# FOREIGN DIRECT INVESTMENT AND ECONOMIC PERFORMANCE: A SYSTEMATIC REVIEW OF THE EVIDENCE UNCOVERS A NEW PARADOX

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**Abstract:** How effective is foreign direct investment in supporting economic performance in low-income countries? This paper assesses this question using meta-regression-analysis techniques on a set of 550 and 554 estimates of the impact of FDI on economic performance from 103 micro and 72 macro-studies, respectively. The results suggest that (a) the estimated effects tend to be larger in the macro/country than in the micro/firm studies, (b) the effect is significantly greater in low- than in middle-income countries, and (c) econometric method and specification choice seem central to understand the observed variation in the estimates. The paradox this study raises is how to reconcile the main lesson from the literature (that the effect emerges only for countries that have reached certain thresholds, mainly with respect to human capital and financial development) with the finding that the effects are larger for counties that are typically far from reaching such critical thresholds. We argue 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.

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## POLICY SUMMARY

Are inflows of foreign direct investment (FDI) beneficial in triggering economic growth and development in low income countries (LICs)? This paper examines this question using meta-regression-analysis techniques. These are techniques for summarizing and distilling the lessons from a given body of econometric evidence, i.e. quantitative studies. For this exercise, a data set was constructed containing 550 micro or firm and 554 macro or country-level estimates of the effects of FDI on performance, from 103 micro and 72 macro empirical studies (published and unpublished). Our data set also contains information on more than 30 important sampling, design and methodological differences across empirical studies.

This exercise generates three main sets of results. The first is that of a surprisingly extensive data dearth with respect to FDI in LICs. One would expect that FDI is an area for which there is plenty of quantitative evidence, but that does not seem the case. Yet, the available evidence provide stronger support for differentiating the effect of FDI on growth across levels of development rather than in terms of geographic regions, which further justifies the emphasis (on LICs) of this report. More importantly, our analysis of this body of evidence suggests that the effect of FDI on economic performance is significantly greater in low-income than in lower and upper middle-income countries.

The second group of results relates to the distribution of the effects of FDI and whether these are affected by publication or reporting bias. 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; while 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. Their distribution along income levels is also of interest: 47 percent of the reported effects are positive and significant in micro estimates on LICs while 53 percent of the reported effects are positive and significant in macro studies which include only developing countries. Our results also suggest that reporting or publication bias is not particularly severe in this body of evidence, especially when methodological differences are taken into account.

The third group of results refers to the reasons identified in our analysis as capable of explaining the variation on the estimated effects of FDI on growth. Our main conclusion is that the choice of econometric method and empirical specification matter a

great deal. There are a number of specific findings. Firstly, we find evidence that those econometric specifications that attempt to control for unobserved heterogeneity via the use of firm level data (or panel level estimators in macro) tend to be systematically associated with smaller (albeit more precise) estimates of the effect of FDI on performance. Secondly, the inclusion of absorptive capacity variables such as human capital and R&D is associated with systematically smaller effects of FDI on growth in micro studies. In macro studies, controlling for R&D and institutions is associated with systematically smaller effects of FDI on growth in both developing countries and mixed cross country studies, whereas controlling for financial depth and infrastructure is associated with systematically smaller effects of FDI on growth in studies on developing countries only and with systematically higher effects of FDI on growth in studies on mixed developing and developed countries.

What are the main implications from these findings for future research? Firstly and foremost, this study identifies a new paradox. How to reconcile the main lesson from the literature (that the effect emerges only after countries have reached certain thresholds, mainly with respect to human capital and financial development) with the finding here that the effects are larger for counties often found much further below those critical thresholds? We argue 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. We present two further suggestions for future research: (a) there seems to be a clear need for further data collection and analysis on FDI and performance for LICs and this should unquestionably generate high returns, and (b) future studies should try to differentiate more carefully between different types of FDI (for example, in terms of sectoral distribution).

What are the main policy lessons from this study? According to our summary of the results from the available empirical literature, if donors and governments want to maximize the growth dividends from FDI then a focus on LICs, providing for a competitive environment, and investing in complementary human capital, financial development and R&D should receive priority.

## 1. INTRODUCTION

The conventional wisdom about foreign direct investment (hereafter FDI) in low income countries (LICs) is that the little FDI these countries receive is often concentrated in the natural resources sector, thus explaining its perceived limited development impact.[1] The aim of this paper is to take stock of the aggregate as well as firm level (that is of the micro as well as the macro) evidence on FDI in low income countries and use it to confront, re-assess and gauge these preconceptions by carrying out a comprehensive systematic review of this evidence through a meta-regression analysis exercise.

Historically FDI has been mainly concentrated in advanced economies, which act both as senders (outward FDI) and recipients (inward FDI). Yet, emerging markets in general and low income countries in particular have increasingly benefited from FDI inflows. The participation of developing countries in total worldwide FDI has increased substantially since the early 1990s and has become even more pronounced after the 2008 financial crisis. The latest UNCTAD figures show that developing countries now attract more than half of the global FDI inflows (UNCTAD 2010). It is also important to mention that this has occurred while FDI inflows have been more widely distributed. In other words, it is not that developing countries that traditionally attract FDI (mainly Latin American, parts of Asia and Eastern Europe) have since the crises done better. Instead low income countries have experienced substantial increases in terms of FDI inflows.

The literature has focused on the determinants of FDI (why do corporations move business abroad? e.g. Dunning, 1988) and on the impact of FDI on the host country (which are the spillover effects from foreign firms to domestic firms, local suppliers and customers? e.g. Borensztein, Gregorio and Lee 1998 and De Mello 1997).

The availability of aggregate and firm level data supports a growing empirical literature on the relationship between FDI and economic growth, investment and

[1] See e.g. Asiedu 2006; Buckley, Clegg, Cross, Liu, Voss and Zheng 2007; Spencer 2008.

productivity.[2] Several studies document important effects -positive or negative- on host countries growth and investment both at the aggregate level (e.g. the technological upgrading via the "demonstration" effect; technology sourcing), as well as at the firm level (e.g. enhanced productivity; "market stealing effect" via increased competition). While aggregate level regression analyses have a wider cross-country perspective they tend to find it difficult to deal with potential econometric drawbacks in terms of endogeneity and omitted variable biases, firm-level evidence might be often restricted to a single country study but tackles such econometrics issues with more ease.

The econometric difficulties when analysing macro data has led to 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. Panel data analyses are well suited to ameliorate the aforementioned aggregate-level econometric limitations by tackling the fundamental issue of un-observed heterogeneity. One obvious drawback of micro studies is that they have little to say in terms of the economy-wide effect of FDI.

With these sets of relative advantages and disadvantages in mind, the view we take in this paper is that the two bodies of evidence (micro and macro) deserve equal attention because they can potentially reveal new lessons about FDI in low income countries, especially when studied in tandem. The micro evidence can throws light on private returns and localized effects, while the macro evidence can uncover important features of social returns and the net effects of FDI inflows.

This paper tries to offer three main contributions: (1) it focuses on both the micro and macro evidence so as to identify and highlight differences between private and social returns to FDI; (2) it exploits a substantially higher number of "data-points" with respect

[2] See Hymer 1960 and 1976; Vernon 1966; Caves 1974; Rugman 1981; Dunning 1988; Haddad and Harrison 1993.
[3] There are three main channels: a) movement of high skilled staff from MNCs to domestic firms; b) demonstration effect; c) competition effect. On the latter see also Aitken and Harrison (1999).

to previous meta-analyses investigations on FDI in low and lower middle income countries; and (3) it exploits a relatively wider set of explanatory variables and controls than that in previous studies.

Our main findings are as follows. The first is that of a surprisingly extensive data dearth that still exists with respect to FDI in LICs. One would expect that FDI is an area for which there is plenty of quantitative evidence, but that does not seem the case. Yet, the available data provide stronger support for differentiating the effect of FDI on growth across levels of development rather than in terms of geographic regions, which further justifies the emphasis (on LICs) of this report. More importantly, this body of evidence suggests that the effect of FDI on economic performance and growth is significantly greater in low-income than in lower and upper middle-income countries (both at the micro and macro level). Secondly, we find that 44 percent of these estimates are positive and significant, 44 percent are insignificant and 12 percent are negative and significant in micro studies (see figure1), and 50 percent of these estimates are positive and significant, 39 percent are insignificant and 11 percent are negative and significant in macro ones (see figure 2). Thirdly, regarding the reasons our analysis identify as capable of explaining the variation on the estimated effects of FDI on performance and growth, the choice of econometric method and specification matters a great deal. We find evidence that those empirical specifications that have human capital in their sets of control variables significantly tend to report smaller effects of FDI on performance in micro studies, as well as those that take into account R&D expenditures in both micro and macro studies, measures of trade openness or financial depth in macro studies on developing countries and broadly defined political institutions in macro studies as a whole. This study identifies a new paradox referring to the discrepancy between the mains lesson from the literature (namely that the effect of FDI on performance emerges only after countries have 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. We argue 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.

The paper is organised as follows. Section 2 presents a short (unsystematic) literature review on the impact of FDI, especially in less developed countries, that serves as motivation for this study. This is because few economists would take issue with how accurate they believe the main messages are. Yet the findings from a systematic review we present later are nothing but contrasting. Section 3 describes in detail the database constructed for the meta-regression analysis the results of which are presented and discussed in Section 4. Section 5 presents concluding remarks and some implications we derive for policy and future research.

