		(0.000)	(0.000)	
se		0.000			0.000			0.000			0.103	
		(0.000)			(0.000)			(0.001)			(0.145)	
Log Square Root DF			0.187***			0.402***			0.086			0.259***
			(0.069)			(0.085)			(0.104)			(0.094)
Constant	2.025***		-0.297	2.157		-0.613	2.270***		0.154	1.546***		-0.787*
	(0.267)		(0.278)	(1.314)		(0.420)	(0.407)		(0.355)	(0.368)		(0.455)
H0: β2=1			Rej***			Rej***			Rej***			Rej***
Observations	549	549	548	94	94	94	251	251	250	204	204	204
N. Cluster	103	103	103	10	10	10	51	51	51	43	43	43

*** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses. Papers with |t|>40 and [1/se]>25000 excluded from the sample.

FAT-MRA Estimated equation columns (1,4,7,10): $t_{ij} = \beta_0 + \beta_1 * [1/se_{ij}] + \varphi_j + v_{ij}$

PEESE-MRA Estimated equation in columns (2,5,8,11): $t_{ij} = \beta_0 \, se_{ij} + \beta_1 * [1/se_{ij}] + \varphi_j + v_{ij}$

Card-Kruger Estimated equation in columns (3,6,9,12): $\log|t_{ij}| = \beta_0 + \beta_2 \text{Log}\sqrt{DF_{ij}} + \varphi_j + v_{ij}$

Table 5: MRA test for Publication Selection Bias, , Random Effect model: Macro Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All Countries			*Developing*			*Mixed*	
	FAT	PEESE	Card-Kruger	FAT	PEESE	Card-Kruger	FAT	PEESE	Card-Kruger
1/se (True)	0.000	0.003***		0.001	0.003***		-0.001***	0.002	
	(0.001)	(0.001)		(0.001)	(0.001)		(0.000)	(0.001)	
se		0.157**			0.172**			0.115	
		(0.076)			(0.086)			(0.154)	
Log Square Root DF			0.221**			0.249*			0.089
			(0.111)			(0.148)			(0.142)
Constant	2.215***		0.011	2.062***		-0.093	2.535**	2.660**	0.357
	(0.421)		(0.286)	(0.356)		(0.384)	(1.126)	(1.135)	(0.375)
H_0: β_2=1			*Rej****			*Rej****			*Rej****
Observations	553	553	553	373	373	373	180	180	180
Clusters	72	72	72	53	53	53	24	24	24

*** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses. Papers with |t|>40 and [1/se]>23000 excluded from the sample.

FAT-MRA Estimated equation columns (1,4,7,10): $t_{ij} = \beta_0 + \beta_1 * [1/se_{ij}] + \varphi_j + v_{ij}$

PEESE-MRA Estimated equation in columns (2,5,8,11): $t_{ij} = \beta_0 \, se_{ij} + \beta_1 * [1/se_{ij}] + \varphi_j + v_{ij}$

Card-Kruger Estimated equation in columns (3,6,9,12): $\log|t_{ij}| = \beta_0 + \beta_2 \text{Log}\sqrt{DF_{ij}} + \varphi_j + v_{ij}$

Table 6 The "augmented" Firm Level MRA by Geographical area, Micro Sample

	(1)	(2)	(3)	(4)
	Country dummies	Time dummies	Region Dummies	Development Dummies
Log Square Root DF	-0.038***	-0.027***	-0.030***	-0.027***
	(0.014)	(0.009)	(0.010)	(0.010)
Horizontal Spillover FDI as share of VA	0.029	0.060	0.103*	0.062
	(0.058)	(0.045)	(0.055)	(0.042)
Horizontal Spillover FDI as share of employment	0.021	0.015	0.035	0.042
	(0.030)	(0.030)	(0.028)	(0.029)
Horizontal Spillover FDI as share of equity capital	0.036	0.026	0.024	0.039
	(0.033)	(0.035)	(0.028)	(0.031)
Dummy for direct effect of FDI	0.078**	0.067**	0.070***	0.071***
	(0.031)	(0.027)	(0.024)	(0.023)
Dummy for vertical Spillover	0.016	0.003	0.022	0.024
	(0.031)	(0.028)	(0.025)	(0.024)
Dummy for backward Spillover	0.041	0.034	0.030	0.033
	(0.055)	(0.050)	(0.044)	(0.043)
Performance Measure: TFP or Efficiency	-0.011	0.011	-0.001	0.007
	(0.032)	(0.028)	(0.025)	(0.024)
Performance Measure: Value Added	-0.046	-0.011	-0.029	-0.021
	(0.041)	(0.037)	(0.034)	(0.032)
Performance Measure: Labour Productivity	-0.008	-0.015	-0.001	0.002
	(0.028)	(0.028)	(0.023)	(0.023)
Estimation strategy controlling for Endogeneity	-0.032	-0.052***	-0.049**	-0.053**
	(0.025)	(0.019)	(0.021)	(0.020)
Domestic firm sample only	-0.016	-0.022	-0.012	-0.012
	(0.017)	(0.023)	(0.020)	(0.021)
Foreign firm sample only	-0.051	-0.031	-0.054*	-0.037
	(0.037)	(0.038)	(0.028)	(0.028)
Panel Model	-0.006	0.018	0.001	-0.004
	(0.026)	(0.024)	(0.022)	(0.021)
Firm Level Data	-0.109**	-0.073*	-0.089**	-0.098***
	(0.049)	(0.038)	(0.034)	(0.035)
Control for labor quality/human capital	-0.043	-0.018	-0.032	-0.039*
	(0.031)	(0.025)	(0.025)	(0.023)
Control for capital/worker	-0.037	-0.017	-0.033	-0.030
	(0.031)	(0.021)	(0.022)	(0.022)
Control for Exporting firms	-0.022	-0.046*	-0.036	-0.034
	(0.026)	(0.027)	(0.022)	(0.021)
Control for competition	-0.010	-0.021	-0.034	-0.031
	(0.032)	(0.018)	(0.023)	(0.022)

