DEAKIN
UNIVERSITY AUSTRALIA

Faculty of Business and Law
School of Accounting, Economics and Finance

School Working Paper

ECONOMICS SERIES

SWP 2010/14

Foreign Direct Investment and Economic Growth:

a Real Relationship or Wishful Thinking?

Sasi Iamsiraroj and Mehmet Ali Ulubaşoğlu

Foreign Direct Investment and Economic Growth: a Real Relationship or Wishful Thinking?*

Sasi Iamsiraroj and Mehmet Ali Ulubaşoğlu
Deakin University, Australia

ABSTRACT

Several theories have been advanced on the beneficial effect of foreign direct investment (FDI) on growth. However, mixed empirical findings have resulted in a long-standing debate. This study explores the global FDI–growth relationship through an 'informed' econometric analysis predicated on substantial guidance obtained from a detailed investigation of 880 estimates reported in 108 published studies. With model uncertainties alleviated and the core specification benchmarked against the aforementioned assessment, our econometric analysis, utilizing a global sample of 140 countries, documents robust and clear findings regarding the cross-country FDI–growth relationship.

Keywords: FDI, economic growth, absorptive capacity

JEL Classification: F21, F4

*We would like to thank Hristos Doucouliagos, Sebnem Kalemli-Ozcan, Constantina Kottaridi and Diana Weinhold for their contributions into this paper.

Iamsiraroj, Alfred Deakin Research Institute, Deakin University, sasi.iamsiraroj@deakin.edu.au

Corresponding Author: Ulubaşoğlu, Faculty of Business and Law, Deakin University, 70 Elgar Road, Burwood, Victoria 3125, Australia. Tel: +61-3-9244 6592. Fax: +61-3-9244 6283. Email:mehmet.ulubasoglu@deakin.edu.au

1 Introduction

Developing countries are generally unable to exploit the benefits from their abundant natural resources due to inadequate human and physical capital and technological knowhow. Many of these countries are also typically constrained by weak protection of property rights, corruption, and severe civil, political and economic instability. Such setbacks hinder their capital accumulation and become obstacles to using already existing resources. Consequently, international sources of growth such as development aid assistance, loans, portfolio flows, and foreign direct investment (FDI), become highly pursued items on their economic agenda. Compared to other sources of international capital, FDI arguably offers significant advantages, principally because it provides the host country with a relatively more stable flow of funds, helps augment productive capacity, and increases employment and trade. It is also argued that FDI generates positive knowledge externalities through labour training and skill acquisition, helps transfer technology and organisational knowhow, introduces new production processes, creates backward and forward linkages across sectors, and provides domestic firms with much-desired access to foreign markets. The host country, in return, offers foreign firms new and relatively unexploited markets, cheap labour, and natural resources.

Globally, FDI has grown from about 0.5% of the world's GDP in 1970 to over 3% in 2008.[1] The World Bank (2010) reports that the overall share of developing countries in global FDI inflows was 37% in 2010, representing more than a three-fold increase since 2000. Thus, the growth effects of FDI and the channels through which these effects operate are of great importance to understand.

Despite a significant body of theoretical and empirical research exploring these connections, extant empirical literature does not offer a clear picture on the central issue of whether FDI has globally any effect on growth. A thorough review of the literature

[1] See World Development Indicators online.

conducted in this study reveals 108 empirical studies using data from around the globe and reporting 880 regression estimates of the effects of FDI on growth. Curiously, the distribution of these estimates is such that 43% are positive and statistically significant, 26% are positive and statistically insignificant, 17% are negative and statistically significant, and 14% are negative and statistically insignificant. That is, fewer than half of the studies have found a positive and statistically significant effect, and nearly one-third report a negative effect of FDI on growth. Further, 40% find a statistically insignificant effect. This mixed distribution could suggest that the theoretical predictions about the beneficial role of FDI for the host country might be very optimistic, and in the absence of a clear and meaningful underlying relationship, the theoretical predictions do not receive full support from the data. Thus, it appears that the theories related to issues such as spillovers, technology diffusion, labour training and skill acquisition, might be merely 'wishful' thinking, rather than pointing towards the 'real' effects of FDI on growth.

At this stage, another FDI–growth investigation that is not carefully designed would merely add to the existing uncertainty. With this in mind, this paper takes a two-step approach towards a more informed exploration of FDI-growth relationship. The first step conducts a detailed empirical assessment of the 880 reported FDI–growth estimates in 108 studies using data from around the globe. This investigation is useful for two reasons. First, being almost the entire population of published estimates, our dataset permits a better understanding of the research process by providing formal evidence on the manner in which findings vary with respect to factors such as the choice of dependent and independent variables, sample composition, time span, and methodology. This procedure, also known as meta-regression analysis (MRA), has been adopted by a growing number of papers to shed light on several important issues (e.g., Card and Krueger 1995; Görg and Strobl 2001; Disdier and Head 2008; Doucouliagos and Ulubasoglu 2008; Card et al. 2010; Havranek and Irsova 2011; Irsova and Havranek

2013). Second, with accumulated evidence considered in its entirety, variations exhibited by numerous models accounted for, and the effects of sampling error netted out, an econometric specification that can serve as a highly useful benchmark for empirical analysis using primary data is possible.

Not surprisingly, our analysis of the past FDI–growth estimates yields substantially rich information on the sources of different findings on the global FDI–growth relationship and how, in turn, uncertainties related to empirical formulation can be alleviated to obtain a more reliable picture on the said link. Using data from a sample 140 countries around the world over the period 1970–1999, we largely confirm the evidence related to the sources of variations driving the findings of the literature. The benchmark specification is then extended in plausible directions to fit the most recent FDI–growth data better. Our approach contrasts with not only those studies adopting a simple qualitative assessment of previous findings to formulate their specification, but also many MRA-based studies that do not convey their results to a formal framework for an informed econometric analysis.

Before proceeding, it is worthwhile to emphasize that Iwasaki and Tokunaga (2014) comes closes to our study. Using 119 published estimates from 23 studies on the transition economies of Central and Eastern Europe and former Soviet Union, Iwasaki and Tokunaga find a non-zero effect of FDI on economic growth. We differ from their study in three major respects. First, we cover the whole world, and use 880 estimates from 108 published studies. Second, we convey our meta-analysis findings to primary data. In particular, we cross-check our MRA findings with cross-country global data, as well as conduct econometric investigation using the benchmark specification suggested by the MRA. Third, given our global focus, our results convey a very different set of findings.