## 2. A BRIEF, BIASED AND UNSYSTEMATIC SURVEY OF THE EVIDENCE

The purpose of this section is to provide a brief survey of the literature. The intention is to base this survey on some of the most widely cited papers so as to produce an unsystematic and openly biased review. The findings from this intentionally biased review are to be compared to those of the systematic review of the evidence we carry out in the remainder of this paper. To anticipate our results, below we argue the main conclusion (from a "biased" review of the evidence) is that the effect of FDI on economic performance is conditional on the host economy having reached some minimal thresholds, with the literature given particular emphasis to human capital, financial development and institutional quality. In summary, the lesson is that the effect of FDI on economic performance is economically and statistically meaningful only in countries that have reached minimum thresholds levels of absorptive capacity. For example, according to the existing literature we should expect to observe FDI effects only in

countries in which the workforce has achieved a certain average years of schooling, or in which the level of financial development or institutional quality has crossed certain critical thresholds.

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 investment fuels growth directly as well as indirectly. FDI can increase overall employment and create new and possibly better jobs, FDI can provide ready access to up-to-date industrial technology, it can give host country firms greater access and exposure to international markets, and it can also demonstrate to host country firms the value of new management and export techniques. Some of these benefits are usually studied under the broader term "spillovers."

The fact that it is difficult to identify first-order effects of FDI on economic performance suggests that, despite all the alleged benefits discussed above, there must also be some non-negligible costs. What can these 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 ensuing. 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 even agriculture, then smaller benefits should be expected.

What do the macro/country and micro/firm bodies of empirical evidence say? The macro evidence typically uses cross sections as well panel techniques to examine the effects of FDI on GDP growth rates or, less often, on TFP growth rates across countries and over time. Few scholars 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 stronger once thresholds are taken into account. The seminal contribution of Borenzstein, De Gregorio and Lee (1998) puts forward the notion that only those countries that have sufficiently educated work forces have the capacity to benefit 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 only be seen with clarity in those countries that have reached a certain level of financial development (because this helps potential suppliers of the foreign firm to develop).

The micro-evidence on the effects of FDI on economic performance reaches similar conclusions. It typically uses panel techniques to look at the effects of FDI on output or TFP growth rates across firms and sectors and over time. Few scholars would disagree with the statement that also this body of evidence tends to identify relatively modest first-order effects of FDI on performance, which become substantially stronger once specific types of effects are taken into account (namely vertical spillovers and, even more specifically, backward linkages). One of the most influential pieces in this other strand of literature, Javorcik (2004), uses data on Lithuanian firms to make this point. She argues that there have been important difficulties in finding positive intra-industry productivity spillovers from FDI, yet the picture changes when one focuses on how these effects operate across industries and, specifically, through contacts between foreign affiliates and their local suppliers in upstream sectors.

We think it is extremely important to highlight one recent piece of evidence that bridges (apparently unknowingly) the results from the macro and micro literatures discussed above. Blalock and Gertler (2009) 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. They find that these thresholds are crucial in identifying the FDI effects. Interestingly, none of the macro studies discussed above is cited in Blalock and Gertler and hence their important finding that reconciles the macro and micro does not receive the full attention it deserves.

What are the main lessons from this brief yet unsystematic review? One is that 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. The main lesson is 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 rather unappreciated direct consequence of this finding on the importance of thresholds is that low-income countries are almost by definition those in which these types of thresholds or minimum critical levels or capabilities are less likely to have been reached. 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.

## 3. A DETAILED, UNBIASED AND SYSTEMATIC SURVEY OF THE EVIDENCE

Cross-countries aggregate and firm level analyses complement each other and are both included in our systematic review via a meta-regression analysis of the whole existing literature. Furthermore, the impact of FDI and entry strategy of foreign investors is dependent on the level of economic development (Meyer and Sinani, 2009), "institutional conditions and transition"[4] (Peng, Wang and Jiang 2008) and more generally market-supporting institutions (e.g.; Meyer, Estrin, Bhaumik and Peng 2008). Therefore the

[4] The institution based view is considered as the third leg of a strategy tripod including "industry based-competition" and "firm-specific resources and capabilities".

literature focuses on the conditions under which FDI are productivity (firm level) and growth (aggregate level) enhancing along different dimensions[5].

The analysis of FDI in emerging markets, and especially low income and middle income countries, might be characterised by different expectations. On the one hand, poor business environments might lead to detrimental effects on FDI (both directly and indirectly). On the other hand, the relative scarcity of capital in emerging markets may entail a high reward for new foreign owned projects in the host countries.[6] Which of these two effects prevails is uncertain.

We select meta-analysis as our main tool of investigation. In fact, we build upon a quickly expanding meta-analysis literature on FDI that has so far focused on advanced, emerging and transition economies (e.g. Holland, Sass, Benacek and Gronicki 2000; Gorg and Strobl 2001; Wooster and Diebel 2006; Meyer and Sinani 2009; Havranek and Irsova 2010; Hanousek, Koceda and Maurel 2010) and we exploit this methodology specifically for low and middle income countries.

### 3.1 Funnel Plots: a bird eye view on the FDI-growth relationship

This section presents and discusses our results comparing the partial correlation coefficients and the precision of the 549 micro estimates and 553 macro estimates collected in the database via the use of a "funnel plot"[7]. In figures 3 and 4, the partial correlation coefficient variable on the horizontal axis is defined as $t/\sqrt{(t^2+df)}$ with t being the "t-statistic", df being the "degrees of freedom,"-whereas the precision variable on the vertical axis is computed as $1/se_{ij}$, with $se_{ij}$ being the standard deviation of the "$i^{th}$" estimate in the "$j^{th}$" study-. This bird's eye view of our variable of interest (i.e. our dependent variable) in each single study vis-a-vis its precision is important for a

[5] See also Driffield and Love 2007; Driffield, Love and Manghiniello 2010; Bhaumik, Driffield and Pal 2010.
[6] This is in line with the international trade theory expectation that capital flies where its relative reward is higher, that is typically the case in emerging markets.
[7] For a detailed description on the data collection process and selection of relevant papers see Appendix 5.

preliminary assessment of the existence and strength of the FDI-growth relationship.

In fact, the funnel plot (see Stanley and Doucouliagos, 2010) provides a pictorial representation on the average effect of the papers collected in a Meta-Regression-Analysis (MRA), where the peak of the graph usually represents the average effect of the relationship, and the scatter plot shows the dispersion around this mean effect. We will consider the micro sample excluding studies with precision (1/se) above the 25000 threshold and the macro sample excluding studies with precision (1/se) above the 23000. The reasons for this choice are elicited by detecting very clear outliers when the funnel plots are drawn without this restriction[8]. In other words there is a need for a careful assessment of extremely "precise" estimates that could potentially drive regressions results.

There is a heterogeneous set of estimates clustered around the partial correlation coefficient value mean of 4.5% for micro and 14.5% for macro estimates. In fact, the macro papers we collected are a cross-section of developing countries or developing and developed countries[9]. Overall, we could tentatively infer that the net effect measured by macro studies might be somehow higher than the gross effect measured by micro studies, in line with the interpretation of social versus private returns of FDI.

Furthermore, from a preliminary eyeballing of the "non-symmetry" of the two funnel plots, one can tentatively detect signs of potential publication bias, which will formally tested in section 3.3.2.

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[8] On this basis, we will exclude these outliers from the econometric analysis that follows. The excluded micro estimates are four and they 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. Foreign direct investment, spillovers and output dispersion - The case of India 2009 International Journal of Information and Management Sciences 20 (4), pp. 491-503; E Torlak, Foreign Direct Investment, Technology Transfer, and Productivity Growth in Transition Countries Empirical Evidence from Panel Data.

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

### 3.2 The Selection of the variables from the quantitative studies

The analysis of selected articles (see Appendix 5) and of existing meta-analysis on FDI also guided the choice of *independent variables* to be included in meta-regression-analysis. 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' dataset and estimators (e.g. period analysed, panel vs. cross section, sample of domestic vs. foreign firms, number of observations, estimators); variables on the equation estimated (e.g. output variables and other controls). Appendixes 3 and 4 contain a summary of all variables included in micro and macro datasets, respectively. We collected data for all variables for all selected papers at the firm 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. Many studies include as independent variables different measures of FDI, for example a dummy for foreign presence in a firm 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 reported the t statistics of both (or more) measures of FDI, which appear in the dataset as more than one observation[10].

As discussed in detail in Appendix 5 the selected papers were obtained from the search "FDI + country". We classified all papers found with Google Scholar and Scopus using these keywords. Once we classified all papers from this search, we cross checked our dataset of articles with the articles used by existing meta-analysis. All the papers used by other-meta analysis but not found through our searches were added to our dataset. The list of papers used to build the database can found in Appendixes 1 and 2.

[10] We have an average of 5.3 estimates per paper in the whole sample (549/103), 4.8 for countries excluding China (360/75) and 6.8 for China (189/28).

