

Protocol

SYSTEMATIC REVIEW FOR FOREIGN DIRECT INVESTMENT IN LOW INCOME COUNTRIES

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(1) Background

The conventional wisdom about foreign direct investment (hereafter FDI) in low income countries is very powerful. It says that such countries receive little FDI and because it is often concentrated in natural resources, it has limited development impact (e.g. Asiedu 2006; Buckley, Clegg, Cross, Liu; Voss and Zheng 2007; Spencer 2008). The aim of the research here proposed is to take stock of the aggregate as well as firm level (i.e., macro and micro) evidence on FDI in low income countries and use it to confront, re-assess and gauge these preconceptions.

Admittedly 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 countries¹ in particular have been increasingly targeted by transnational corporations. Indeed the participation of developing countries in total worldwide FDI has increased since the early 1990s, culminating with 2009 being the first year ever in which FDI to developing surpassed that to developed countries.

The related 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 spillovers 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, more recently, firm level data supports a growing empirical literature on the relationship between FDI and economic growth, FDI and

¹ On the classification on low income countries see section 4.1.

investment and FDI and productivity (Hymer 1960 and 1976; Vernon 1966; Caves 1974; Rugman 1981; Dunning 1988; Haddad and Harrison 1993). Several studies document important effects (positive or negative) on host countries growth and investment at the aggregate level (e.g. the technological upgrading via the “demonstration” effect; technology sourcing), as well as at the firm level (e.g. plants enhanced productivity; “market stealing effect” via increased competition). While aggregate level regression analyses have a wider cross-countries perspective but do show potential econometric drawbacks in terms of endogeneity and omitted variable, firm-level evidence might be often restricted to a single country study but tackles such econometrics issues in a more robust way. The econometric difficulties when analysing macro data has led to increased interest in the investigation of the spillovers effects of FDI on domestic firms (so called horizontal spillovers²) and backward and forward linkages (so called vertical spillovers) by exploiting firm-level or plant-level databases on firm productivity and performance. For example, panel data analyses (longitudinal databases) are well suited to ameliorate the aforementioned aggregate-level econometric limitations by tackling the fundamental issue of un-observed heterogeneity. With these caveats in mind, the view we take in this project is that the two bodies of evidence (micro and macro) deserve equal attention because they are able to teach us different things about FDI in low income countries. The micro evidence throws light on private returns and localized (or gross) effects, while the macro evidence illuminates social returns and the net effects of FDI inflows.

² 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).

(2) Objectives

Aggregate and firm level analyses complement each other and should be both included in our systematic review of the existing literature. Furthermore, the impact of FDI and entry strategy of foreign investors is context dependent (e.g. Peng, Wang and Jiang 2008; Meyer, Estrin, Bhaumik and Peng 2008), and the literature needs to focus on the condition under which FDI are productivity (firm level) and growth (aggregate level) enhancing.

The analysis of FDI in emerging markets, and especially low 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 entails a high reward for new foreign owned projects in the host countries³. Which of these two effects will prevail is uncertain. The systematic review here proposed will pay special attention to the identification/separation of both effects.

We selected the meta-analysis as our main tool of investigation. In fact, we will build on a quickly expanding meta-analysis literature on FDI that is focusing on advanced, emerging and transition economies (e.g. Holland, Sass, Benacek and Gronicki 2000; Gorg and Strobl 2001; Meyer and Sinani 2009; Havranek and Irsova 2010; Hanousek, Koceda and Maurel 2010; Driffield and Love 2007; Driffield, Love and Manghiniello 2010;

³ This in line with the international trade theory expectation that capital flies where the relative reward is higher, that is typically the case in emerging markets.

Bhaumik, Driffield and Pal 2010) and we will be exploiting this methodology specifically for an encompassing list of low income countries.

(3) Review team

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(4) Methods (inclusion criteria, search strategy, methods of data analysis)

4.1 Search strategy for identification of relevant studies

In low income countries the channels through which FDI impinges on growth and investment are heterogeneous and the study here proposed will try to unbundle, possibly, the overall effect into economic, institutional/social and political factors, contributing to the existing literature also on this dimension. This is indeed an important contribution on the ongoing debate on the impact of FDI. We selected low

income countries according to the WB definition and we did actually find a very good overlap with the countries of interest for DFID.