Control for R&D	0.046	0.050	0.031	0.034
	(0.031)	(0.030)	(0.027)	(0.028)
Affiliation of author from University	-0.035	0.019	-0.003	0.005
	(0.033)	(0.025)	(0.026)	(0.026)
Africa Area			-0.005	
			(0.040)	
Latin America Area			0.019	
			(0.035)	
Transition Countries Area			0.003	
			(0.025)	
Asian Country Area (but China)			-0.040	
			(0.029)	
Lower Middle Income				-0.040
				(0.034)
Upper Middle Income				-0.017
				(0.031)
Constant	0.370***	0.296***	0.297***	0.301***
	(0.078)	(0.070)	(0.063)	(0.060)
Observations	549	549	549	549
N. Cluster	103	103	103	103
Tau^2	0.00173	0.00227	0.00112	0.000944
Tau^2	0.042	0.048	0.033	0.031

Robust Random Effect Meta-regression model ('robumeta' STATA command rho=0.8). Standard Errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. In columns 1 regression controls for country dummies, in columns 2 regression controls for median year dummies. Paper with |t|>40 and [1/se]>25000 excluded from the sample. The poolability test on the coefficients ($\beta_{LI} = \beta_{LMI} = \beta_{UMI}$) it's rejected at the 1% level. Tau2 is the "between study variance", Tau is the estimated standard deviation of underlying effects across studies (Harbord Higgins 2008). The poolability test on the standard errors [$Se(\beta_{LI}) = Se(\beta_{LMI}) = Se(\beta_{UMI})$] it's also rejected at the 1% level. Reference: Pooling data and performing Chows tests in linear regressions, December 1999 (updated August 2005), STATA Manual.

Table 7 The "augmented" Cross-Country MRA, Macro Sample, dependent variable partial correlation coefficient

	(1)	*(2)*	*(3)*
	All Sample	Poorer Countries	Development Level dummy
Log Square Root DF	-0.070	-0.061	-0.069
	(0.070)	(0.080)	(0.070)
Specification: growth GDP per capita on FDI	0.004	0.041	0.002
	(0.056)	(0.045)	(0.060)
Specification: growth GDP on FDI	0.137	0.105	0.134
	(0.083)	(0.065)	(0.086)
Specification: growth GNP on FDI	0.067	0.221	0.063
	(0.165)	(0.142)	(0.172)
Number of Countries	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)
Country data (vs. Region)	0.004	0.017	0.010
	(0.091)	(0.098)	(0.090)
Number of years in the sample	0.007*	0.002	0.007*
	(0.004)	(0.004)	(0.004)
Data type	0.040	0.040	0.044
	(0.067)	(0.086)	(0.071)
Control for Endogeneity	-0.002	-0.070	-0.004
	(0.037)	(0.047)	(0.037)
Panel Estimation	-0.001	0.012	-0.001
	(0.054)	(0.057)	(0.056)
Fixed Effect Estimation	0.003	0.008	0.005
	(0.059)	(0.053)	(0.061)
Control for Time	0.027	0.010	0.027
	(0.077)	(0.065)	(0.078)
Specification Dummy	-0.037	-0.066	-0.037
	(0.058)	(0.049)	(0.060)
Interaction of FDI with Absorptive Capacity	-0.127**	-0.139**	-0.125**
	(0.050)	(0.050)	(0.053)
FDI measured in Level	0.082	0.002	0.082
	(0.049)	(0.053)	(0.049)
Control for Human Capital	0.102	0.156	0.100
	(0.074)	(0.096)	(0.074)
Control for Trade Openness	-0.014	0.018	-0.016
	(0.061)	(0.050)	(0.059)