The micro dataset is composed by 550 observations from 103 papers[11], published between 1983 and 2010.[12] Appendix 1 reports the whole list of studies, also including two outliers. The period analysed in these papers range from 1965 to 2007. The countries analysed in the chosen papers are the low and middle income countries identified by the World Bank definition. Most of our observations (189) are on China, there were surprisingly not many papers on India and other emerging markets. The type of data used in the selected papers is either cross-sectional or panel data (see Appendix 3 for further details). Out of 550 observations 48% are on cross sections and 52% on 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), the firm output, the value added or labour productivity. The direct effect of foreign firms is defined as the impact of foreign presence on the domestic firm. This effect may be measured as a dummy for foreign presence or as the percentage of foreign presence in the domestic firm. The indirect effect is defined as the foreign firm spillover on the domestic firm, and this may be vertical (forward or backward) or horizontal. There are 12% of the studies on the "direct" effect on FDI on the firm and or sector, while 88% of the observations are on the indirect effects. The latter is divided in two parts: 129 are on purely vertical spillover and 306 are on horizontal spillover.

The macro dataset is composed by 554 observations from 72 papers, published between 1973 and 2010[13]. Appendix 2 reports the whole list of studies. The period analysed in these papers ranges from 1940 to 2008. The countries analysed 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 of the former: 67% of the estimates are only

[11] Our initial data included 570 estimates from 105 papers. We dropped the top and bottom centile of the "t" value variable (i.e. t>30 and t<-6) and the papers referring to Latvia, Czech Republic, Poland and Hungary, that became High Income countries in recent years.
[12] 50% of the studies are published/released after 2007.
[13] 50% of the studies are published/released after 2003.

for developing countries and 33% for mixed cases[14] (Appendix 5.4 presents details on paper selection and coding of their main characteristics). The type of data used in the selected papers is either cross section or panel data. Out of 554 observations 87% are on cross sections and only 13% on panel data. We have 82% of the estimates controlling for some sort of interaction effect of FDI with other macro variables and we have 63% estimates combining both "pure" FDI and interaction[15].

### 3.3 The Empirical Models

#### 3.3.1 Meta Regression Analysis: Unconditional Regressions

Our initial estimated equation assumes the following specification:

$$r_{ij} = \beta_0 + v_{ij} \quad (1)$$

where $r_{ij}$ is the partial correlation coefficient[16] for the "j$^{th}$" estimation within the "i$^{th}$ " paper. Respectively $\beta_0$ and $v_{ij}$ are the average effect and the idiosyncratic (paper-estimate specific) error[17]. The results from the regression on the mean are presented in Table 1 for the micro data set and Table 2 for the macro one. We reported three columns: the pooled entire sample in column 1 in order to be able to interpret the constant as an overall average effect; the three micro (two macro) separate samples coefficients in column two in order to allow for different effect of FDI on growth depending on countries groupings; finally in column three we pooled back the sample by including three dummies in the micro studies (LI, Lowe Middle Income and Upper Middle income) and two (Developing only and mixed studies) in the Macro. We run all the regression weighted by precision ($1/se_{ij}$), but in the first row of column 1 we remove the weights for

[14] This does not hold for the papers, the reason being that some of them include separated regressions for mixed and developing countries only.
[15] We also have standard cases, only interaction, only pure.
16 $t/\sqrt{(t^2+df)}$.
17 We always 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.

constituency check.

If we do or we do not take into account the precision of the estimates, we can always conclude that the relationship between growth and FDI is statistically significant and of a magnitude of around 4.9%, 4.5%[18] within the [-1,1] scale of the partial correlation coefficient. Our preferred sample, i.e. the one excluding outliers, cut out observations with |t|>40 and ($1/se_{ij}$)> 25000 and those are in fact excluded from the sample.

As mentioned, column 2 examines the different impact on the countries included in our sample by looking at the low income (LI), lower middle income (LMI) and upper middle income (UMI) separately. LI are indeed registering a very positive and strong effect of FDI on growth especially when compared with LMI and UMI. Column two run three separate estimates whereas column three pools the sample and introduce two dummies for LMI and UMI (the constant now being LI): the result is unchanged, i.e. LI perform much better and stronger then LMI and even much so with respect to UMI (for a comparison see Mayer and Sinani (2009)). The differences among these three groups of countries are statistically strong.

We obtain a different picture on the macro results in Table 2 where we register a consistently statistical average partial correlation coefficient of 14.5%. Our preferred sample, i.e. the one excluding outliers, cut out observations with |t|>40 and ($1/se_{ij}$)> 23000 and those are in fact excluded from the sample.

We are in line with a recent important study by Doucouliagos, Iamsiraroj and Ulubasoglu that shows that at macro level the relation is both statistically significant and quite strong, with effects averaging around 12 to15%[19]. We also find statistical differences between the "developing country" sample and "mixed countries" sample: the former shows a much stronger effect than the latter, i.e. 9.4% points stronger FDI-

[18] 0.049*** as coefficient of the intercept.

19 These authors too use partial correlation coefficient as their dependent variable.

growth relationship.

### 3.3.2 MRA and Publication/Reporting Selection

Following Card and Kruger (1995), Gorg and Strobl (2001) and especially Doucouliagos and Stanley (2009) we present some results on publication selection in Tables 3 and 4. For different samples, i.e. depending on the level of precision in the estimates, we estimate:

$$t_{ij} = \beta_0 + B_1 SE_{ij} + v_{ij} \quad (2)$$

$$\log|t_{ij}| = \beta_0 + \beta_2 \text{Log}\sqrt{}\text{DFij} + vij \quad (3)$$

Following the method developed by Doucouliagos and Stanley (2009) –Funnel Graph Asymmetry Test (FAT)-, we test the null hypothesis that the $\beta_0$ –the constant in the FAT test- is equal to 0 and this is clearly rejected at 1% (odds columns) in both micro and macro studies. Furthermore we note that the positive publication bias is not severe, according to Doucouliagos and Stanley (2009), because the estimated coefficient (across samples) is below 2 in absolute value (column 3 in Tables 3 and 4).

Alternatively we also follow Card and Kruger (1995) and we test whether the $\beta_2$ in equation (3) -now the coefficient to the Log√DFij- is statistically different from 1. We can again reject this null hypothesis in all samples (column 4 in Tables 3 and 4).

However we would be cautious in interpreting these results: the "publication" bias could effectively originate from very different sources and the conclusion from this set of regression is that we do register some sort of bias, but we are not able to dissect the precise source. In other words we are able to point that the literature has been affected by a certain (no serious though) level of bias, probably due to econometric models misspecification. Furthermore, when running the same test by controlling for studies characteristics (for a comparison with the original FAT see Doucouliagos and Stanley (2009)) there is no more statistical evidence of such a bias. We now turn to the

discussion of these results.

### 3.3.3 Meta Regression Analysis on Studies Characteristics

The specification presented in model (1) has now been "augmented" by adding some controls variables on the type of definitions for the FDI or the growth variable, sample characteristics, type of FDI-growth relationship analysed, various potential controls in the original estimates, econometric methodology, geographical areas/countries and time period of analysis.

The specification of the augmented equation is therefore:

$$r_{ij} = \beta_0 + \boldsymbol{BZ} + v_{ij} \qquad (4)$$

where the bold character for both $\boldsymbol{B}$ and $\boldsymbol{Z}$ denotes a vector and matrix , respectively. The results of this specification are reported in table 5, 6 and 7 for micro studies and 8 and 9 for macro. Two sections on separate comments on results follow.

### 3.4 Firm Level Results

Table 5 has been organised as follows: column 1 exploits the full sample, whereas columns 2 includes estimates where the precision is less than 25000 (our preferred regression). Table 6 and 7 differ in the use of country, macro region dummies and level of development dummies, respectively. All regressions show clustered SE at the level of the paper and Weighted Least Square (the weight being determined by precision).

In table 5 we register a very high r square when all studies are included but this is also a by-product of the inclusion (and therefore high weight) of the "above 25000 precision" studies. When we exclude those, the adjusted r square drops to 73% which for a meta regression is still quite high. In table 6 the regional break down of the regressions shows a much wider patterns (due to the changing number of observations and clusters), and adjusted r-square ranges in the 42-91% interval.

In order to assess whether the results for the whole sample might well be the

effect of a composition of very different type of countries, we divided the sample according to two criteria as shown in tables 6 and table 7: in the former we split the sample by geographical areas, i.e. mainly continents, whereas in the letter we split the sample by level of development, here measured as GDP per capita[20].

We start with the analysis by geographical areas. In table 6, columns 1 and 2 exploit different geographical dummies, i.e. country specific dummies and macro region or continent dummies, respectively. In both cases China (PRC) is the omitted category. For the sake of space, we do not report country and median year of study dummies in the tables[21]. Only "Transition countries" appear to register a stronger positive FDI-growth relationship as a group with respect to the PRC. Column 3 signals the underperformance of LMI and UMI with respect to LI (that is now the omitted category), even if in this regression controlling for misspecification the ranking seems to be LI, UMI and LMI (this is fully in line with Mayer and Sinani 2009).