This systematic review will be carried out in three phases: 1) finding papers in the literature suitable for our project; 2) classifying them on different dimensions; 3) analysing their results/findings as data-point of our meta-regressions analysis. A detailed description of the methodology used to find, classify and analyse papers, a crucial part of the meta-analysis investigation itself, follows. We concentrate our analysis on the impact of FDI on growth and investment in less developed countries and this explicitly excludes advanced economies and the bulk of transition countries⁴.

4.1.1 – Classification of low income countries

As the focus of our systematic review are low income countries, it is first of all necessary to define this group as precisely as possible. We identified these countries using two main criteria and then we matched the countries identified by one criterion with the countries identified by the other criteria. Finally, we checked for the countries DFID is interested in.

The chosen criteria are the following:

- A) The World Bank classification of low income countries (2008). The World Bank's main criterion for classifying economies is Gross National Income (GNI) per capita in PPP. Based on its GNI per capita, every economy is classified as low income, middle income (subdivided into lower middle and

⁴ Some transition countries (e.g. EBRD classification) are still considered low income countries and therefore they will be included in our search.

upper middle), or high income. The groups are: low income (\$975 GNI p.c. or less); lower middle income (\$976 - \$3,855 GNI p.c. bracket); upper middle income (\$3,856 - \$11,905 GNI p.c. bracket).

- B) An alternative classification of low income countries based on the bottom two quintiles of the GNI per capita (PPP) world distribution. We calculated the mean of GNI per capita from 1998 to 2008 for each country⁵ 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 GNI p.c. PPP ≤ 3534.545\$⁶. The data on GNI per capita is taken from the World Development Indicators dataset (World Bank).
- C) We also checked all the DFID countries of interest and we matched these to the countries given by the classifications discussed above. We defined DFID countries of interest as those countries in which DFID operates, as it is specified in the DFID website.

By comparing the countries identified by the WB classification and the countries identified by the alternative classification, the countries identified with the latter correspond to the World Bank 'low income' and 'middle income'. However while

⁵ The advantage of this methodology lies in a more flexible way to choose the time span –not just one year but the average over 10 years- and the 40% threshold of GNI p.c. in PPP.

⁶ Very closet to the upper bound of the "lower middle income" WB bracket.

the WB 'low income' and 'middle income' groups include 143 countries in 2008, our definition only includes 70 countries⁷.

The 54 countries identified with criterion C) overlap with the low and middle income group as defined by the WB. 36 out of 54 countries also correspond to the countries classified in point B).

We focus on the 70 countries of the alternative criterion plus Brazil, China and Russian Federation⁸. This classification has guided the search for relevant papers which is described in the section below.

4.2 Criteria for inclusion and exclusion of studies in the review: strategy for identification of relevant studies.

Given the list of countries identified in section 4.1, we run extensive searches in order to identify the order of magnitude of papers that we might include in the database. The searches were carried out with three well-known academic search engines⁹:

1. Google scholar (covering both published and un-published papers)
(www.scholar.google.com)
2. Scopus (covering only published papers) (www.scopus.net)

⁷ We have to bear in mind that the alternative classification spans from 1998 to 2008, whereas the WB classification refers to 2008 only. In other words the WB method should be regarded as a wider group, given that between 1998 and 2008 some low or middle income countries were "lifted" out or in of poverty. The alternative criterion is also affected by missing values.

⁸ India is already included.

⁹ These search engines are mainly focusing on the English literature. We also run separate search runs with alternative languages (French, Spanish, Portuguese), i.e. languages pertaining to the main colonies of the advanced European countries. See section 4.2.1.

3. Publish or Perish (covering published and unpublished papers)

(<http://www.harzing.com/pop.htm>)

As our interest lies in the effect of FDI in 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 name” and “foreign direct investment + country name” in the Title, Abstract and Keywords. These are broad searches which lead to a high number of papers, but we believe they allow identifying almost¹⁰ all papers written on FDI for a certain country in English.