Control for Financial Account Openness	-0.054	-0.139	-0.057
	(0.091)	(0.098)	(0.089)
Control for Financial Deepness	0.045	-0.142*	0.047
	(0.095)	(0.072)	(0.096)
Control for R&D	-0.072	-0.154	-0.075
	(0.144)	(0.117)	(0.141)
Control for Institutions	-0.005	-0.049	-0.004
	(0.050)	(0.058)	(0.053)
No control for Capital	-0.061	-0.110	-0.056
	(0.121)	(0.098)	(0.126)
Control for Infrastructure	-0.008	0.050	-0.009
	(0.104)	(0.110)	(0.105)
Continent control	0.000	0.020	-0.000
	(0.048)	(0.053)	(0.049)
Trend control	-0.022	-0.025	-0.022
	(0.055)	(0.052)	(0.056)
70s decade dummy	0.036	0.006	0.039
	(0.086)	(0.103)	(0.085)
80s decade dummy	0.010	0.105	0.013
	(0.097)	(0.097)	(0.093)
90s decade dummy	0.069	0.091	0.074
	(0.115)	(0.174)	(0.116)
Dummy: Papers with both developing and developed country data			-0.018
			(0.066)
Constant	0.141	0.290	0.131
	(0.248)	(0.206)	(0.247)
Observations	553	373	553
N. Cluster	72	53	72
Tau^2	0.0500	0.0388	0.0508
Tau	0.223	0.197	0.225

Robust Random Effect Meta-regression model ('robumeta' STATA command rho=0.8). Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Tau^2 is the "between study variance" (Harbord Higgins 2008). Papers with |t|>40 and [1/se]>23000 excluded from the sample. Tau2 is the "between study variance", Tau is the estimated standard deviation of underlying effects across studies (Harbord Higgins 2008). All regression control for four time period dummies (60s omitted category).

Table 8 The "augmented" Cross-Country MRA, Macro Sample, dependent variable coefficient

	(1)	(2)	(4)
VARIABLES	All	Developing	Mixed Dummy
Log Square Root DF	0.172	-0.026	0.172
	(0.130)	(0.185)	(0.132)
Specification: growth GDP per capita on FDI	0.311*	0.221	0.305*
	(0.166)	(0.171)	(0.167)
Specification: growth GDP on FDI	0.371**	0.262	0.368**
	(0.169)	(0.159)	(0.173)
Specification: growth GNP on FDI	0.079	0.165	0.065
	(0.167)	(0.266)	(0.173)
Number of Countries	-0.003**	-0.001	-0.002*
	(0.001)	(0.003)	(0.001)
Country data (vs. Region)	0.055	0.010	0.060
	(0.174)	(0.242)	(0.176)
Number of years in the sample	0.015**	0.019*	0.015**
	(0.006)	(0.010)	(0.006)
Data type	0.093	-0.090	0.094
	(0.129)	(0.232)	(0.131)
Control for Endogeneity	-0.020	0.051	-0.020
	(0.074)	(0.104)	(0.075)
Panel Estimation	-0.101	-0.115	-0.106
	(0.146)	(0.230)	(0.150)
Fixed Effect Estimation	-0.030	0.015	-0.022
	(0.104)	(0.138)	(0.111)
Control for Time	-0.030	-0.066	-0.025
	(0.092)	(0.152)	(0.095)
Specification Dummy	-0.071	-0.123	-0.077
	(0.102)	(0.140)	(0.106)
Interaction of FDI with Absorptive Capacity	-0.133**	-0.155	-0.125**
	(0.056)	(0.110)	(0.062)
FDI measured in Level	0.138	0.113	0.140
	(0.100)	(0.141)	(0.101)
Control for Human Capital	-0.090	-0.157	-0.096
	(0.086)	(0.182)	(0.088)
Control for Trade Openness	-0.107*	-0.163**	-0.119*
	(0.062)	(0.079)	(0.061)
Control for Financial Account Openness	0.137	0.134	0.139
	(0.101)	(0.134)	(0.102)