Table 7 performs the same exercise where now we compare the group of countries by income level instead of by geographical areas: column 1 whole sample, column 2 low income, column 3 middle income (lower and upper), column 4 low and lower middle, column 5 lower middle income and finally column 6 upper middle income. Two main findings stand out. Firstly, the significance and magnitude of the coefficients on specification variables is quite homogenous across columns, i.e. within each income group[22] the role of modelling appears to have a pretty similar impact on the FDI-growth relationship *within* the same group. In other words, the income per capita sample subdivision appears to be much more suitable than the geographical areas subdivision. Secondly some of the specification variables that we would be more interested in low

[20] 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.

[21] Available upon request.

22 Please note that some samples may overlap across columns.

income countries, such as the inclusion of human capital, R&D and export control (all somewhat linked to the absorptive capacity of a country) are significant and negative especially in low income countries regressions. Our interpretation refers to the role of absorptive capacity in the recipient country, as detailed below

Is the variation of the partial correlation coefficient affected by the estimation model specification, such as sample choice, type of estimator, inclusion/exclusion of control, variables definitions, etc? If this is the case, which ones are the key variables? These question are examined in order below.

We do not observe statistically significant differences when using domestic or foreign data sample with respect to both samples pooled together but we do observe a relevant effect of direct spillover compared to indirect and vertical compared to the horizontal.

The way in which our RHS FDI and LHS, growth, are measured appears to have some scope in explaining the partial correlation variability, but not much. In the overall sample FDI measured as valued added or equity capital marginally outperform "share of output sales" (omitted category), in other word the FDI-growth link is positively associated with the former (value added or equity) and less so with the latter (share of output sales). However this results is not consistent across regions.

Cross section data (with respect to panel) and industry level averages estimates (with respect to firms' level unit of measurement) are statistically positively correlated with a higher FDI relationship. In other words when using the panel level firms database we register a much lower effect of the aforementioned relationship. These findings appear to be in line with the interpretation that more "accurate" quality of the data and sophisticated econometric techniques are possibly characterized by much weaker results than cross sectional and/or higher level of aggregation data.

Finally we concentrate on a wide range of confounding factors. In MRA is quite

important to correct for the risk of omitted variable bias. In other words different estimates might control for different variables and therefore obtain different results because of different specification/inclusion of control variable[23]. We analysed the potential role of human capital, capital intensity, export, competition and R&D. Two findings are discussed in order. If a regression does control for human capital, export and R&D the FDI-growth relationship is weakened. We interpret these as a further corroboration of absorptive capacity hypothesis, whose main argument is that there exist a limited possibility to benefit from FDI whenever the technological and/or human capital level (i.e. education) levels in low middle income countries are well below a certain threshold[24]. Secondly, we recognize the importance of the omitted variable bias especially in the literature on Low and Middle income countries.

### 3.5 Macro Level Results

In tables 8 and 9 we turn to cross-countries results. We register high adjusted r-square, some statistically significant moderator variables and compelling findings. Three main points are discussed in order: the role of the time span of the study; the use of Panel econometric techniques and the analysis of some absorptive capacity variables.

We discover that the longer the time span of a study, the higher the value of the partial correlation coefficient in the MRA. The longer the time span of the study the stronger the effect of FDI on growth. In other words, studies looking at longer time series seem to be more suitable to pick up the FDI-growth relationship.

The role panel method specification is of crucial importance also in macro type of

[23] This is further complicated when there are interactions terms (see also Doucouliagos et al. 2010).

[24] 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 WLS 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-a-vis indirect remain a very robust results. A similar consideration is valid for the use of the firm level data (as opposed to industry level): regardless of the estimator used the adoption of firm level data is associated with statistically lower partial correlation coefficients between FDI and growth.

studies: the use of this type of estimators reduces the effect of FDI on growth. In other words, we find that the omission of this econometric methodology would create an upper bias in the estimated effect of FDI on growth. Finally, and more importantly, also in macro type of study we register an important role of absorptive capacity variables. In column 2 of table 8 we note that controlling for financial deepness, R&D and quality of institutions leads to a lower effect of FDI on growth. This results is actually corroborated in table 9, where the overall effect is decomposed in developing countries only and mixed sample: the former shows a consistent negative sign on coefficients for absorptive capacity measures and this again show that not controlling for those would lead the FDI growth relationship to be upper biased. This is much less the case for mixed countries groupings (column 3 table 9).

## 4 CONCLUSIONS

Are inflows of foreign direct investment (FDI) beneficial in triggering economic growth and development in low income countries (LICs)? This paper examines this question using meta-regression-analysis techniques. These are techniques for summarizing and distilling the lessons from a given body of econometric evidence. For this exercise, a data set was constructed containing 550 estimates micro and 554 macro of the effects of FDI on growth, from 103 different (published and unpublished) micro and 72 macro empirical studies. Our data set also contains information on more than 30 important sampling, design and methodological differences across empirical studies and econometric models.

We find that 44 percent of these estimates are positive and significant, 44 percent are insignificant and 12 percent are negative and significant for micro studies; 50 percent of these estimates are positive and significant, 39 percent are insignificant and 11 percent are negative and significant for macro ones. The distribution of these effects for the LIC sub-sample is not much different, with 47 percent of the reported

effects positive and significant in micro studies. Our results also suggest that reporting or publication bias is not particularly severe in this body of evidence. More importantly, this body of evidence suggests that the effect of FDI on economic growth is significantly greater in low-income than in lower and upper middle-income countries.

Our findings show that we are able to explain a large share of the variation of the partial correlation coefficient variation when controlling for FDI and growth variables type of measurement, sample characteristics, type or FDI-growth relationship analysed, 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/middle income countries at the firm level, but this is a relative low magnitude, especially when compared with macro results both in our analysis and in most recent studies. In line with the literature we do find that study design affects the results in many dimensions. Finally, we do find that those studies controlling for the absorptive capability such as R&D or human capital, financial development and quality of institutions report a statistically lower partial correlation coefficient of FDI on growth. These results highlight important potential channels through which FDI may affect growth and echo previous findings on thresholds and absorptive capacity requirements. What are the main implications from this study for future research? We present three: (a) there is a clear need for further data collection for LICs and this should unquestionably generate high returns, especially in light of the fact that the estimated impact of FDI on economic growth seems to be substantially larger in LICs than elsewhere, (b) future studies should try to differentiate more carefully between different types of FDI (for example, in terms of sectoral distribution), and (c) studies seem too little concerned with issues of domestic adaptive capability.

What are the main policy lessons from this study? According to our summary of

the results from the available empirical literature, if donors and governments want to maximize the growth dividends from FDI then a focus on LICs, providing for a competitive environment, and investing in complementary human capital and R&D should receive top priority.

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

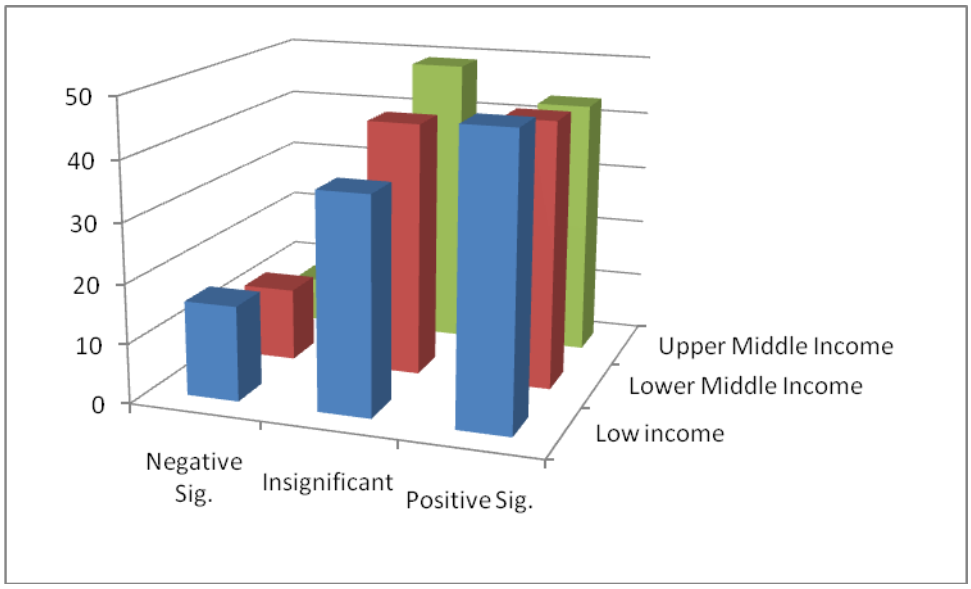



Figure 2. Percentage of Significant and Insignificant coefficients by sample, Macro Level Studies