The searches in Google scholar and Publish or Perish are those that give 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 journals, while Google scholar and Publish or Perish also consider other sources (such as working papers)¹¹. The highest number of papers for the keyword ‘FDI + China’ is given by Publish or Perish with 1488 records. The highest number of search for the keyword ‘Foreign direct investment + China’ is given by Google scholar with 963 records. Considering all countries for which we run searches we have a maximum of 1488 papers to review for the keywords ‘FDI + country’ and a maximum of 2796 papers to review for the keywords ‘Foreign Direct Investment + country’ (where country is one of the 73 low income countries in

¹⁰ We are aware that the detailed grid search we performed cannot be, by definition, encompassing. However we do not think to be missing a relevant part of the literature we refer to.

¹¹ The results of the searches with Scholar Google vs. Scopus for the BRICs countries are reported in appendix 1 of this document.

our list). As our interest is not limited to papers published in academic journals, we screen all papers from Google Scholar and Publish or Perish searches. Note that these searches identify only country level studies. Google Scholar, Scopus and Publish or Perish will also be used to search for cross-country studies (see appendix A.1).

As shown above, the number of papers written on the country of interest and FDI are extremely high. Of course many of the papers are not relevant to our research. An appropriate classification of relevant papers will allow us to build a dataset of articles that will be used in the meta-analysis. The first step undertaken to build our database of articles are described in section 4.3 below.

4.2.1 Literature in other languages

The searches discussed above only cover the Anglo-Saxon literature, but we believed that studies in other languages could be valuable. It was possible to search for papers written in French, Italian, Spanish and Portuguese. More specifically we are interested in papers where there is a direct match between the language in which the paper is written and the colonial origin of the country analyzed. In order to double-check for the availability of studies not belonging to the Anglo-Saxon literature we classified all low income countries by colonial origin and we run the search "FDI+ country" in the relevant language. In the section below we discuss the methodology adopted to classify countries by colonial origin and the results of the searches carried out in foreign languages.

We classified all low-middle income countries by colonial origin using the 'Colonial Origin'-variable from the Quality of Governance (QoG) Cross-Section Dataset (version 17 June 2009). The classification of the former colonial ruler by QoG follows Bernard et al (2004)¹² Bernard et al (2004) exclusively focus on "Western overseas" colonialism. The classification is applicable to each country that has been colonized since 1700, and in the case of several colonial powers, the last one is counted, if it lasted for 10 years or longer¹³.

For the countries belonging to the French-Belgium, Italian, Spanish and Portuguese sub-groups we run the search "FDI+ country" in the relevant language in Google scholars and Scopus. The overall number of papers for the searches in the four languages is 67 in Google Scholar and 2 in Scopus. Out of the 67 papers found in Google Scholars 12 are in French, 50 in Spanish, 5 in Portuguese and none in Italian. Overall only 14 papers have been classified as relevant papers (i.e., reporting quantitative evidence) and included in our provisional articles database. Out of the 14 papers, only two are actual econometric studies, while the remaining papers are mainly descriptive overviews of the effects of FDI on the country analyzed. Overall other-than-English literature provides some detailed studies, but most papers are not

¹²Bernard, M., Reenock, C., and Nordstrom, T. 2004. "The Legacy of Western Overseas Colonialism on Democratic Survival." *International Studies Quarterly*, 48: 225-50.

¹³ The QoG dataset classify countries in eleven category; i.e.: 0) Never colonized by a Western overseas colonial power; (1) Dutch; (2) Spanish; (3) Italian; (4) US; (5) British; (6) French; (7) Portuguese; (8) Belgian; (9) British-French(10) Australian.

comparable with the type of "technical" or "econometric" studies of the Anglo-Saxon literature.

4.3 Papers classification

After having searched for relevant papers, we started to classify the papers in the database. Following the above criteria we come up with a relevance indicator based on three levels (*, **, ***).