Control for Financial Deepness	0.064	-0.347	0.067
	(0.197)	(0.241)	(0.201)
Control for R&D	-0.202	-0.117	-0.214
	(0.257)	(0.337)	(0.255)
Control for Institutions	0.020	-0.024	0.021
	(0.082)	(0.116)	(0.083)
No control for Capital	-0.089	-0.102	-0.087
	(0.145)	(0.193)	(0.149)
Control for Infrastructure	-0.026	0.126	-0.031
	(0.115)	(0.151)	(0.119)
Continent control	0.049	0.050	0.049
	(0.064)	(0.090)	(0.065)
Trend control	-0.190*	-0.225	-0.194*
	(0.100)	(0.136)	(0.101)
70s decade dummy	0.059	0.087	0.073
	(0.158)	(0.206)	(0.157)
80s decade dummy	0.089	0.192	0.097
	(0.135)	(0.194)	(0.135)
90s decade dummy	0.207	0.388*	0.218
	(0.149)	(0.213)	(0.153)
Dummy: Papers with both developing and developed country data			-0.033
			(0.069)
Constant	-0.605	-0.037	-0.602
	(0.475)	(0.613)	(0.488)
Observations	553	373	553
N. Cluster	72	53	72
Tau^2	0.0186	0.0232	0.0191
Tau	0.136	0.152	0.138

Robust Random Effect Meta-regression model ('robumeta' STATA command rho=0.8). Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Tau2 is the "between study variance", Tau is the estimated standard deviation of underlying effects across studies (Harbord Higgins 2008). Papers with |t|>40 and [1/se]>23000 excluded from the sample. All regression control for four time period dummies (60s and before, 70s, 80s and 90s)

Figure 3 Funnel Graph Micro Database, Firm Level (excluding outliers with precision above 25000)

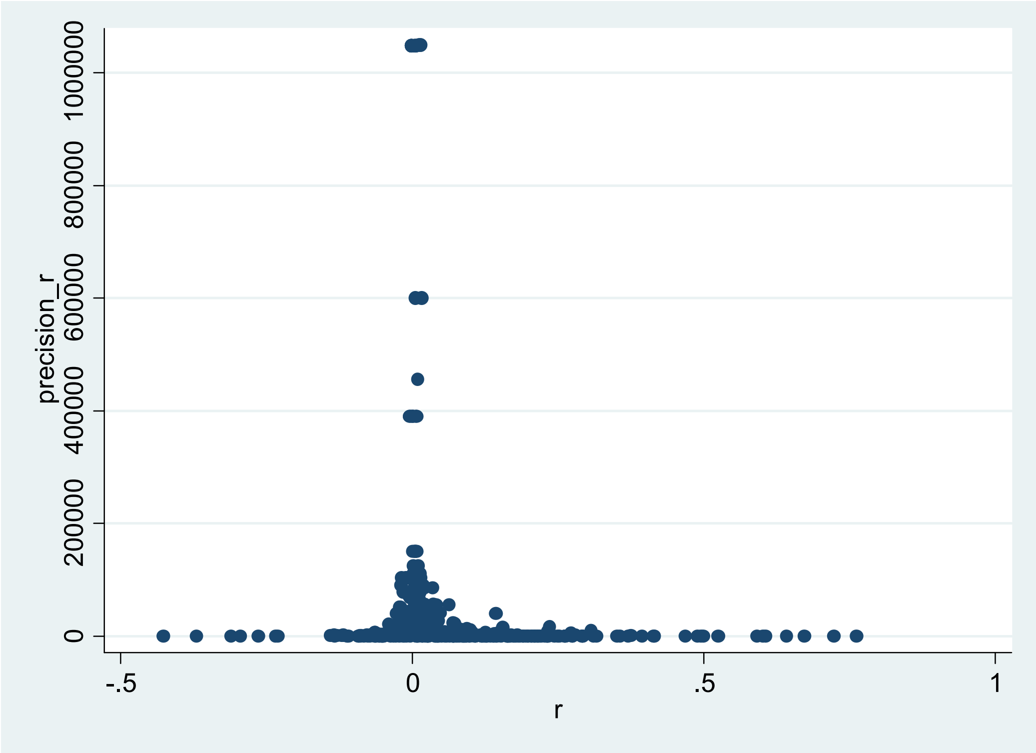
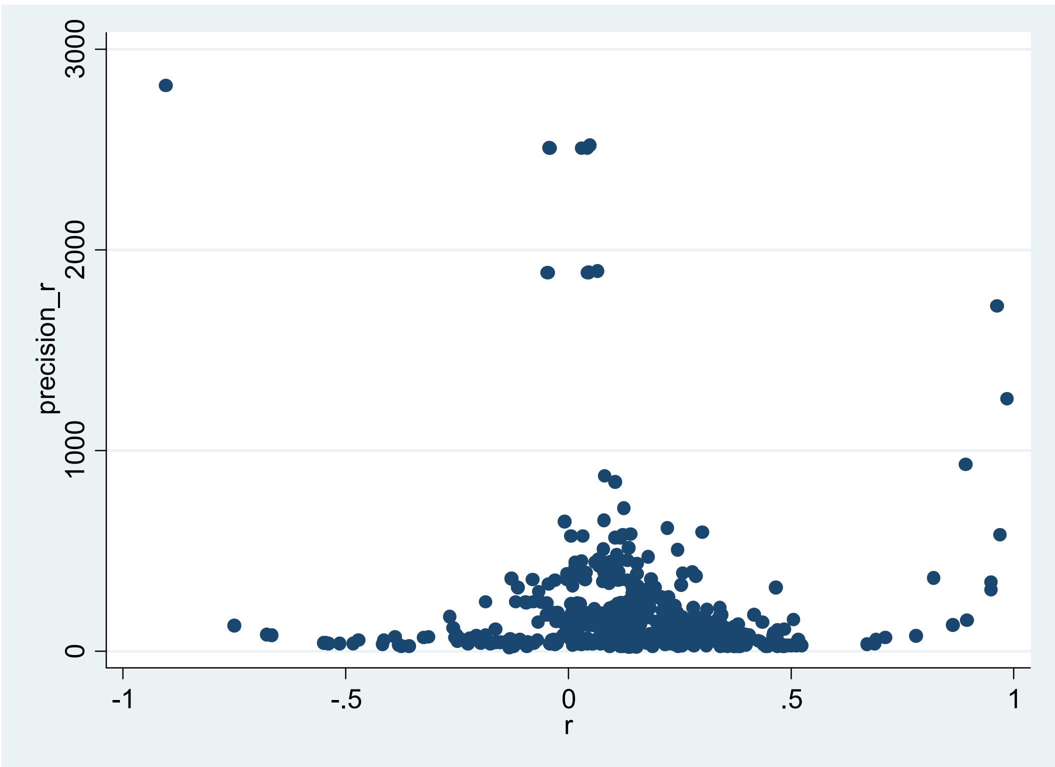