Taken together, our analysis documents six robust and clear conclusions on the global FDI–growth linkage. First, voluntary exchanges reflected in FDI *do* generate real

growth globally, but this effect is smaller than those in transition economies.[2] Second, the FDI–growth relationship exhibits stronger within-region variation than within-country variation. While this does not mean that there is no within-country variation, a region, as a larger unit, might host sufficiently different types of FDI that in turn demonstrate greater ability to enhance growth. Single countries might host a more narrow range or more specific types of FDI that have comparatively lower ability to generate growth alone. Third, the FDI–growth association holds globally as strongly as in the developing world. This is important because theoretical arguments generally point to the benefits of FDI only for developing countries. Fourth, absorptive capacity is important, but our evidence suggests that crucial absorptive capacity variables are trade openness and financial development. The latter is consistent with Alfaro et al. (2004). Also, the absorptive capacity effects work non-linearly, in that FDI enhances growth up to a certain level of financial development and trade openness, and the effect tapers off at very high levels of the latter two. Conversely, schooling does not emerge strongly as an absorptive capacity variable. Fifth, it is current FDI, rather than past (i.e., lagged) FDI, that matters for growth. This is probably because FDI's effect is encapsulated by other parts of the economy over time such that the effect is observed only contemporaneously. Lastly, government size and inflation play important roles in the manner in which FDI affects growth.

2 A Brief Review of the Theoretical and Empirical Literature

The aforementioned varied distribution of FDI–growth estimates parallels diverse questions on the connection between FDI and growth. In what follows, we provide a critical overview of the theoretical and empirical literature to shed light on the background of the divergent findings in prior work. The very range of questions that arises demonstrates that it is not entirely surprising to obtain mixed results.

[2] See for example, Görg and Strobl (2001) and Feld and Heckermeyer (2009).

Razin and Sadka (2007) classify the literature on FDI into two broad categories: (i) micro-level studies exploring, with reference to international trade and industrial organisation theories, the market power of foreign firms, firm-specific production and cost advantages, and (ii) macro-finance studies that generally focus on the long-term growth effects of FDI with respect to growth theories.

2.1 Positive Effects of FDI on Growth

In neoclassical models, long-term growth can only result from exogenously driven technological progress and/or labour force growth. Hence, FDI can only affect economic growth if it enhances technological progress. The mere injection of capital stock would lead to long-term level effects, yet only transitional growth. In endogenous growth theories, FDI contributes to growth directly through higher capital stock and newer technology, and indirectly through improving human capital, infrastructure, institutions, and spillovers. Positive externalities can take the form of managerial skills, organisational knowhow, and labour training. FDI can also assist the host economy with gaining access to world markets. Empirical studies finding a positive effect of FDI on growth include De Gregorio (1992), Zhang (2001), and Baldwin et al. (2005).[3]

Although the theoretical predictions are clear, a number of puzzling facts also exist. While the effect of FDI on growth would depend inversely on the technological gap between the investor and the host country (motivated by the neoclassical prediction that capital would flow across countries in search of higher marginal returns), one puzzle is that, until recently, approximately three-quarters of global FDI activity took place among developed nations (Razin and Sadka 2007). Thus, one wonders what the data can deliver in the context of the North–South relationship.

[3] Baldwin et al. (2005) use industry-level data from seven OECD countries.

Numerous other questions abound. For example, FDI is often a specific investment into a specific sector.[4] Hence, for FDI-driven technology transfers and spillovers to be able to create economy-wide growth, a multiplier effect should be initiated across sectors. Does FDI reach the other parts of the economy? What if foreign firms operate in isolated enclaves? Does FDI bring *the* latest technology, or simply more of the existing high technology? Where do foreign firms stand in the host economy relative to leading domestic firms? How do foreign firms manage the domestic labour—by training or by firing?[5] What roles do country-specific factors play in these activities?[6]

These are well-known questions that scrutinise the growth-generating role of FDI in the host country. Divergent effects seem normal if models using cross-country data do not carefully model the factors conducive to growth, including the type of inflows, domestic economic conditions, timing of the effects, and regulatory framework.

2.2 Adverse Effects

Negative coefficients have also been estimated for FDI in the growth models (e.g., Carkovic and Levine 2005).[7] This leads to the question: how does FDI cost growth? One channel could be through the distortions in the domestic economy. Easterly (1993) notes that policies in the form of preferential tax treatments and other concessions can distort domestic incentives. If foreign firms obtain significant benefits from host governments, the distortions caused could have large negative effects on growth. Further, Borensztein et al. (1998) argue that if FDI enters a country to overcome trade barriers, it might result in an FDI inflow that does not respond to higher efficiency, but only to profit opportunities

[4] One reason for the FDI surge in developing nations is the foreign acquisition of domestic firms in privatisation programs that generally target specific industries (e.g., the sale of telecommunication firms).
[5] It is well known that privatised firms (or those acquired by foreign firms) dispose of some labour initially.
[6] In fact, a number of studies have found heterogeneous FDI–growth effects across countries (e.g., de Mello 1999, Nair-Reichert and Weinhold 2001), even within developing countries. Nair-Reichert and Weinhold (2001) argue that this heterogeneity is more pronounced in more open economies. See also Durham (2004).
[7] Note that a negative coefficient is generally estimated when FDI is interacted with some absorptive capacity variable in the model (the negative sign generally belongs to the non-interacted FDI variable). We elaborate on this in the next section; nevertheless, a negative estimate points to a detrimental effect.

created by distorted incentives. Balasubramanyam et al. (1996) argue that the mere infusion of human capital and new technology into a distortion-ridden economy may neither lift the economy to a higher plane nor alter the slope of the production function. It might, instead, merely serve to redistribute income in favor of the new agents of production. Sadik and Bolbol (2001) argue that FDI is not economically justifiable in some Arab countries due to distorted incentives in defence and petrochemical contracts. These considerations suggest a potential for net negative effects to accrue from FDI.

It is also argued that FDI might crowd out domestic investment by diverting scarce resources away from other productive sectors. However, a number of studies also argue (or cite the argument) that FDI facilitates domestic investment. Borensztein et al. (1998) find that this crowding out effect is not robust. De Mello (1999) finds that the substitutability between capital stocks embodying old (domestic) and new (FDI-related) technology is higher in advanced economies than developing economies.