The first step consists of a preliminary screening of the papers identified in the search run. We first identified those papers which are not relevant to our research and we collected basic details (Article Title/Author/Year/Publication) of all others papers. We excluded articles that analyse the determinants of FDI (e.g. determinants of FDI locations) and we included everything else. This selection was done by reading the article title, abstract and keywords. Once we take the preliminary selection into account, we can have a rough estimate of the number of papers to be analysed in more detail. For example we can see that out of 867 papers identified by the Publish or Perish search of "FDI + China", only 170 may be of interest to our research (i.e. 20%). We screened all papers identified with the search "FDI + Country" for our 73 low income countries and 342 papers have been selected and included in the initial classification. This selection still includes a high number of papers, many of which may not be useful in our meta-analysis and therefore the selection needs to be refined. This will be done in the step described below.

4.4 Criteria for quality appraisal of studies and description of methods used in the component studies

In the second step we look for more details on all papers classified in step one. For each paper we collect the following information: Link analysed; Year; sector; Type of data used; estimators; main results (this is a sub-set of the encompassing list described in section 4.5). This gives us a better understanding of the type of paper catalogued and we can formulate an initial judgement on the overall relevance of the paper to our research. The papers are then graded according to three levels of relevance.

- A) Paper Likely Not Relevant (*): Papers which analyse aspects of FDI not relevant to our research; Descriptive papers (e.g. Literature review or descriptive analysis of the impact on FDI on the host country); 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).
- B) Likely Relevant (**): All empirical papers that analyse the direct or indirect impact of FDI on growth. At the end of this step, we will be able to have a first selection of papers to be included in the meta-analysis.
- C) Relevant (***) in the third step a more detail categorisation of papers will be applied. This part will aim at identifying the controls for the specific characteristics of different studies in the meta-regression analysis.

4.5 Details of study coding categories

Following Gorg and Strobl (2001) and Meyer and Sinani (2009)¹⁴, we will collect the following information for all the papers included in the Meta-Analysis (see section 4.6 for a technical appraisal):

- Country
- Year
- N = number of observations in the individual study
- K = number of explanatory variables
- DF = N–K degrees of freedom reflecting power of the test statistics
- AUTHAFF = 1 if all authors are from academia, =0 if at least one of the authors is not.
- Nature of the Data (e.g. cross-section versus panel)
 - PANEL = 1 if the model uses panel data, =0 if cross-section
- Type of estimator (RE, FE, selection bias, robust, etc)
 - ENDO =1 if model used is 2SLS, 3SLS, GMM; =0, otherwise
 - FIXED = 1 if fixed effects estimation is used (or country dummies)
 - ...
- Type of equation been estimated:
 - Dependent variable is labour productivity

¹⁴ The list of variables we propose here is wider than those in Gorg and Strobl (2001) and Meyer and Sinani (2009) and it is actually close to what these studies would have liked to include if not constrained by limited degrees of freedom. We might also consider adding country level variables for transparency, economic freedom, human capital, R&D expenditures.

- Dependent variable is Total Factor Productivity
 - Dependent variable is other
- Link analysed
 - Direct spillovers (within MNCs)
 - Horizontal spillovers (between MNCs and domestic firms)
 - Backward vertical linkages (between MNCs and suppliers)
 - Forward vertical linkages (between MNCs and customers)
 - Other
- Aggregation level (Industry, firm, plant, national)
- MNC measure:
 - industry employment share
 - industry equity capital
 - industry sales share
 - other
- T-stat (of the link analysed)
- Direction of the link
- Colonial origin
- Lower income vs. Middle income dummies
- Published vs. Unpublished papers
-

The wide range of studies we are investigating (see section 4.2 and 4.3) should allow us to collect a sufficient number of “data points” to include these variables in the meta-analysis as covariates. However, we want also be sure that there are no multicollinearity problems within these covariates. We’ll therefore perform a detailed cross-correlation analysis of all our RHS variables beforehand.