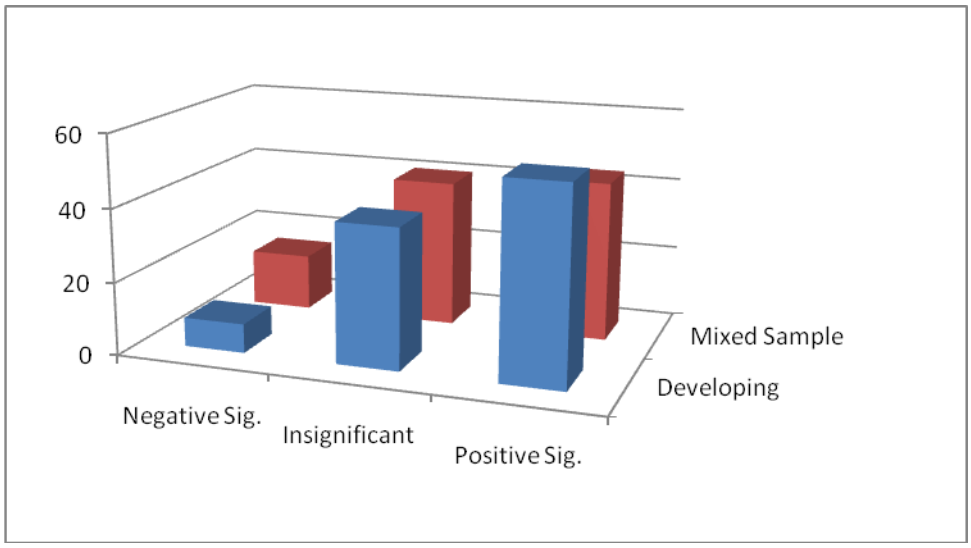


Table 1 Regressions on the mean. Partial Correlation Coefficient as Dependent Variable. Firm Level (Micro) database.

| | *Pooled Regression* | *Three Samples (weighted)* | *Pooled with Dummies (weighted)* |
|---|---|---|---|
| Un-weighted | 0.049*** | | |
| | (0.011) | | |
| Weighted (1/se) | 0.045* | | |
| | (0.024) | | |
| Low Income (94 obs. 10 clusters) | | 0.373*** | 0.373*** |
| | | (0.074) | (0.071) |
| Lower Middle Income (251 obs. 51 clusters) | | 0.047 | -0.326*** |
| | | (0.047) | (0.085) |
| Upper Middle Income (204 obs. 42 clusters) | | 0.038* | -0.335*** |
| | | (0.021) | (0.074) |
| Observations | 549 | | 549 |
| N. Cluster | 103 | | 103 |

Robust standard errors, clustered at the level of the 103 papers in parentheses *** p<0.01, ** p<0.05, * p<0.1. Papers 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. 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 2 Regressions on the mean: Partial Correlation Coefficient as Dependent Variable. Cross-Countries Level (Macro) database.

| | *Pooled Regression* | *Two Samples (weighted)* | *Pooled with Dummy (weighted)* |
|---|---|---|---|
| Un-weighted | 0.158*** | | |
| | (0.022) | | |
| Weighted (1/se) | 0.145*** | | |
| | (0.031) | | |
| Low Income only (373 obs. 53 clusters) | | 0.176*** | 0.176*** |
| | | (0.032) | (0.032) |
| Mixed (180 obs. 24 clusters) | | 0.082** | -0.094** |
| | | (0.037) | (0.042) |
| Observations | 553 | | 553 |
| N. Cluster | 72 | | 72 |

Robust standard errors, clustered at the level of the 9 (full sample) papers, in parentheses *** p<0.01, ** p<0.05, * p<0.1. Papers with |t|>40 and [1/se]>23000 excluded from the sample. The poolability test on the coefficients ( $\beta_{LI+OTHERS} = \beta_{LI\ ONLY}$ ) it's rejected at the 1% level. The poolability test on the standard errors [$Se(\beta_{LI+OTHERS}) = Se(\beta_{LI\ ONLY})$] 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 3: MRA test for Publication Selection Bias, Micro Sample

Estimated equation in odd columns (1,3): $t_{ij} = \beta_0 + \beta_1 * [1/SE_{ij}] + v_{ij}$

Estimated equation in even columns (2,4): $\log|t_{ij}| = \beta_0 + \beta_2 \text{Log}\sqrt{DF_{ij}} + v_{ij}$

| | *(1)* | *(2)* | *(3)* | *(4)* |
|---|---|---|---|---|
| VARIABLES | LHS: t. Full sample | LHS: log\|t\| Full sample | LHS: t. 1/se<25000 | LHS: log\|t\| 1/se<25000 |
| Constant | 1.819*** | 0.081 | 1.800*** | 0.079 |
| | (0.291) | (0.262) | (0.286) | (0.263) |
| 1/se | 0.000 | | 0.000 | |
| | (0.000) | | (0.000) | |
| Log √ DF | | 0.100 | | 0.101 |
| | | (0.065) | | (0.065) |
| $H_0$: $\beta_2$=1 | | Rej*** | | Rej*** |
| Observations | 550 | 550 | 549 | 548 |
| N. Cluster | 103 | 103 | 103 | 103 |

*** 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 in columns (3) and (4).

Table 4: MRA test for Publication Selection Bias, Macro Sample

Estimated equation in odd columns (1,3): $t_{ij} = \beta_0 + \beta_1 * [1/SE_{ij}] + v_{ij}$

Estimated equation in even columns (2,4): $\log|t_{ij}| = \beta_0 + \beta_2 \text{Log}\sqrt{DF_{ij}} + v_{ij}$

| | *(1)* | *(2)* | *(3)* | *(4)* |
|---|---|---|---|---|
| VARIABLES | LHS: t. Full sample | LHS: log\|t\| Full sample | LHS: t. 1/se<23000 | LHS: log\|t\| 1/se<23000 |
| Constant | 2.058*** | 0.245 | 1.863*** | 0.283 |
| | (0.300) | (0.397) | (0.327) | (0.395) |
| 1/se | -0.002*** | | 0.000 | |
| | (0.000) | | (0.001) | |
| Log √ DF | | 0.080 | | 0.061 |
| | | (0.161) | | (0.160) |
| $H_0$: $\beta_2$=1 | | Rej*** | | Rej*** |
| Observations | 554 | 554 | 553 | 553 |
| N. Cluster | 72 | 72 | 72 | 72 |

*** 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 in columns (3) and (4).

Table 5 The "augmented" Firm Level MRA, Micro Sample

| | *(1)* | *(2)* |
|---|---|---|
| | Full sample | No Outliers |
| Constant | 0.062 | 0.275* |
| | (0.179) | (0.156) |
| Log √ DF | 0.080*** | 0.053** |
| | (0.027) | (0.022) |
| Definition of Spillover | | |
| FDI: Share value added | 0.153* | 0.146* |
| | (0.083) | (0.082) |
| FDI: Share of employment | 0.068 | 0.055 |
| | (0.048) | (0.046) |
| FDI: Share of equity capital | 0.104** | 0.092** |
| | (0.047) | (0.046) |
| FDI: direct effect | 0.172** | 0.174** |
| | (0.085) | (0.086) |
| FDI: vertical spillover | -0.011 | -0.011 |
| | (0.026) | (0.026) |
| FDI: backward spillover | 0.020** | 0.019* |
| | (0.010) | (0.010) |
| Definition of Growth | | |
| Growth: TFP efficiency | -0.059 | -0.060 |
| | (0.038) | (0.040) |
| Growth: Value added | -0.005 | -0.009 |
| | (0.040) | (0.039) |
| Growth: Labour productivity | 0.002 | 0.004 |
| | (0.026) | (0.027) |
| Sample and Estimator | | |
| Dummy Endogeneity | 0.063*** | 0.063*** |
| | (0.008) | (0.009) |
| Domestic Firms Sample | 0.040* | 0.036* |
| | (0.021) | (0.020) |
| Foreign Firms Sample | 0.026 | 0.009 |

| | | |
|---|---|---|
| | (0.077) | (0.074) |
| Panel | | -0.099*** |
| | | (0.036) |
| Cross section | 0.115*** | |
| | (0.038) | |
| Firm level data | -0.261*** | -0.224*** |
| | (0.066) | (0.059) |
| Control Variables | | |
| HK as labour quality | -0.120** | -0.111** |
| | (0.054) | (0.047) |
| Capital per worker | -0.088* | -0.092* |
| | (0.048) | (0.049) |
| Export | -0.109* | -0.096 |
| | (0.062) | (0.063) |
| Competition | 0.038*** | 0.035*** |
| | (0.012) | (0.011) |
| R&D | -0.002 | -0.004 |
| | (0.003) | (0.003) |
| University Affiliation | 0.130 | 0.077 |
| | (0.087) | (0.081) |
| Observations | 550 | 549 |
| Adjusted R-squared | 0.886 | 0.732 |
| N. Cluster | 103 | 103 |

Robust standard errors in parentheses clustered at level of the study *** p<0.01, ** p<0.05, * p<0.1. All regressions control for median year and country dummies, available upon request. Papers with |t|>40 and [1/se]>25000 excluded from the sample in column (2).