Figure 4 Funnel Database Macro Level, Cross-Sections (excluding outliers with precision above 23000)



Appendix 1 List of Micro/Firm Level Studies Used in the Meta-Analysis

1. Abraham, F., Konings, J., Slootmaekers, V. (2010) "FDI spillovers in the Chinese 1manufacturing sector" *Economics of Transition* 18 (1), pp. 143-182
2. Aitken, B.J. and Harrison, A.E. (1999) "Do domestic firms benefit from direct foreign investment? Evidence from Venezuela" *American Economic Review*, Vol. 89, No. 3 (Jun., 1999), pp. 605-618
3. Altomonte, C., Pennings, E. (2009) "Domestic plant productivity and incremental spillovers from foreign direct investment" *Journal of International Business Studies* 40 (7), pp. 1131-1148"
4. Akhawayn, A. and Bouoiyour, J. (2003) "Labour productivity, technological gap and spillovers: Evidence from Moroccan manufacturing industries" WPCATT, University of Pau,
5. Akimova, I., Schwodiauer, (2004) "Ownership structure, corporate governance, and enterprise performance: Empirical results for Ukraine" *International Advances in Economic Research* 10 (1), pp. 28-42"
6. Akulava, M. (2008) "The Impact of FDI on Sectors' Performance Evidence from Ukraine" EERC MA Thesis,
7. Aslanoglu, E. (2000) "Spillover Effects of Foreign Direct Investments on Turkish Manufacturing Industry" *Journal of International Development* 12, pp. 111-1130
8. Athukorala, P and Tien, TQ (2009) "Foreign direct investment in industrial transition: the experience of Vietnam" - Departmental Working Papers
9. Banga, R. (2006) "The export-diversifying impact of Japanese and US foreign direct investments in the Indian manufacturing sector", *Journal of International Business Studies*, 37, 558-568
10. Björk, I (2005)"Spillover effects of FDI in the manufacturing sector in Chile" School of economics and management, Lund University, Master thesis
11. Blalock G, Gertler PJ (2008): "Welfare Gains from Foreign Direct Investment through Technology Transfer to Local Suppliers", Journal of International Economics 74(2): pp. 402-421.
12. Blalock, G., Gertler, P.J. (2009) "How firm capabilities affect who benefits from foreign technology" *Journal of Development Economics* 90 (2), pp. 192-199
13. Blalock, G., Simon, D.H (2009) "Do all firms benefit equally from downstream FDI the moderating effect of local suppliers capabilities on productivity gains" *Journal of International Business Studies* 40 (7), pp. 1095-1112
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Appendix 2 List of Macro/Cross Countries Level Studies Used in the Meta-Analysis

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Appendix 3: Firm Level data Summary Statistics.