Government size could be another channel for adverse growth effects. Governments might need to invest in infrastructure to attract FDI; this might increase foreign debt and the distortionary tax burden, serving as another example of crowding out. All these suggest a role for domestic investment and government size in growth models.

2.3 Conditional Effects: Absorptive Capacity

A number of findings suggest that developing and developed countries respond to FDI differently in growth generation (e.g., Durham 2004). Thus, several authors have argued that the effects of FDI on growth are *conditional* upon the existence of other factors. For example, Borensztein et al. (1998) and Blomstrom et al. (2000) highlight the need for an adequate stock of human capital for host countries to close technology gaps. Further, the beneficial effect of FDI is enhanced in an environment characterised by an open-trade and investment regime and macroeconomic stability (Balasubramanyam et al. 1996). In addition, Alfaro et al. (2004) find that developed financial markets are an important

determinant of the extent to which FDI affects growth. Moreover, infrastructure such as telephone lines, paved roads and electricity are suggested as absorptive capacity variables. Hence, the direct effect of FDI on growth can be zero (or negative), while FDI interacted with human capital, or with financial-market development or trade, might have a positive effect on growth.[8] Therefore, the implications for emerging markets are mixed because poorer countries are less likely to possess the necessary initial absorptive characteristics.

However, it is important to note that absorptive capacity is also a determinant of FDI. Think of it this way: would foreign firms invest in a country with high inflation, low openness, weak infrastructure, and poor human capital? Rational investors would consider these factors before undertaking investment in the host country.[9] Thus, if absorptive capacity were not controlled for in a growth regression, FDI would be capturing its effects.

Combining these factors suggests that FDI can potentially affect economic growth through any of four channels: (i) a *direct* (but transitional) *effect* on growth, just like other factor inputs; (ii) *indirectly* through stimulating the accumulation of other inputs; (iii) *interactively* through its effect on the marginal product of other inputs; and (iv) *negatively*, consistent with distortion and crowding out theories.

3 Empirical Analysis of the Existing FDI–Growth Estimates

In addition to the diverse *theoretical* issues raised above demonstrating the need for a systematic assessment of the FDI-growth relationship, it is worth noting three *empirical* points that reinforce this need. The first question is: can all the 'nice' theoretical

[8] World Bank (2001) argues that countries with low absorptive capacities such as Morocco, Uruguay, and Venezuela failed to reap spillovers, while Malaysia and Taiwan fared well due to better capacities.

[9] An FDI and absorptive capacity interactive variable in a growth regression—often estimated to be positive—would be capturing the effects that reflect the decision of a foreign firm based on a prior assessment of the absorptive capacity of the host country, and its subsequent operations. The non-interactive FDI variable should then capture the effects that do not rest on, or are independent of, the absorptive capacity (assessment). A negative or insignificant sign for this variable probably reflects that these are either 'bad' investments, or investments that are oriented towards using cheap labour and repatriating profits back to country of the investor, rather than accessing the host market for the long term, and making no contribution to growth.

effects of FDI (e.g., positive externalities, productivity gains, transfer of managerial and organisational knowhow, and backward and forward linkages) can be detected with cross-country data? At first glance, these effects seem more relevant at the microeconomic rather than the macroeconomic level of analysis. If the latter presumption is true, the mean FDI–growth effect should be zero, given sizeable variations in earlier estimates.

The second question is related to the nature of the FDI–growth relationship. There are at least three issues here. First, does the reduced form relationship between FDI and growth—as employed by most studies—convey the entire story? Given that FDI is said to mobilise several factors that could be growth generating or growth dampening, it is not clear from reduced form specifications the channels through which FDI exerts its effects on growth, and how contrasting effects amount to an aggregate effect. Second, in a cross-country model that does not control FDI-determining factors, FDI is likely to capture institutional, macroeconomic and infrastructural factors, rather than operations of foreign firms. Third, there might also be some periods, regions, and countries across which FDI has a varying relation with growth. Thus, the variation in evidence might be due to variation in the real, underlying effects of FDI and growth.

The third question is statistical: sampling error. While statistical significance is an important dimension in assessing the results from an individual model, it is, in general, inadequate when considering the results from numerous studies.[10] Given that *all* studies are plagued by sampling error, it is necessary to consider the precision of the reported estimates and to construct confidence intervals. Focusing on the individual estimates and their associated t-statistics would suggest erroneously that FDI has no effect on growth.

[10] For example, Papanek (1973), Mosley et al. (1987), Durham (2004), Alfaro et al. (2004), and Wang et al. (2004) together report 68 FDI–growth estimates. The partial correlations reported in these papers range from –0.68 to +0.77, with an average correlation of +0.06. Likewise, the associated t-statistics also vary, including values close to zero. It is tempting to conclude from these studies that FDI does not affect growth.

3.1 Approach to MRA

As the standardised measure of the effect of FDI on growth, we use the partial correlation between FDI and economic growth.[11] Consider the basic econometric model: $growth = \alpha + \delta FDI + \beta_1 x + u$, where x is a vector of controls, and u is the residuals. Direct FDI effectiveness is given by $\partial growth/\partial FDI = \delta > 0$. We convert various estimates of δ into partial correlations, r. However, an important issue is that when the basic growth model includes both FDI and its interactions (e.g., an absorptive capacity variable), the calculation of the partial correlation for the *total* FDI effect is not possible.[12] The implication of this limitation for our approach is that we are able to provide the average FDI–growth estimate only from studies that do not use an interaction term for FDI (94 of 108 studies). To understand the depth of this limitation we compare the average partial correlation from only studies using interaction terms, as well as those from all studies.