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

| | *(1)* Country Dummies | *(2)* Regions Dummies | *(3)* Low, Middle Income Dummies | *(4)* Africa | *(5)* Centr. South America | *(6)* Transition | *(7)* China | *(8)* Asia (but China) |
|---|---|---|---|---|---|---|---|---|
| Constant | 0.275* | -0.244 | 0.120 | 0.166 | 1.107*** | -0.100 | 0.243** | 0.448*** |
| | (0.156) | (0.197) | (0.194) | (0.137) | (0.108) | (0.183) | (0.115) | (0.098) |
| Lower M. income | | | -0.326*** | | | | | |
| | | | (0.124) | | | | | |
| Upper M. income | | | -0.285** | | | | | |
| | | | (0.111) | | | | | |
| Asia (but China) | | 0.048 | | | | | | |
| | | (0.072) | | | | | | |
| Centr. South America | | 0.035 | | | | | | |
| | | (0.096) | | | | | | |
| Africa | | 0.090 | | | | | | |
| | | (0.144) | | | | | | |
| Transition | | 0.144** | | | | | | |
| | | (0.057) | | | | | | |
| Log Square Root DF | 0.053** | 0.031 | 0.034* | 0.052 | -0.240* | 0.022 | 0.007 | -0.436*** |
| | (0.022) | (0.021) | (0.019) | (0.054) | (0.130) | (0.019) | (0.013) | (0.060) |
| FDI: Share value added | 0.146* | 0.030 | 0.047 | | | | | 0.182*** |
| | (0.082) | (0.093) | (0.085) | | | | | (0.037) |
| FDI: Share of employment | 0.055 | 0.074 | 0.011 | -0.050*** | 0.038*** | 0.036* | -0.026 | 1.570** |
| | (0.046) | (0.046) | (0.052) | (0.009) | (0.006) | (0.019) | (0.028) | (0.592) |
| FDI: Share of equity capital | 0.092** | 0.107** | 0.048 | -0.126*** | 0.007 | 0.173*** | 0.007 | 0.197*** |
| | (0.046) | (0.045) | (0.051) | (0.017) | (0.006) | (0.020) | (0.028) | (0.036) |
| FDI: direct effect | 0.174** | 0.176** | 0.169** | -0.039*** | 0.036*** | 0.267*** | 0.011*** | 0.302*** |
| | (0.086) | (0.082) | (0.084) | (0.007) | (0.004) | (0.023) | (0.003) | (0.031) |
| FDI: vertical spillover | -0.011 | -0.011 | -0.013 | -0.062*** | 0.243*** | -0.028** | 0.017** | 0.011*** |
| | (0.026) | (0.031) | (0.029) | (0.008) | (0.006) | (0.013) | (0.008) | (0.002) |
| FDI: backward spillover | 0.019* | 0.019 | 0.019 | 0.032 | | 0.029*** | -0.006 | |
| | (0.010) | (0.013) | (0.013) | (0.017) | | (0.002) | (0.007) | |
| Growth: TFP efficiency | -0.060 | -0.002 | 0.008 | -0.038*** | -0.003 | -0.073** | -0.087 | -1.274** |
| | (0.040) | (0.056) | (0.040) | (0.002) | (0.003) | (0.031) | (0.075) | (0.554) |
| Growth: Value added | -0.009 | 0.061 | 0.037 | | -0.098 | -0.295*** | 0.020 | -1.735*** |
| | (0.039) | (0.055) | (0.063) | | (0.175) | (0.028) | (0.119) | (0.586) |
| Growth: Labour productivity | 0.004 | 0.158*** | 0.133*** | | -0.072 | -0.037 | -0.045 | -1.272** |
| | (0.027) | (0.039) | (0.046) | | (0.156) | (0.022) | (0.076) | (0.545) |
| Dummy Endogeneity | 0.063*** | 0.053*** | 0.054*** | -0.048 | 0.006 | -0.082*** | 0.070*** | 0.003 |
| | (0.009) | (0.018) | (0.017) | (0.028) | (0.005) | (0.024) | (0.001) | (0.006) |
| Domestic Firms Sample | 0.036* | 0.029 | 0.029 | -0.041 | -0.038** | 0.025 | -0.014*** | 0.086*** |
| | (0.020) | (0.018) | (0.019) | (0.031) | (0.014) | (0.015) | (0.004) | (0.011) |
| Foreign Firms Sample | 0.009 | 0.034 | 0.088 | | | | 0.002 | |
| | (0.074) | (0.063) | (0.080) | | | | (0.034) | |
| Panel | -0.099*** | -0.034 | -0.096** | -0.007 | 0.315 | -0.099*** | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (0.036) | (0.035) | (0.037) | (0.009) | (0.281) | (0.019) | | |
| Cross section | | | | | | | 0.021 | -0.009 |
| | | | | | | | (0.058) | (0.008) |
| Firm level data | -0.224*** | -0.187*** | -0.130** | | 0.320 | -0.037 | -0.254*** | -0.068 |
| | (0.059) | (0.055) | (0.055) | | (0.282) | (0.032) | (0.035) | (0.304) |
| HK as labour quality | -0.111** | -0.112* | -0.164*** | | 0.437* | -0.005 | -0.179*** | 0.274 |
| | (0.047) | (0.062) | (0.053) | | (0.230) | (0.022) | (0.042) | (0.257) |
| Capital per worker | -0.092* | 0.026 | 0.077** | -0.090** | -0.385*** | 0.217*** | -0.215*** | -0.667** |
| | (0.049) | (0.053) | (0.039) | (0.032) | (0.076) | (0.022) | (0.060) | (0.264) |
| Export | -0.096 | -0.055 | 0.035 | 0.190** | -0.437*** | -0.066* | -0.183* | -0.336 |
| | (0.063) | (0.067) | (0.051) | (0.061) | (0.113) | (0.032) | (0.091) | (0.215) |
| Competition | 0.035*** | 0.014 | 0.017 | -0.005 | -0.280*** | 0.015 | 0.019*** | 0.356* |
| | (0.011) | (0.021) | (0.019) | (0.027) | (0.015) | (0.020) | (0.005) | (0.191) |
| R&D | -0.004 | -0.001 | 0.001 | | -0.077 | -0.008*** | 0.042 | -1.965* |
| | (0.003) | (0.003) | (0.004) | | (0.053) | (0.003) | (0.044) | (0.946) |
| University Affiliation | 0.077 | 0.147** | 0.182** | | -0.220 | 0.147*** | | |
| | (0.081) | (0.064) | (0.070) | | (0.151) | (0.020) | | |
| Observations | 549 | 549 | 549 | 50 | 60 | 191 | 189 | 59 |
| N. Cluster | 103 | 103 | 103 | 6 | 19 | 30 | 28 | 21 |
| Adjusted R-squared | 0.732 | 0.671 | 0.678 | 0.807 | 0.912 | 0.911 | 0.427 | 0.673 |

Robust standard errors in parentheses clustered at level of the study *** p<0.01, ** p<0.05, * p<0.1. In columns 4-8 regressions control for median year and country 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. 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" Firm Level MRA by Income Level, Micro Sample

| | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* |
|---|---|---|---|---|---|---|
| VARIABLES | All | LOW Income | MIDDLE Income | LOW and Lower MIDDLE Income | Lower MIDDLE Income | Upper MIDDLE Income |
| Constant | 0.275* | 1.295 | 0.308 | -0.704*** | -0.137 | -0.019 |
| | (0.156) | (1.191) | (0.208) | (0.138) | (0.162) | (0.199) |
| Log Square Root DF | 0.053** | -0.342 | 0.042** | 0.069*** | 0.030* | 0.027 |
| | (0.022) | (0.315) | (0.018) | (0.022) | (0.017) | (0.022) |
| FDI: Share value added | 0.146* | | 0.149* | | | 0.263*** |
| | (0.082) | | (0.079) | | | (0.039) |
| FDI: Share of employment | 0.055 | 0.011 | 0.038 | 0.062 | -0.015 | 0.127* |
| | (0.046) | (0.021) | (0.048) | (0.041) | (0.028) | (0.073) |
| FDI: Share of equity capital | 0.092** | 0.129 | 0.076 | 0.095** | 0.019 | 0.181*** |
| | (0.046) | (0.381) | (0.048) | (0.041) | (0.029) | (0.029) |
| FDI: direct effect | 0.174** | 0.269 | 0.178** | 0.012 | 0.018* | 0.263*** |
| | (0.086) | (0.405) | (0.086) | (0.008) | (0.010) | (0.026) |
| FDI: vertical spillover | -0.011 | 0.024 | -0.010 | 0.019*** | 0.018** | -0.028** |
| | (0.026) | (0.022) | (0.027) | (0.006) | (0.007) | (0.014) |
| FDI: backward spillover | 0.019* | 0.015 | 0.019* | -0.007 | -0.004 | 0.030*** |
| | (0.010) | (0.016) | (0.010) | (0.006) | (0.008) | (0.003) |
| Growth: TFP efficiency | -0.060 | | -0.038 | 0.010 | 0.017 | 0.010 |
| | (0.040) | | (0.024) | (0.054) | (0.043) | (0.009) |
| Growth: Value added | -0.009 | -0.246*** | 0.037 | 0.094 | 0.111* | 0.028 |
| | (0.039) | (0.075) | (0.041) | (0.058) | (0.058) | (0.037) |
| Growth: Labour productivity | 0.004 | 0.059 | -0.012 | 0.112** | 0.093** | -0.049 |
| | (0.027) | (0.079) | (0.030) | (0.051) | (0.046) | (0.045) |
| Dummy Endogeneity | 0.063*** | 0.043 | 0.064*** | 0.068*** | 0.068*** | -0.031 |
| | (0.009) | (0.087) | (0.007) | (0.004) | (0.004) | (0.032) |
| Domestic Firms Sample | 0.036* | -0.053 | 0.038* | -0.007 | -0.009 | 0.025* |
| | (0.020) | (0.059) | (0.020) | (0.008) | (0.005) | (0.015) |
| Foreign Firms Sample | 0.009 | | 0.010 | 0.011 | -0.047 | |
| | (0.074) | | (0.070) | (0.053) | (0.044) | |
| Panel | -0.099*** | | | -0.078* | | -0.013 |
| | (0.036) | | | (0.041) | | (0.022) |
| Cross section | | -0.024 | 0.099*** | | 0.134*** | |
| | | (0.032) | (0.034) | | (0.040) | |
| Firm level data | -0.224*** | | -0.185*** | -0.292*** | -0.282*** | -0.050 |
| | (0.059) | | (0.064) | (0.048) | (0.053) | (0.031) |
| HK as labour quality | -0.111** | -0.007*** | -0.087* | -0.143*** | -0.189*** | 0.003 |
| | (0.047) | (0.001) | (0.048) | (0.046) | (0.048) | (0.039) |
| Capital per worker | -0.092* | -0.062** | -0.074* | -0.191*** | -0.100* | -0.026 |
| | (0.049) | (0.020) | (0.037) | (0.060) | (0.058) | (0.037) |
| Export | -0.096 | | -0.024 | -0.207** | -0.223*** | 0.046 |
| | (0.063) | | (0.059) | (0.080) | (0.075) | (0.047) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Competition | 0.035*** | 0.355*** | 0.041*** | 0.029*** | 0.025*** | 0.042 |
| | (0.011) | (0.063) | (0.012) | (0.005) | (0.006) | (0.048) |
| R&D | -0.004 | 0.363 | -0.006** | 0.109 | 0.082 | -0.007*** |
| | (0.003) | (0.758) | (0.003) | (0.089) | (0.076) | (0.003) |
| University Affiliation | 0.077 | -0.342 | 0.064 | 0.164* | -0.056 | -0.064 |
| | (0.081) | (0.567) | (0.070) | (0.097) | (0.106) | (0.067) |
| Observations | 549 | 94 | 455 | 345 | 251 | 204 |
| Adjusted R-squared | 0.732 | 0.765 | 0.719 | 0.793 | 0.780 | 0.831 |
| N. Cluster | 103 | 10 | 94 | 60 | 51 | 43 |