Variable Name	*Variable Description*	*Mean*	*SD*
Publication Year	Year of Publication	2005.561	3.728565
N. citation Per year	n. citation/ (2010-year of publishing)	12.45337	24.43988
Country	Country analyzed by the paper		
Start Year	Initial year in the paper's data	1994.995	6.249497
End Year	Last year in the paper's	1999.279	5.430929
Median Year	Median of start and end year	1997.453	5.388137
N. (for Panel)	N in paper's data	24549.96	57815.15
N. Observation		50647.66	160567.4
Sample Domestic firms only	Dummy variable =1 if paper use domestic firms only	0.196491	0.397693
Sample Foreign Firms only	Dummy variable =1 if paper use foreign firms only	0.038597	0.192801
Sample All firm	Dummy variable =1 if paper use data domestic & foreign firms	0.654386	0.475986
Estimators			
Degree Freedom		49791.86	161860.8
Coefficient	Coefficient of the FDI variable	20.61123	1157.813
Our dependent variable: t-Statistics		18.85593	398.9618
SE		46.36205	511.2277
Dummy for direct effect of FDI	Dummy variable =1 for direct effect of FDI	0.124561	0.330511
Dummy for indirect effect of FDI	Dummy variable =1 for indirect effect of FDI	0.87193	0.334461
Dummy Horizontal Spillover	Dummy variable =1 for horizontal spillover	0.545614	0.498352
Dummy Vertical Spillover	Dummy variable =1 for vertical spillover	0.236842	0.425518
Dummy Backward spill	Dummy variable =1 for backward spillover	0.114035	0.318133
Cross section Dummy	Dummy variable =1 if paper uses cross section data	0.482456	0.500131
Panel Dummy	Dummy variable =1 if paper uses panel data	0.517544	0.500131
Firm level Dummy	Dummy variable=1 if paper uses firm level data	0.754386	0.430829
Human capital dummy/Labour Quality	Dummy variable=1 if paper controls for Human capital	0.340351	0.474243
Capital/Capital per Worker	Dummy variable=1 if paper controls for capital or capital per worker	0.74386	0.436884
Export Dummy	Dummy variable=1 if paper controls for	0.263158	0.440734

	export		
Competition Dummy	Dummy variable=1 if paper controls for competition	0.264912	0.441674
R&D	Dummy variable=1 if paper controls for R&D	0.14386	0.351256
Mean GDP per capita PPP	Mean GDP per capita PPP in the country from start to end year	3875.914	2676.447
Dummy FDI non linear	Dummy variable=1 if FDI is interacted or squared	0.405263	0.491374
H spill share value added	Dummy variable=1 if FDI measure refers to Horizontal spillover: measured as share of value added	0.014035	0.117739
H spill share employment	Dummy variable=1 if FDI measure refers to Horizontal spillover: measured as share of employed	0.191228	0.393614
H spill share equity/Capital	Dummy variable=1 if FDI measure refers to Horizontal spillover: measured as share of equity or capital	0.14386	0.351256
H spill share output/sales	Dummy variable=1 if FDI measure refers to Horizontal spillover: measured as share of output or sales	0.222807	0.416495
Y=TFP or efficiency	Dummy variable=1 if dependent variable is TFP or efficiency	0.329825	0.470562
Y= firm output	Dummy variable=1 if dependent variable is firm's output	0.340351	0.474243
Y= Value added	Dummy variable=1 if dependent variable is value added	0.091228	0.288186
Y=labor productivity	Dummy variable=1 if dependent variable is labor productivity	0.226316	0.418813
Endogeneity yes or no	Dummy variable=1 if paper controls for Dummy Endogeneity	0.34386	0.475412
FE yes no	Dummy variable=1 if paper has fixed effect	0.510526	0.500328
Observations		550	
Nr. Clusters / papers		103	

Appendix 4 Macro Level database summary statistics

Variable Name	*Variable Description*	*Mean*	*SD*
Dummy Stage of Development (1=only Developing)		0.676	0.469
Log Square Root DF		2.322	0.506
Growth GDP p.c. (w.r.t. TFP)		0.487	0.500
Growth GDP (w.r.t. TFP)		0.294	0.456
Growth GNP (w.r.t. TFP)		0.101	0.302
# Countries in the Sample		55.912	31.371
Dummy Country level Obs. (w.r.t. Regions or Province)		0.879	0.326
Time Span		19.865	9.033
Dummy Endogeneity		19.865	9.033
Dummy Panel estimator		0.473	0.500
Dummy FE estimator		0.276	0.448
Dummy Delta Log LHS&RHS		0.264	0.441
Dummy Interaction FDI		0.82	0.463
Dummy Combined Regression		0.63	0.328
Dummy Human Capital control		0.383	0.486
Dummy Trade Openness		0.612	0.488
Dummy Financial Account Openness		0.616	0.487
Dummy Financial		0.458	0.499

Deepness control		
Dummy R&D control	0.072	0.259
Dummy Institutions control	0.184	0.388
Dummy No Capital control	0.020	0.140
Dummy Infrastructure control	0.307	0.462
Dummy Continent	0.953	0.212
Dummy Trend	0.092	0.289
Observations	554	
N. Cluster/papers	72	

Appendix 5: Data construction

In this section we describe the steps undertaken to build the meta-analysis datasets with a focus on the dataset of firm's level papers. We will discuss: the classification of low and middle income countries; the search strategy for identification of relevant papers and studies; the initial classification of papers; the firm level dataset construction.