To find the unconditional mean FDI–growth effect, partial correlations between FDI and growth are regressed on a constant: $r_{ij} = \beta_0 + v_{ij}$ where r_{ij} is the i^{th} FDI–growth partial correlation reported in the j^{th} study and v_{ij} is the random error. In computing this average effect, we also construct *weighted* averages, by assigning greater weight to estimates with higher precision (where the weight is the inverse of the standard error of a partial correlation).[13]

The approach described above assumes that r varies randomly around a central effect, β_0, which is the mean FDI–growth effect, after allowing for random sampling error. To identify the variables that cause heterogeneity in the primary models, we utilise a vector (**Z**) of moderator variables which include indicators that capture modelling, data,

[11] A detailed description of the MRA process can be found in Doucouliagos and Ulubasoglu (2008).
[12] The multiple partial correlation for FDI, a device to capture the partial correlation of the *total* effect, can only be computed for a model when FDI and its interactions are entered in the regression in alternate times, information that is not provided by studies. See Cowden (1952) for details.
[13] Alternative weights can be used, for example, the number of citations received and the impact factor of the journal in which the study was published. While precision is available for all estimates, impact factors are not available for all journals.

and estimation differences, as well as time and regional dummies:[14] $r_{ij} = \gamma_0 + \boldsymbol{\gamma} \boldsymbol{Z}_{ij} + v_{ij}$ (Stanley and Jarrell 1989; Stanley 2001). **Z** also includes binary indicators on whether model *i* in study *j* utilises a certain FDI interaction term. The implication of the aforementioned inability to calculate the full partial correlation is that those binary indicators in the MRA will detect how the linear FDI term is affected in a regression model following the inclusion of an FDI interaction.

To identify the empirical studies to include in the MRA, an exhaustive and comprehensive search was conducted.[15] This intensive search revealed 108 comparable published papers in English that offer regression-based estimates of the FDI-economic growth association using cross-country data.[16,17,18] The reference list of studies included in the MRA is provided in Appendix A. To ensure data accuracy, the estimates and the study characteristics were independently checked by several coders.

Figure 1 illustrates the FDI–growth relationship with a funnel plot, tracing the association between partial correlations and the precision measure. Mimicking the varied distribution above, the funnel plot highlights a large variation in the reported estimates.

3.2 Mean FDI–Growth Partial Correlation

Table 1 reports the average effect sizes. Column 1, using all estimates, reports average effect size as +0.12 and +0.10. Column 2 focuses only on studies without FDI interactions and reports an analogous size effect. Focusing on average partial correlation of the linear FDI variable from studies that use FDI interactions, column 3 reports +0.25 as average

[14] If the FDI–growth relationship does not vary by country or region, or over time, it implies that the association applies universally, pointing to a single FDI–growth value. However, this is unlikely to be the case. The more likely case is a distribution of FDI–growth values concerning different regions or periods.

[15] Numerous search engines were accessed, including Econlit, Google Scholar. Keyword searches included 'foreign direct investment', 'FDI', 'growth', 'economic growth', 'GDP', 'international capital flows', 'international transfers', and 'national performance'. In addition to search engines, exhaustive manual searches were also conducted. This involved investigating any references listed in empirical, theoretical, and review studies.

[16] The search for papers was terminated in June 2009.

[17] Studies reporting the effect of FDI on growth at plant/firm level, or for specific industries, are excluded.

[18] It should be noted that a very small number of estimates were eliminated because they were extreme outliers, probably due to reporting/typing errors in the original published studies.

effect size. Column 4 excludes the top and bottom 5% estimates of the entire sample,[19] column 5 is restricted to studies controlling for endogeneity, while column 6 focuses on estimates derived from models using data from only developing countries. Finally, column 7 considers only studies that have been published after the year 2000, given significant heterogeneity among prior studies. All columns report average effect size between +0.10 and +0.17.[20] None of the 95% confidence intervals include zero and they are rather tight. Although it is not possible from these estimates to make a universal conclusion about the FDI–growth effect size, given the aforementioned limitation relating to partial correlations, it appears that the positive growth effect of FDI is robust to different partitions of the data. It must be noted that, contrary to theoretical predictions that FDI from North to South would be more growth enhancing, the analysis restricted only to developing countries does not yield a significantly different effect size.

3.3 Heterogeneity: Real World Factors, Modelling, Estimation, and Data

We consider a large list of moderator variables to capture heterogeneity due to real world factors, as well as the modelling, data, and estimation differences. Appendix B presents the definitions and sample means of these variables.

Here we report the results of a general-to-specific modelling strategy, where we commence with all potential explanatory variables and sequentially remove any variable that was not statistically significant at the 10% level, using Wald tests to validate all excluded variables (Hendry 1995).[21,22] The constant term is β_0, which is estimated to be 0.11 in column 1 of Table 2.

[19] However, there is no theoretical reason to exclude these estimates, as they are not outliers.
[20] All standard errors are adjusted for the clustering of estimates within studies. This is to address the data dependence, which arises due to clustering of observations within a study (Everitt et al. 2001; Hox 2002). If the estimates are reported by a different author, or if the same author uses a different set of samples, the corresponding estimates are considered statistically independent (Hunter and Schmidt 2004).
[21] The full set of estimation results is available upon request.
[22] The MRA explains 56% of the variation in partial correlations, which is a large fraction for these data.

Time. Of the seven time dummies, *1940s, 1950s, 1960s, 1970s, 1980s, 1990s* and *2000s*, indicating whether studies use data from those decades, the *1940s* is used as the benchmark. Table 2 finds that models using data from the *1980s* produce larger FDI–growth effects, which might be due to increased globalisation, liberalisation and integration efforts. The *2000s* captures weaker effects. The latter result is conditional in that the 15 studies have used data from only the 2000–2002 period. Surprisingly, the seven-fold increase in global FDI in the 1990s did not produce a higher FDI–growth effect. This evidence suggests that the FDI–growth link is stronger in some periods than others.[23]

Region.[24] The ten regional dummies constructed are *Africa, Australasia, East Asia, Central and Eastern European Countries (CEECs), Latin America, the Middle East, North America, South-East Asia, South Asia,* and *Western Europe*, each indicating whether the sample contains countries from the relevant region. North America is used as the benchmark. Three regions emerge as important. *Western Europe* has a positive coefficient, suggesting that models estimated using data that include Western European countries find statistically stronger FDI–growth effects. In contrast, both the Middle East and South-East Asia have negative coefficients, meaning that the FDI–growth relationship is weaker in those regions than it is in North America.[25] Column 1 of Table 2 also finds that the FDI–growth experience seems to be much smaller in South-East Asia than it is in

[23] This result can arise from technology shocks, spurts in globalisation and regulation, and spurts of financial deepening affecting global product cycles.

[24] Unfortunately, some studies do not provide this information. They merely identify their samples as developing countries. This leads to a loss of observations in our MRA.