Robust standard errors in parentheses clustered at level of the study *** p<0.01, ** p<0.05, * p<0.1. All regressions control for median year and country dummies. Paper with |t|>40 and [1/se]>25000 excluded from the sample.

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

| | *(1)* | *(2)* |
|---|---|---|
| VARIABLES | Full sample | No Outliers |
| Constant | 1.863 | 0.031 |
| | (1.407) | (0.504) |
| Dummy Stage of Development (1=only Developing) | -0.203 | -0.015 |
| | (0.154) | (0.089) |
| Log Square Root DF | -0.587 | 0.043 |
| | (0.576) | (0.179) |
| Growth GDP p.c. (w.r.t. TFP) | -0.002 | -0.020 |
| | (0.072) | (0.047) |
| Growth GDP (w.r.t. TFP) | 0.170 | 0.172** |
| | (0.155) | (0.083) |
| Growth GNP (w.r.t. TFP) | -0.166 | -0.103 |
| | (0.254) | (0.176) |
| # Countries in the Sample | -0.001 | -0.001 |
| | (0.003) | (0.001) |
| Dummy Country level Obs. (w.r.t. Regions or Province) | 0.318 | 0.303** |
| | (0.191) | (0.118) |
| Time Span | 0.027** | 0.013** |
| | (0.011) | (0.005) |
| Dummy Cross Section (w.r.t Panel) | -0.317 | 0.024 |
| | (0.336) | (0.160) |
| Dummy Endogeneity | 0.035 | 0.033 |
| | (0.075) | (0.058) |
| Dummy Panel estimator | -0.343*** | -0.192*** |
| | (0.124) | (0.070) |
| Dummy FE estimator | -0.051 | -0.036 |
| | (0.085) | (0.060) |
| Dummy Long Run | -0.338 | -0.053 |
| | (0.251) | (0.108) |
| Dummy Delta Log LHS&RHS | -0.086 | 0.031 |
| | (0.126) | (0.096) |

| | | |
|---|---|---|
| Dummy Interaction FDI | -0.008 | -0.005 |
| | (0.057) | (0.047) |
| Dummy Combined Regression | -0.132 | -0.065 |
| | (0.119) | (0.068) |
| Dummy FDI Initial Level | -0.216 | 0.166 |
| | (0.161) | (0.117) |
| Dummy FDI period average | -0.335 | 0.055 |
| | (0.215) | (0.095) |
| Dummy Human Capital control | -0.009 | 0.077* |
| | (0.080) | (0.044) |
| Dummy Trade Openness control | 0.024 | 0.038 |
| | (0.053) | (0.049) |
| Dummy Financial Account Openness control | -0.134 | -0.090 |
| | (0.090) | (0.055) |
| Dummy Financial Deepness control | -0.189** | -0.116** |
| | (0.075) | (0.052) |
| Dummy R&D control | 0.211 | -0.352* |
| | (0.513) | (0.185) |
| Dummy Institutions control | -0.069 | -0.077* |
| | (0.044) | (0.042) |
| Dummy No Capital control | -0.150 | -0.134** |
| | (0.096) | (0.063) |
| Dummy Infrastructure control | 0.056 | 0.002 |
| | (0.125) | (0.080) |
| Dummy Continent | -0.100 | -0.017 |
| | (0.137) | (0.094) |
| Dummy Trend | -0.093 | -0.088 |
| | (0.194) | (0.079) |
| Observations | 554 | 553 |
| N. Cluster | 72 | 72 |
| Adj- R-squared | 0.858 | 0.519 |

Robust standard errors in parentheses clustered at level of the study *** p<0.01, ** p<0.05, * p<0.1. All regressions control for median year. Papers with |t|>40 and [1/se]>23000 excluded from the sample in column (2).

Table 9 The "augmented" Cross-Countries MRA by Country Grouping, Macro Sample

| | *(1)* | *(2)* | *(3)* |
|---|---|---|---|
| VARIABLES | All Countries | Developing Grouping Only | Mixed Grouping Only |
| Constant | 0.031 | -0.404 | 1.866*** |
| | (0.504) | (0.313) | (0.426) |
| Dummy Stage of Development (1=only Developing) | -0.015 | | |
| | (0.089) | | |
| Log Square Root DF | 0.043 | 0.263*** | -0.627** |
| | (0.179) | (0.085) | (0.232) |
| Dummy Growth GDP p.c. (w.r.t. TFP) | -0.020 | 0.223*** | 0.010 |
| | (0.047) | (0.076) | (0.030) |
| Dummy Growth GDP (w.r.t. TFP) | 0.172** | 0.243** | 0.585*** |
| | (0.083) | (0.116) | (0.118) |
| Dummy Growth GNP (w.r.t. TFP) | -0.103 | 0.347** | -0.815*** |
| | 0.043 | 0.263*** | -0.627** |
| # Countries in the Sample | -0.001 | -0.004*** | 0.003*** |
| | (0.001) | (0.001) | (0.001) |
| Dummy Country level Obs. (w.r.t. Regions or Province) | 0.303** | -0.010 | |
| | (0.118) | (0.104) | |
| Time span | 0.013** | 0.002 | 0.017 |
| | (0.005) | (0.004) | (0.010) |
| Dummy Cross Section | 0.024 | 0.334*** | -0.357** |
| | (0.160) | (0.113) | (0.154) |
| Dummy Endogeneity | 0.033 | -0.021 | 0.046 |
| | (0.058) | (0.041) | (0.103) |
| Dummy Panel Estimator | -0.192*** | -0.111 | -0.403 |
| | (0.070) | (0.069) | (0.292) |
| Dummy Fixed Effect Estimator | -0.036 | 0.159** | -0.008 |
| | (0.060) | (0.068) | (0.104) |
| Dummy Long Run | -0.053 | 0.224*** | -0.217 |
| | (0.108) | (0.079) | (0.207) |
| Dummy Delta Log LHS&RHS | 0.031 | -0.140** | -0.317*** |
| | (0.096) | (0.065) | (0.089) |
| Dummy Interaction FDI | -0.005 | 0.024 | -0.052 |
| | (0.047) | (0.076) | (0.034) |
| Dummy Combined Regression | -0.065 | -0.020 | -0.026 |
| | (0.068) | (0.112) | (0.016) |
| Dummy FDI Initial Level | 0.166 | 0.346*** | 0.257** |
| | (0.117) | (0.106) | (0.111) |
| Dummy FDI period average | 0.055 | 0.290** | 0.076*** |
| | (0.095) | (0.129) | (0.011) |
| Dummy Human Capital Control | 0.077* | 0.134 | -0.055 |
| | (0.044) | (0.091) | (0.034) |
| Dummy Trade Openness Control | 0.038 | -0.025 | 0.015 |
| | (0.049) | (0.023) | (0.073) |
| Dummy Financial Account Openness control | -0.090 | -0.008 | -0.275 |
| | (0.055) | (0.032) | (0.196) |
| Dummy Financial Deepness Control | -0.116** | -0.151*** | 0.304** |
| | (0.052) | (0.027) | (0.118) |
| Dummy R&D control | -0.352* | -0.289* | |
| | (0.185) | (0.170) | |
| Dummy Institutions control | -0.077* | -0.109* | -0.356*** |
| | (0.042) | (0.064) | (0.026) |
| Dummy No Capital Control | -0.134** | -0.048* | |

| | | | |
|---|---|---|---|
| | (0.063) | (0.027) | |
| Dummy Infrastructure control | 0.002 | -0.139* | 1.031** |
| | (0.080) | (0.074) | (0.429) |
| Dummy Continent | -0.017 | 0.217*** | -0.060 |
| | (0.094) | (0.070) | (0.084) |
| Dummy Trend | -0.088 | -0.115** | 0.113 |
| | (0.079) | (0.044) | (0.289) |
| Observations | 553 | 373 | 180 |
| N. Cluster | 72 | 53 | 24 |
| Adj-R-squared | 0.519 | 0.657 | 0.790 |

Robust standard errors in parentheses clustered at level of the study *** p<0.01, ** p<0.05, * p<0.1. All regressions control for median year and country dummies. Paper with |t|>40 and [1/se]>23000 excluded from the sample.