A5.1 Classification of low and middle income countries

As the focus of this meta-analysis are low income countries, we firstly defined what we intended as low/middle income countries. We identified those countries with two main criteria and then we matched the countries identified by one criterion with the countries identified by the other one. The chosen criteria were the following:

a) The World Bank definition. The World Bank's main criterion for classifying economies is gross national income (GNI) per capita. Based on its GNI per capita, every economy is classified as low income, middle income (subdivided into lower middle and upper middle), or high income. The groups are: low income, $975 or less; lower middle income, $976 - $3,855; upper middle income, $3,856 - $11,905.
b) The definition of less developed countries as the 40% of Countries with lowest GNI per capita in PPP. We calculated the mean of GNI per capita from 1998 to 2008 for each country and we listed the countries with lowest 40% of GNI per capita. By looking at the distributions of the mean of GNI per capita, the threshold for the poorest country is set at GNIPPP<= 3534.545. The data on GNI per capita is taken from the World Development Indicators dataset (World Bank)

By comparing the countries identified by the WB definition and the countries identified by our definition, the countries identified with our criteria correspond to the World Bank 'low income' and 'middle income groups'. However while the WB 'low income' and 'middle income' groups include 143 countries, our definition only includes 70 countries. Because of its greater comprehensiveness, we adopted the WB definition[33]. We should note because we follow the WB definition, in the group 'middle income' there are also relatively advanced economies such as Poland, Turkey and Lithuania. This classification has guided the search for relevant papers which is described in the sections below.

A5.2 Search strategy for identification of relevant studies

Given the list of countries identified in step 1, we run extensive searches in order to identify the order of magnitude of papers to be included in the database. The searches were initially carried out with three search engines: Google scholar, Scopus and "Publish or Perish".[34] As our interest laid in the effect of FDI on low income countries we first had to identify all articles which discuss the effect of FDI in the countries of interest. In order to do this, two main searches were carried out: "FDI + country" and "foreign direct investments + country". We should note that in Google scholar we limited the search of the keywords to

[33] We are able to find relevant papers on 24 out of 143 lower and Middle low income countries. Some papers do cover the additional 119 countries we are not able to include in the analysis, but they are not suitable for a codification via a Meta Regression Analysis, e.g. because not in English, because lacking an econometric/statistical analysis, because analysing a different relationship with respect to the FDI-growth, etc.

[34] Publish or Perish is available at http://www.harzing.com/pop.htm

“title only” while in Scopus we searched the keywords selecting the option “Keyword, Abstract and Title”. These are very broad searches which lead to a high number of papers, but we believe they allow identifying the majority of relevant papers for each country of interest. In this way we ensure that we don’t miss any relevant study.

Out of the three software used, the searches in Google scholar and publish or perish gave the highest number of papers. The lower number of articles identified by Scopus is due to the fact that this software only searches for papers published in academic journal, while Google scholar and “Publish or Perish” also consider other sources (such as working paper). The highest number of papers for the keyword ‘FDI + country’ is given by publish or perish with 1488 records for countries coded in the 143 WB list. Out of 1488 papers 867 are on China. The highest number of search for the keyword ‘Foreign direct investments + country’ is given by Google scholar with 2796 records. Out all papers identified by Google scholar search 963 are on China.

We also carried out the following searches: “MC + country”, “multinational + country”, “TC + country”, “transnational corporation + country”. These searches did not lead to many relevant papers. For example using the keywords ‘MNC+ China’ in Scopus we obtain 73 papers of which none was relevant to our project. The same keywords in Google scholar gave only 35 results, and again, none was relevant to our project. Because of the low number of results given by these searches they were not used and we focused on “FDI + country” and “foreign direct investments + country”.

As shown above the number of papers given by the search specified above are extremely high. Of course many of the papers were not relevant to our research. An appropriate selection allowed us to build a dataset of articles. In the section below we describe the methodology followed to selected relevant studies.