[25] Sadik and Bolbol (2001) argue that the Arab market is fairly protected, and is neither deep nor large enough to attract market-seeking FDI. In addition, Arab labour is neither cheap nor highly skilled. They find that FDI in Tunisia and Egypt has a significant negative effect on growth, while 'imposed implants' such as defence contractors or petrochemical and oil-related investments in Saudi Arabia and Oman do not meet either the investment criteria or the optimum resource allocation of the host country.

the rest of Asia. Finally, the results imply that East Asia and Latin America are significantly no different from North America in benefiting from FDI.[26]

Measurement. Five dummy variables capture the differences in FDI measurement: *Gross FDI, Growth Rate of FDI*, *Lagged FDI*, and *Net FDI*.[27] The *FDI/GDP* ratio is the most common measure and is used as the benchmark. We also control for *Growth Rate of GDP Per Capita* (versus *Growth Rate of GDP*). *Lagged FDI* is especially important here. If FDI is an autoregressive process,[28] whether contemporaneous or lagged FDI is employed in modelling should not matter. However, there are reasons to believe that it is lagged FDI, rather than contemporaneous FDI, that should affect growth because all the suggested channels are more likely to work with some time lag (e.g., Durham 2004).

Table 2 demonstrates that FDI measured with a lag results in smaller effects. Given the coefficient of –0.12 on *Lagged FDI* and that of β_0 in Table 2 being +0.11, FDI in the past has almost zero direct effect on contemporaneous growth. This can occur if over time, FDI's effect is encapsulated in other parts of the economy. This result resonates with Durham (2004), who finds different results with contemporaneous and lagged FDI.[29]

Estimation. The dummy variables *2SLS*, *3SLS*, *GLS*, *GMM*, and *SUR* capture the estimator differences that might matter for the FDI–growth relationship. OLS is the benchmark. Reverse causality or omitted variables are likely to induce endogeneity between FDI and economic growth, so it is important to assess how 2SLS, 3SLS and GMM results might be different than OLS. Also, some of the estimators are used in

[26] The negative effect related to South Asia might be due to countries with weak FDI performance in the study periods, for example, Burma, Indonesia, Laos, Vietnam, and the Philippines. Considering the result from East Asia and Latin America result, it can be said, as is well known, that Hong Kong, Singapore, Taiwan, Brazil and Mexico have done well in FDI and growth terms.

[27] *Gross* and *Net FDI* are measured as the dollar value of investments. *Lagged FDI* refers to lagged variables regardless of the type of FDI measurement, which is controlled with other dummies. Therefore, it indicates a space in the timing only.

[28] FDI flows might be autoregressive when funds are committed and allocated over several years.

[29] In addition, the use of *Net FDI* in dollar value results in larger FDI–growth effects. Measuring growth on a *per capita* basis versus overall GDP also results in larger effects.

combination with *Fixed Effects*, *Random Effects*, *Granger Causality*, *VAR,* and *ECM*. Nair-Reichert and Weinhold (2001) suggest a strong presence of country fixed effects in the FDI–growth relationship. A number of studies employ time-series techniques, such as Granger Causality and panel co-integration (e.g., Zhang 2001), suggesting different directions of causality between FDI and growth (income per capita in the case of co-integration) and other contingent factors such as the trade regime (de Mello 1999).

Strikingly, Table 2 shows that none of the estimation methods make a difference to the FDI–growth effect compared to OLS.[30] Two findings are noteworthy: endogeneity and individual heterogeneity. The finding that addressing endogeneity in a model did not yield, on average, a different result than OLS in the literature is very surprising, given our strong priors on reverse causality. The explanation could be that there is either no endogeneity between FDI and growth, such that taking a measure does not correct any bias, or that the literature uses poor instruments, such that the correction was, on balance, not achieved. In general it is evident that instrumental variables employed in the literature do not fully comply with exclusion restrictions to ensure a reasonable correction in endogeneity.[31] Thus, it is not entirely unexpected that our MRA cannot detect any significant difference between estimates that 'address' endogeneity and those that do not. The close average partial correlations in columns 1 and 5 in Table 1 reinforce this finding.

[30] The estimation methods were also classified into the following three broad groups: *Individual*, *Instrumental*, and *System estimation*. *Individual* denotes estimates whereby individual-country heterogeneity is captured via fixed effects or random effects models. *Instrumental* denotes estimates based on instrumental variables (2SLS, 3SLS, and GMM), while *System* estimation refers to studies that estimate a system of equations. No differences in results emerge.

[31] One might consider partial correlation as a measure of statistical strength of the relationship in question as reflected by the t-statistics of coefficient estimates. Considering that 2SLS is, by construction, less efficient than OLS, normally a valid instrumentation in the presence of endogeneity should indicate a lower *statistical* association between FDI and growth. In the absence of endogeneity, no correction is necessary, and a valid instrumentation is likely to approximate the OLS (i.e., true) relationship. Invalid instrumentation in the presence of endogeneity can result in the OLS estimate, and even in a *zero* statistical association in the absence of endogeneity. Efficiency of other instrument-based methods with respect to OLS (e.g., GMM), can vary depending on the number of moment conditions exploited, but the previous reasoning is also likely to hold with those methods. Therefore, one would presumably expect a lower statistical link between FDI and growth if the endogeneity problem were appropriately addressed. Note that the focus here is on the *statistical* association, not on differing magnitudes of the IV/OLS coefficient estimates, which depend not only on the discussion above, but also the direction of bias in the FDI–growth relationship.

Analogously, controlling for other factors, neither panel fixed nor random effects estimators yield a divergent effect compared to (pooled) OLS. Although this is contrary to the strong individual heterogeneity suggested in the literature, it implies that the FDI–growth relationship does not vary from country to country.[32] However, this MRA finding does not mean that each economy has the same production function or follows the same growth process, rather it merely suggests that FDI does not exhibit significantly different variations in contributing economic growth across countries.

Data. The data differences are captured by *Single*, *Panel*, and *Length Average*, with *Cross-Sectional* used as the benchmark. While some panel datasets consist of annual time series, others average the annual data, such as five-yearly averages. *Length Average* measures the number of years of annual data that are used to average the data. The growth literature presumes that cross-sectional data capture long-term effects, panel data capture medium-term (transition) effects, and annual data capture short-term effects.

Neither the use of panel data compared to cross-sectional nor the length of the period over which growth is averaged is significant in Table 2. However, the coefficient on *Single* is negative, which means that models investigating the FDI–growth effects with single-country data report, on average, smaller effects than those that use a cross-section of countries. The major feature of *Single*-country models is that they exploit only the time dimension of the data. Thus, if the presumption of cross-sectional data referring to long-term effects and time-series data referring to short-term effects is true, FDI is likely to affect growth more strongly in the long-term. Alternatively, a *Single*-country model might reflect FDI types, motives, and other market characteristics that are too narrow to generate any significant growth.