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

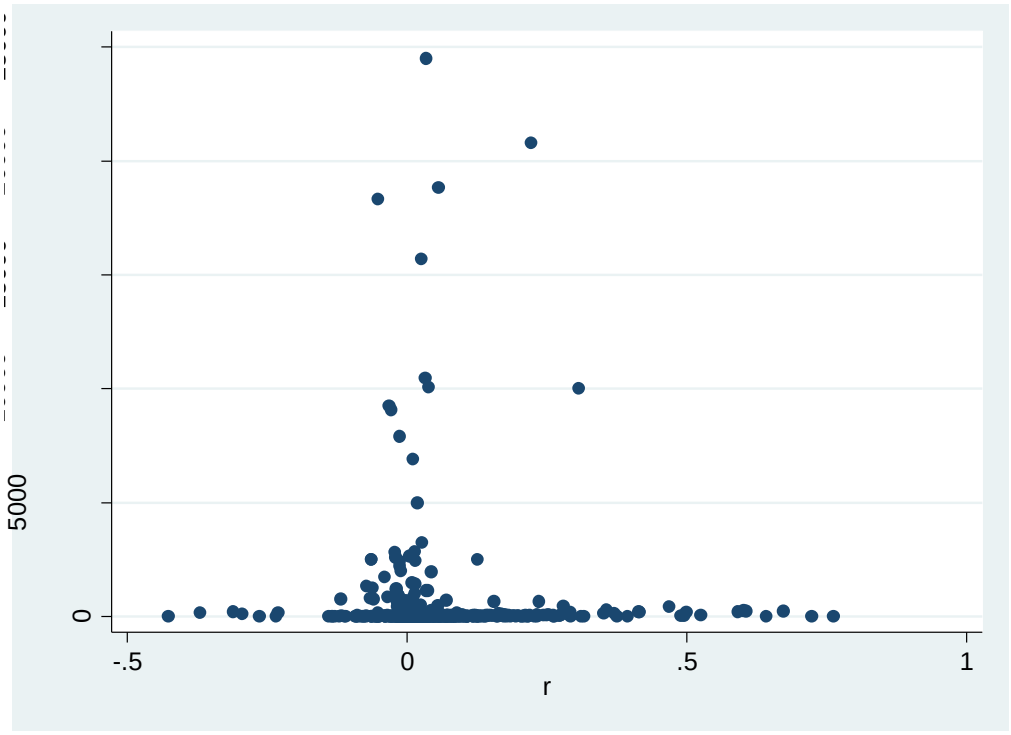
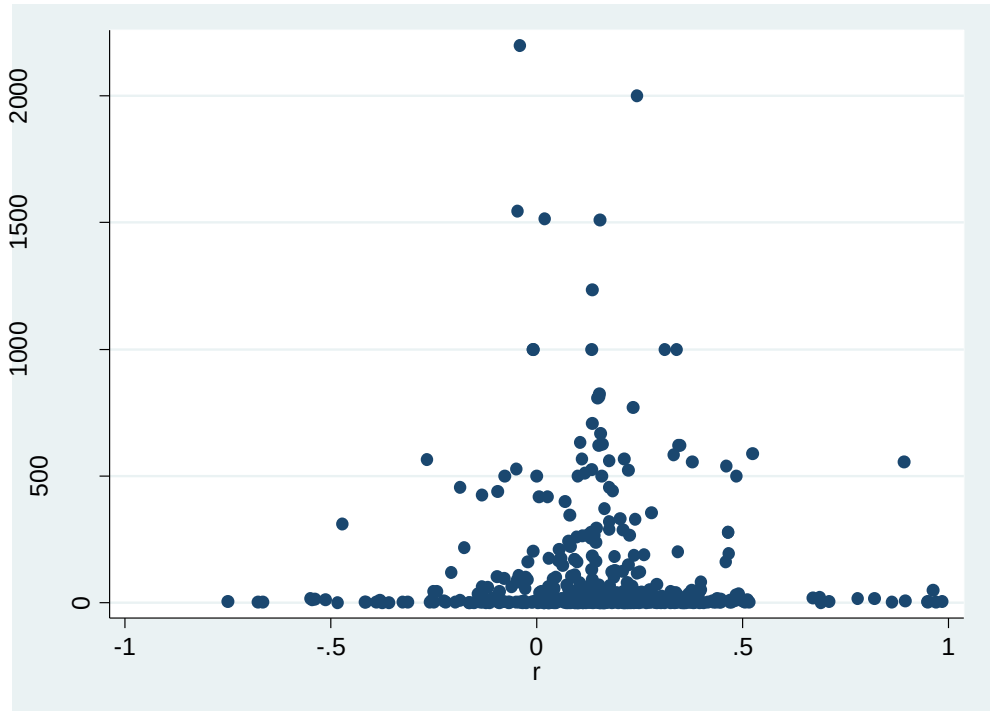



Figure 4 Funnel Database Macro Level, Cross-Sections (excluding outliers with precision above 23000)



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 Japanease 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 (2005): Welfare Gains from Foreign Direct Investment through Technology Transfer to Local Suppliers. Working paper, University of California (Berkeley).
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
14. Blomström, M. (1986) "Foreign investment and productive efficiency: the case of Mexico" - *The Journal of Industrial Economics*, Vol. 35, No. 1 (Sep., 1986), pp. 97-110
15. Blomström, M. and Persson (1983) "Foreign investment and spillover efficiency in an underdeveloped economy: Evidence from the Mexican manufacturing industry" *World Development*, Vol. 11, No. 6,
16. Blomströ̈m, M., Sjöholm, F. (1999) "Technology transfer and spillovers: Does local participation with multinationals matter?" *European Economic Review* 43 (4-6), pp. 915-923
17. Blomström M, Wolff EN (1994): Multinational Corporations and Productivity Convergence in Mexico. In: Baumol WJ, Nelson RR, Wolff EN (Eds.): Convergence of Productivity: Cross National Studies and Historical Evidence. Oxford University Press, pp. 263–283.
18. Buckley, P.J., Clegg, J., Wang, C. (2002) "The impact of inward FDI on the performance of Chinese manufacturing firms" *Journal of International Business Studies* 33 (4), pp. 637-655

19. Buckley, P.J., Clegg, J., Wang, C. (2006) “Inward FDI and host country productivity: Evidence from China's electronics industry” *Transnational Corporations* 15 (1), pp. 13-37
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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 analysed 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 export | 0.263158 | 0.440734 |
| 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 and it's measured as share of value added | 0.014035 | 0.117739 |
| H spill share employment | Dummy variable=1 if FDI measure refers to Horizontal spillover and it's measured as share of employed | 0.191228 | 0.393614 |
| H spill share equity/Capital | Dummy variable=1 if FDI measure refers to Horizontal spillover and it's 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 and it's 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 | 0.091228 | 0.288186 |

| | | | |
|---|---|---|---|
| | variable is value added | | |
| Y=labour productivity | Dummy variable=1 if dependent variable is labour 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 Cross Section (w.r.t Panel) | | 0.879 | 0.326 |
| Dummy Endogeneity | | 19.865 | 9.033 |
| Dummy Panel estimator | | 0.473 | 0.500 |
| Dummy FE estimator | | 0.276 | 0.448 |
| Dummy Long Run | | 0.204 | 0.403 |
| Dummy Delta Log LHS&RHS | | 0.264 | 0.441 |
| Dummy Interaction FDI | | 0.82 | 0.463 |
| Dummy Combined Regression | | 0.63 | 0.328 |
| Dummy FDI Initial | | 0.179 | 0.383 |

| | | |
|---|---|---|
| Level Dummy FDI period average | 0.368 | 0.483 |
| Dummy Human Capital control | 0.383 | 0.486 |
| Dummy Trade Openness control | 0.612 | 0.488 |
| Dummy Financial Account Openness control | 0.616 | 0.487 |
| Dummy Financial Deepness control | 0.458 | 0.499 |
| 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 definition25. 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".26 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 "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 +

[25] 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.

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

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 analyse 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 analysed; Year and sector analysed; Type of data and estimators used; main results, etc. With this information we formulated an initial judgement 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 analyse 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 analyse 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 analysed 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 analysing the effect of FDI on GDP (and its transformation), while in term of microeconomic studies we restricted our attention to articles analysing 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. 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 554 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.