A5.3 Initial classification of papers

The initial searches gave us a sense of the number of papers that could potentially be included in the meta-analysis. We used the results of the searches to classify the papers in a database. The classification of papers was done in several steps which can be summarized as follow:

a) Preliminary classification from the search ‘FDI + country’

b) Definition of the type of microeconomic and macroeconomic studies to be classified

c) Definition of the variables to be included in the dataset

First we screened the papers identified through the searches ‘FDI + country’. We focused on the results of the searches from Google scholar and Scopus only. This because we assessed that the results form “Publish or Perish” were the same as those given by Google Scholar. We first identified the papers likely to be relevant to the project and we collected some basic information (Article Title/Author/Year/Publication) in an excel file. The initial selection of articles was done using a very broad criterion. More precisely we excluded from our preliminary dataset all articles that analyze the determinants of FDI location, and we included everything else. This selection was done by reading the article’s title and abstract.

The initial selection included a high number of papers on a wide range of topics and therefore had to be refined. In order to do this, for each paper selected we classified the following detail: Link analyzed; Year and sector analyzed; Type of data and estimators used; main results, etc. With this information we formulated an initial judgment on the relevance of the papers to our research. The papers were initially graded according to two level of relevance:

- Paper not relevant, i.e. papers which analyze aspect of FDI not relevant to our research. These are both descriptive papers (e.g. literature review or descriptive analysis of the impact on FDI on the host country) and papers which have a relevant title but can't be accessed/downloaded (e.g. many Chinese papers have a relevant title but their texts are not accessible or are in Chinese).

- Papers that are relevant, i.e. all empirical papers that analyze the direct or indirect impact of FDI on growth.

Secondly, we focused on the papers classified as 'relevant'. As this selection included all articles on the impact of FDI on growth, the types of papers initially classified were of a very different nature and dealt with many different research questions. It is well known that there are several channels through which FDI may affect growth such as export, trade, innovation, knowledge and firms performances, moreover the impact of FDI may be analyzed both at micro and at macro level. At this point we had to define the focus of our meta-analysis in order to choose which papers were going to be part of our final dataset. We decided that both microeconomic and macroeconomic papers were going to be considered, although in two different dataset due to the rather dissimilar nature of those studies. In term of the macroeconomic studies we focused our interest on papers analyzing the effect of FDI on GDP (and its transformation), while in term of microeconomic studies we restricted our attention to articles analyzing the impact of FDI on firms and sectors growth or productivity. After having identified the types of studies to include in the dataset, as a third step we defined the data that had to be collected. The decision on what data was needed from the papers was done separately for microeconomic and macroeconomic studies. While we applied the same methodology to both types of studies in terms of selection and classification, the data collected had to differ due to the nature of the studies. Because of this the dataset on micro level studies and that of macro studies contain different variables.
A5.4 The Cross-Countries level dataset specificity. We start our research fixing both the keywords and the sources for studies' research. In particular, we considered different keywords' combinations, taking either the acronyms or the full words and allowing for both British and American English. For the sake of simplicity, in what follows we report just the acronyms and the British English spelling. So that, we took:

FDI and GROWTH
FDI and GDP GROWTH
FDI and LABOUR PRODUCTIVITY GROWTH
FDI and TFP
FDI and TFP GROWTH

The bases for researching were identified as Google Scholar and Scopus, to take into account both unpublished and published works.

At the very beginning the research was "unbounded", in the sense that we were searching the aforementioned keywords anywhere in the paper. Subsequently, for the sake of feasibility, we restrict our attention to papers having the relevant words just in the title. For example, the number of papers in Google Scholar having "FDI and GDP" anywhere are 26,600 while the ones having them just in the title are 361.

The cross-country focus of the research question led us to discharge time-series analysis, so that we considered cross-section and panel data studies. Moreover, we excluded all the works sampling just developed countries, while we retained the ones having both developed and emerging economies.

In order to double-check the relevance of the selected studies, we referred to the work of Doucoliagos et al. (2010). This is the most authoritative and up-to-date meta-analysis on the effects of FDI and GDP growth at the macro level. Two things must be noted. First, the country spectrum of Doucoliagos et al. (2010) is broader than ours. In fact, they consider not only low-income but also high-income economies. Second, they include time-series studies. We are confident that the first part of our analysis, which is based on firm-level data, is very effective in assessing the within-country effects of FDI. Getting now to further details, in our macro meta-analysis we employed 553 observations, taken from 72 studies, 66 of which are comprised into Doucoliagos et al. (2010). Four out of the remaining six were found through "TFP and FDI" keywords, using both Google scholar and Scopus; one refers to the search "FDI and growth" in Google Scholar (i.e. Alfaro et al, 2009) and the last one is the very recent IMF working paper of Dabla-Norris et al. (2010) which probably was not available when Doucoliagos et al. undertook their research.

The average number of observations per study is 7.69. In particular, the studies on FDI and TFP have an average number of observations equal to 16.25 while the ones based on FDI and GDP have 7.19 observations.