[32] Our interpretation of the absence of individual heterogeneity here is based on the fixed effects estimator being less efficient and the random effects estimator being more efficient than OLS. If these two estimators do not, on average, deliver a different statistical association between FDI and growth compared to OLS, individual country heterogeneity is likely to be absent.

It is worth emphasizing that in the results above that relate to single-country models, the absence of individual country heterogeneity in panel data models, as well as significant variations found of regions, are consistent with the interpretation that being larger economic units, regions are more conducive to higher growth from FDI inflows.

Explanatory Variables. To explore the specification differences, 20 dummy variables are constructed: convergence; share of government consumption in GDP; share of investment in GDP; labour input; share of trade in GDP; financial-market development; inflation; economic freedom; democracy; political instability; foreign aid; literacy rate; average years of schooling; primary schooling, secondary schooling, higher education; FDI interacted with financial-market development; FDI interacted with years of schooling; FDI interacted with secondary schooling; and FDI interacted with trade.

The results indicate a statistically significant and positive coefficient for both *FDIxFinancial Market* and *FDIxTrade*, with the implication that the partial correlation of the linear (i.e., non-interactive) FDI term is significantly higher when FDI is interacted with financial markets and trade in the respective model. This result implies that FDI's effect on growth works not only linearly, but also through its interaction with conditioning variables. Put differently, without any interaction term the model assumes that the linear FDI variable captures the total FDI effect, in which case FDI's variation in the specification, direct and joint with other variables, is not clearly teased out, leading to greater imprecision in the estimate of the linear FDI term.[33]

Controlling for the size of government results in larger effects for FDI, while controlling for financial markets, inflation, foreign aid, and secondary schooling results in robustly smaller effects. We follow Doucouliagos and Ulubasoglu (2008) in interpreting

[33] The increased partial correlation of the linear FDI term after controlling for FDI's interactions in the regression can be due to either the reduced regression error variance (i.e., lower uncertainty in the model), or the increased sum of squares for FDI, such that the variation related to FDI's direct effect is 'cleaned' once its joint variation with conditional variables is considered. In both cases, this result signals the relevance of FDI's interaction effect in the model.

these findings. If the size of government is negatively (positively) related to growth, FDI is positively (negatively) related to larger governments. It is generally agreed that larger governments are negatively associated with growth. Thus, the MRA result implies that a higher role of FDI in the economy is associated with larger governments.[34] In contrast, models that control for financial markets report smaller FDI–growth effects. This result implies that if financial markets are positively (negatively) related to growth, FDI is positively (negatively) related to financial markets. Likewise, if inflation is positively (negatively) related to growth, the MRA suggests that FDI is positively (negatively) related to inflation. Similarly, the MRA predicts that FDI is associated with greater secondary schooling (absorptive capacity), and higher levels of foreign aid.

Importantly, domestic investment is not estimated to be significant in the MRA. This result is consistent with the fragile evidence between FDI and domestic investment (Borensztein et al. 1998; Alfaro et al. 2004), despite the arguments that FDI might crowd out the latter.[35] Openness (the share of trade in GDP) is also statistically insignificant. The MRA does not predict a strong direct association between openness levels and FDI. It suggests that trade is a significant absorptive capacity variable for FDI.

Robustness. Columns 2 to 5 of Table 2 explore the sensitivity of the MRA results. Column 2 presents the results when all estimates are given an equal weight (assumed to be of equal quality). Column 3 removes the top and bottom 5% correlations. Not surprisingly, by removing larger observations, the fit of the model improves (the adjusted R-squared rises from 0.56 to 0.63). Column 4 uses all studies except those that use data

[34] The effect of FDI when government is not included in a growth model is +0.11, rising to +0.18 when government is included in the model. This implies that there is an indirect effect of FDI and government on growth: FDI is associated with larger governments, which in turn reduces growth.

[35] In fact, UNCTAD (1999) finds that all three effects, namely, crowding out, crowding in, and neutrality, in the FDI–investment relationship are possible. They suggest, for example, that Sub-Saharan Africa and Latin America are likely to have experienced crowding out. However, the MRA finding above does not mean that investment has no place in the growth specification.

for a single country, leaving cross-sectional and panel data studies. From developing countries' perspective, the most appropriate sample for analysis is FDI from industrial countries into developing countries. Hence, in column 5 of Table 2, the dataset is restricted to those estimates that only include FDI into developing countries. Column 6 of Table 2 restricts the data specifically to those estimates that controlled for both domestic capital and convergence.

Importantly, column 4 of Table 2 demonstrates that the *FDIxFinancial Market* result disappears when models estimated using data from *Single* countries are excluded from the MRA. Given that single-country models exploit only the time dimension of the data; this finding might suggest that the FDI-financial markets' interaction matters for growth more strongly over time.[36] Overall, this finding suggests that the interaction between *FDIxFinancial Market* matters for growth, but the effect is likely to work under some nuanced circumstances.

Two important differences emerge when only the estimates from developing countries are used. First, the coefficient on *Lagged FDI* is smaller. Second, the coefficient on *FDIxTrade* is significantly larger (0.27 compared to 0.11). Models estimated using data from developing countries, which ignore this interaction, find a lower partial correlation for the linear FDI term. The marginal contribution of this term to growth is greater when FDI is interacted with trade in the sample of developing countries. Conversely, *Lagged FDI* is insignificantly different from contemporaneous FDI when convergence and domestic investment are controlled jointly in the FDI–growth models.[37]

[36] It seems plausible to assume that an insignificant *FDIxFinancial Market* interaction in the primary regression is likely to lead to no change in the partial correlation of the linear FDI term. Thus, the total FDI effect is likely will be captured by the linear FDI term.

[37] In addition to the robustness tests reported in columns 2 to 6 of Table 2, we ran various other MRA models (unreported), none of which alter the essence of the results reported in Table 2, column 1. For example, we re-ran the MRA on only those estimates drawn from cross-sectional data (excluding panel data estimates) and then only those estimates that control for trade, investment, and convergence, respectively. We re-ran the MRA using a single measure of economic freedom by combining any estimates that control for economic freedom, government consumption, trade, and/or inflation, as a single binary variable. We

4 Econometric Analysis and Results

This section aims to cross-check the MRA findings with a global dataset that covers nearly 140 countries over the period 1970 to 2009. The principal objective here is to explore whether econometric evidence is consistent with the MRA evidence in terms of the direction of effects. A *one-to-one* match between the magnitudes of partial correlations indicated by the MRA and econometric analysis might not be possible given a number of issues that cannot be modelled with the MRA.