4.6 Statistical procedures to be used

Meta-regression analysis is a well established methodology. The research here proposed will use this methodology on both aggregate- and firm-level evidence of the effect of FDI on growth and investment in low income countries. We also budget to present preliminary results from this at one the leading conference on this research tool, namely “The fourth annual international Meta-Analysis Economic Research-Net Colloquium,” Hendrix College, October 1-2, 2010¹⁵.

Meta-analysis analysis (MRA henceforth) refers to a set of statistical methods for reviewing and evaluating bodies of empirical evidence in a rigorous way. If a large number of studies have been carried out on a given topic, then combining their results in a systematic manner can provide additional strength, further insights and greater explanatory power than can the more informal, narrative discussions of individual results which is typical of more traditional literature surveys. MRA goes beyond what is often called vote-counting or head-counting (Light and Smith, 1997), in which the inference that a specific event occurs in a majority of cases is usually

¹⁵ <http://www.hendrix.edu/maer-network/>

taken as evidence of the significance and magnitude of the “true” effect. Head-counting (which is the standard practice in traditional literature reviews) is considered neither systematic nor statistically powerful in drawing conclusions about a given body of scientific evidence. When the number of existing studies is very large, head-counting is even more likely to support misleading conclusions because the Type-II errors of the individual studies do not cancel out, but add up instead (Florax et al., 2002).

One seminal procedure to summarise a body of scientific evidence was developed by Fischer (1932). It assumes that the underlying p-values are uniformly distributed under the null hypothesis of no effect, and then proposes that minus twice the sum of the logs of the p-values follows a chi-square distribution¹⁶. It is well-established that the Fischer test is generous in ascribing significance. Stanley and Jurell (1998) discuss three main reasons for this. First, it does not distinguish between positive and negative statistically significant effects, as both are only counted as significant. Second, the null hypothesis of the Fischer test is that none of the observations reflects a genuine effect. A finding of significance therefore does not necessarily mean that the average effect is statistically significant. Third, the assumption of unbiased estimates is often violated in the case of non-experimental evidence.

¹⁶ This approach assumes independence across studies and that each one of them is unbiased; this is clearly an important assumption which is usually addressed by estimating MRA equations with study fixed-effects so as to capture unobserved heterogeneity among findings.

The technique which focuses on the magnitude of the effect was developed by Glass (1976), who suggests focusing on the “effect size” to compare and integrate findings. He defines the effect size as the average outcome of the treatment group minus the average outcome of the control group, divided by the standard deviation of the control group.¹⁷

A related development refers to estimating the “average” effect in order to assess its practical and statistical significance and to explain its variation among studies. Stanley (1998) and Rose (2004) compute the average (normalised) test statistic while Djankov and Murrell (2002) use aggregate t-statistics for this purpose. One way to amalgamate results from different studies is combining t-statistics. Djankov and

Murrell (2002) suggest aggregating t-statistics as follows: $\bar{t} = \sum_{k=1}^M t_k / \sqrt{M}$, where M is the total number of studies, and t_1, \dots, t_M are t-statistics on $\hat{\beta}$, with \bar{t} taken as normally distributed given sufficiently large sample sizes in all analyses¹⁸. Djankov and Murrell (2002) argue that statistical tests based on this \bar{t} are more powerful than tests on individual observations, as the former provides additional information on the statistical significance of the effect.

¹⁷ One common criticism of Glass’s effect size method is its estimate of the overall standard deviation. Hedges and Olkin (1985) argue that it is inappropriate and propose a pooled estimate in its stead, corrected for the degrees of freedom. They also argue that conventional methods, ANOVA in particular, are often unsuitable for analysing the effect size as heteroskedasticity across studies can mask design differences that the meta-analysis itself is intended to investigate.

¹⁸ This condition has to be verified study by study.

The typical study of the effects of FDI on productivity and growth assumes the following specification:

$$\ln VA_{it} = \alpha + \beta_1 \ln K_{it} + \beta_2 \ln L_{it} + \sum_p \mu_p X_{it} + \omega_{it} \quad (1)$$

where VA_{it} is the value added, K_{it} the fixed capital, L_{it} employment, X_{it} a vector of externalities terms which is linked to TFP, “i” represents country/industry/firm, “t” time and ω_{it} is the error term¹⁹. Coefficients μ_p represents the partial effect of “presence of MNCs²⁰” on growth via TFP, ceteris paribus, and its size, sign and level of statistical significance are of central interest here.