4.1 Benchmark Specification

The MRA results above suggest that panel dataset exhibits no difference compared to cross-sectional dataset, and estimator type does not matter relative to (pooled) OLS. Time and regional variations are important. Thus, our benchmark empirical formulation is a pooled OLS estimation of five-year averaged panel data where period-specific and region-specific effects are controlled. FDI/GDP and real GDP growth per capita are FDI and economic growth measures, respectively. We estimate the variants of:

$$Y_{it} = \delta_0 + \delta_1 FDI_{it} + \boldsymbol{\gamma_1}\, \mathbf{A}_{it} + \boldsymbol{\gamma_2}\, FDI_{it} \times \mathbf{A}_{it} + \boldsymbol{\theta}\mathbf{X}_{it} + \boldsymbol{\eta}_i + \boldsymbol{\tau}_t + \varepsilon \qquad (1)$$

where, for country *i* and time period *t*, Y is growth in real GDP per capita, FDI is the share of FDI in GDP, **A** is a vector of absorptive capacity variables including financial development and trade openness, **X** is a vector of other controls, $\boldsymbol{\eta}$ is a vector of 10 regional dummies, $\boldsymbol{\tau}$ denotes time period dummies and ε is the error term. Data descriptions and sources provided are in Appendix C.

It must be noted that this model would capture the *within-region variation* in the FDI–growth association consistent with the MRA finding that regional variation matters more for the relationship. The model might not reflect the best growth process that a

---

also re-ran the MRA using a single human-capital variable by merging estimates factors such as average years of schooling, literacy, primary enrolment, and secondary enrolment into a single binary variable.

country might follow, but the MRA suggests that the FDI–growth relationship is more likely to emerge significant if the unit of analysis is regions, rather than countries.[38] As for the estimation method, it is unclear whether the OLS estimation would provide the causal link between FDI and growth given our strong priors on endogeneity of FDI. We address this issue through a dynamic panel estimation below following the pooled OLS analysis.

Column 1 of Table 3a reports the result of the most basic model with FDI as the only explanatory variable, estimated using 807 observations from 181 countries for the period 1970–1999.[39] Strikingly, the partial correlation between FDI and growth is found to be 0.11, which is exactly the same as β_0 as reported in column 1 of Table 2. The estimated coefficient suggests that, on average, a 1% increase in FDI/GDP in a country is associated with 0.23% higher growth compared to another country in the same region. Column 2 of Table 3a presents the results with predicted benchmark specification that includes all the significant explanatory variables found in the MRA.[40,41] The partial correlation of the linear FDI term is estimated to be 0.15, while its coefficient is 0.46, significant at 1%. *FDIxFinancial Market* has an insignificant coefficient and *FDIxTrade* has a negative coefficient significant at 5%.

The subsequent columns make a series of perturbations to column 2 of Table 3a and demonstrate the manner in which the FDI–growth relationship varies, with a focus on benchmark partial correlation of 0.15. Column 3 of Table 3a excludes *Financial Market* and column 4 removes *FDIxFinancial Market* as well. Consistent with the MRA finding in column 4 of Table 2, these do not yield a different result for linear FDI. However, excluding *FDIxTrade* in column 5 of Table 3a reduces the partial correlation of linear FDI

[38] This is a regional production function or a regional growth process (except it does not include physical investment at present).
[39] The period ends for now in 1999 to mimic the time span of the majority of studies in the MRA sample.
[40] Foreign aid is excluded here because it results in a huge sample loss, but its inclusion does not change the main thrust of the results.
[41] Data availability on right-hand side reduces the sample to 630 and the number of countries to 136 here. However, in another striking (unreported) piece of evidence, the basic specification as in column 1, using this particular sample yields the same partial correlation of 0.11 as when 181 countries were utilised.

to 0.10, which is another finding consistent with the MRA. The coefficient for the linear FDI term is reduced from 0.46 to 0.30, significant at 5%. This reduction in the coefficient is anticipated because removing an interaction with a negative effect would assign that effect, at least partly, to the remaining non-interactive FDI term, reducing its coefficient size. Nevertheless, the negative sign of *FDIxTrade* is surprising, and thus, will be explored below. Continuing with the perturbations, excluding government size, inflation, and secondary schooling in columns 6, 7 and 8, respectively, yield FDI–growth partial correlations of 0.13, 0.16, and 0.15. Coefficient of the linear FDI term varies between 0.41 and 0.52, being significant at the 1% level. The direction of the changes in partial correlation in column 6 and 7 is also consistent with MRA, while removal of schooling does not produce a different partial correlation. Column 9 runs the regression with observations for which lagged FDI is available, while column 10 actually uses lagged FDI instead of contemporaneous FDI. With the latter, the partial correlation of the linear FDI term decreases to 0.08 and its coefficient reduces from 0.36 to 0.25, with the significance level decreasing from 1% to 10%. Again, this result concurs with the MRA finding. Finally, column 11 adds the 2000–2004 period to the sample, and the linear FDI term is estimated with a partial correlation of 0.10. This reduction in the effect is also predicted by the MRA. The estimated coefficient is 0.36, which is significant at 1%

Table 3b excludes different groups of countries from the sample. Restricting the focus to developing countries only, column 1 yields a partial correlation of 0.17. Compared to column 2 of Table 3a, this is not a major difference for the effect of linear FDI, a result predicted by the MRA. Column 2 removes *FDIxTrade* in the sample of developing countries, while column 3 uses lagged FDI in the same sample. Reductions in partial correlations are precisely what are predicted by column 4 of Table 2. Columns 4 to 10 of Table 3b remove regions in the world one by one. Increased partial correlation upon the removal of Middle East is in line with the MRA finding, though contrary to

prediction; removal of Europe and South-East Asia does not create a great difference. An important result, which is not detected with the MRA is the reduced partial correlation (0.11) when Africa is excluded from the sample. Finally, removal of other regions does not make a major difference in the results, which is again in line with the MRA results.