The meta-regression equations we plan to estimate take the form:

$$Y_i = \beta_0 + \sum \beta_k Z_{ki} + \varepsilon_i \quad (2)$$

where Y_i is the value of a summary statistic from analysis i and Z_{ki} are k meta-independent variables. It is common practice to use estimated coefficients or the results of statistical tests (e.g., t-values) as the summary measure. In light of the very large variation in the results from this body of evidence, we also plan to report estimates from maximum-likelihood ordered logit models in which the dependent variable captures whether a result is positive and significant, negative and significant, or not significant, as well as results from various estimators and robustness tests.

¹⁹ Usually this is in turn decomposed in time and individual fixed effects $\omega_{it} = v_i + v_t + u_{it}$ and u_{it} are the random errors $iid(0, \sigma_u^2)$

²⁰ E.g. share of industry employment, industry equity capital, industry, sales output or VA.

One major shortcoming of MRA concerns the so-called “file drawer” problem or publication bias. Namely, the tendency of academic journals to favour studies that report statistically significant results. Card and Krueger (1995) and Ashenfelter et al. (1999) address publication bias in their studies of minimum wage and returns to schooling, respectively (for a review, see Stanley, 2005). One potential problem in this case is the implicit assumption that working papers are not published (and will not be) because they do not contain a sufficient number of statistically significant results. We will carefully check for the publication bias in our Meta-Analysis by taking advantage of the large number of both published and un-published papers in our database.

4.7 Treatment of qualitative research

Useful for introduction and preliminary analysis. We cannot include qualitative research in our meta-analysis, though.

(5) Timeline

Timetable estimates of the start and end dates for the following stages (contracts awarded early May):

	Start date	End date
Registration of title with DFID	12 th April	12 th April
Preparation of protocol	12 th April	21 st May
DFID and External Review of protocol (if using peer review organized through 3ie)	21 st May	4 th June
Study search	4 th June	13 th June
Assessment of study relevance	13 th June	20 th June
Extraction of data	20 th June	31 st July
Synthesis and/or statistical analysis	31 st July	10 th September
Preparation of draft report	10 th September	24 th September
DFID review of draft report	24 th September	8 th October
Dissemination of draft report	8 th October	15 th October
Revision of draft report	15 th October	22 nd October
External review of draft report (if using peer review organized through 3ie, allow 4 weeks for turnaround)	22 nd October	19 th November
Revision	19 th November	17 th December

* Note: subsequent stages can commence while awaiting review (and comments managed retroactively)

(6) Plans for updating

The search phase will be implemented throughout the entire project. However the bulk of the results will be reviewed before the end of phase II (24th September 2010)

(7) Sources of funding

The project on the systematic review is completely financed by DFID.

(8) Statement of conflict of interest

None.

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APPENDIX.

A.1 An Example of BRICS search results with [Scopus] and [Google Scholar] results for “FDI + Country” respectively:

- China [607](91600);
- India [167] (51800);
- Russia [50] (35400);
- Brazil [47] (38500).

If we had used a different combination of keywords, such as FDI & “less developed countries” “low income” “emerging markets”, the search results would have been blurred, due to the “subjective” interpretation of the category in which countries fall.

This “FDI + Country” approach of course excludes the cross-country studies and to remedy this we will separately run a search based on the following keywords: a) FDI & productivity spillovers; b) FDI & investment; c) FDI & growth. As far as b) and c) are concerned we still get very general papers, good for survey or background, but almost for sure not "Data Point" for the meta-analysis. Instead point a) gets a series of papers that are very good candidates for adding data points in the investigation. Therefore the quantity of studies on the BRICs and in general low income countries is pretty high and the material for the meta-analysis is more than adequate from a statistical point of view.