Overall, these findings largely confirm the direction of the effect between linear FDI and growth predicted by the MRA, though magnitudes of changes in partial correlations are somewhat smaller. The latter is not terribly surprising because all the predictions of MRA (such as *Single*) cannot be fitted. With all these findings, we surmise that the benchmark specification proposed by the MRA can greatly alleviate model uncertainties.

4.2 Extending the Benchmark Model

We now extend the benchmark specification to fit better more recent data to the cross-country FDI–growth relationship. The most important extension is the modelling of non-linearity pertaining to the interaction effects of FDI with financial markets and trade openness, which is motivated by the negative, though generally insignificant, coefficients of *FDIxFinancial Market* and *FDIxTrade* in Table 3a. Retaining the 1970–1999 sample for comparability, estimated coefficients in column 1 of Table 4 point to the presence of non-linearity in the form of inverted-U effect for FDI and financial-market interaction and a U-shaped interaction for FDI and trade openness. Although some interactions fall short of being significant at conventional levels, estimated coefficients imply that FDI contributes more to growth at higher levels of financial development, but this effect weakens at very high levels of the latter. In contrast, FDI contributes negatively to economic growth at low levels of trade openness, but this effect tapers off at higher levels of openness. The linear FDI term in the model is strongly significant at 1%.

Subsequent columns of Table 4 check the sensitivity of these findings. Column 2 includes log initial income and investment in the specification. Columns 3 and 4 estimate

the models in columns 1 and 2, respectively, with the extended 1970–2009 sample. Using this sample and the full model in column 4, column 5 clusters the standard errors at the region level. Column 6 removes FDI disinvestments, and finally, column 7 'prunes' the outliers in financial development and trade-openness variables. It is clear that these outliers adversely influence the statistical significance of the non-linear interaction terms such that their removal makes all concerned point estimates strongly significant at 1% to 5%. Hence, with several measures taken, MRA predictions accounted for, and the latest data covered, column 7 can be considered as the 'gold standard' FDI–growth model, and therefore, its coefficients can be used for numerical implications.

Figure 2 traces the effect of FDI on growth across different values of financial development. The solid line in the figure confirms the inverted-U-shaped effect of FDI whereby the dashed lines portray the confidence intervals of this effect.[42] FDI's influence on growth is generally positive (i.e., above the zero line). Considering the bottom band of the confidence interval, FDI has a strictly positive and statistically significant effect on growth below the financial development level of 116% and a statistically insignificant effect beyond. More than 95% of the financial development observations in our sample are below 116%, meaning only a small number of countries experience an insignificant effect. FDI's influence on growth attains its highest level when financial development is 54%. Weakening FDI effectiveness at higher levels of financial development can occur when financial markets become increasingly selective about supporting the domestic sector for projects, which would in turn hinder the backward and forward linkages within the host economy. Conversely, portraying FDI's effect on growth for different levels of trade openness, Figure 3 confirms the U-shaped relationship predicted by the relevant

[42] FDI's effect is evaluated at median trade openness in the respective sample (65.2%). Standard errors to construct the confidence intervals are obtained with the 'delta method'.

coefficients in column 7 of Table 4.[43] FDI has a strictly positive influence on growth below the trade openness level of 114% and an insignificant effect beyond. Approximately 85% of trade openness observations in our sample are lower than 114%. Despite being positive for the large part of the sample, reduced FDI effectiveness on growth as the level of trade openness increases might indicate that FDI and openness become substitutes when trade becomes substantive, such that openness cancels out FDI's effect. This outcome can arise when factors such as foreign and domestic trading firms compete for scarce resources within the host economy, or foreign firms have a motive to exploit the cheap domestic labour or natural resources.

4.3. Dynamic Panel Data Estimation

Our econometric investigation so far does not address any endogeneity between FDI and economic growth. Although this approach is in line with the MRA predictions, reverse causality from growth to FDI is an important consideration in the said relationship. In this section we address the endogeneity problem through a dynamic panel estimation of the FDI-growth relationship. This approach can also be considered as an 'external validation' of the 'gold standard' model predicted by the MRA to a different econometric approach.[44]

Note that the dynamic panel approach introduces three additional changes to the MRA predictions above: a focus on income level (rather than growth), accounting for persistence in income level, and a focus on within-country rather than within-region variation. If our MRA results are correct, then a within-country focus should not make a difference to the results compared to the within-region focus. Size of the estimated coefficient of the lagged dependent variable $ln(y_{t-1})$ will determine how far we are apart

[43] FDI's effect is evaluated at median financial development in the respective sample (28.99%). Standard errors to construct the confidence intervals are obtained with the 'delta method'.

[44] Normally it is preferable that the endogeneity is addressed through a strong instrument that approximates a randomized experiment, and in turn, captures an exogenous shock in FDI. However, different instruments provide different local average treatment effects, and countries may not respond to such treatments in a comparable way. Hence, we opt to extend equation (1) to a dynamic panel data model.

from the MRA specification, given that the growth focus (i.e., $ln(y_t) - ln(y_{t-1})$) assumes a coefficient of 1 for $ln(y_{t-1})$. [45]

Table 5 documents the results. Column 1 replicates the 'gold standard' model in a dynamic panel setting, which is estimated with system-GMM method (Blundell and Bond 1998). Column 2 estimates the same model only in differences (Arellano and Bond 1991), while column 3 to 10 replicates column 1 for developing countries, and when seven different regions are excluded from the global sample one by one. All of our estimations pass the standard dynamic panel tests of Hansen's overidentification and autocorrelation.

The results are striking. First, the 'gold standard model' predicted by the MRA above is reasonably robust to this econometric approach given the fact that the sign and significance of the explanatory variables are generally consistent with the previous findings. In particular, FDI alone has a positive and statistically significant coefficient globally, which is robust across all model variations in Table 5, indicating that a 1% increase in FDI's share in GDP in a given five-year period leads to about 6-7% growth in the income level. Second, absorptive capacity is still important, with trade openness being the most robust indicator globally as seen through its strongly significant interaction with FDI across different models in Table 5. The U-shaped effect of FDI on growth based on different levels of trade openness still holds. Financial development is estimated to be a significant absorptive capacity in a global sample that excludes Sub-Saharan Africa. Third, the factor inputs of schooling and physical capital investment are statistically significant and have positive coefficients, as expected in the country-specific standard production function. These results endorse our 'gold standard' FDI-growth model as robust to endogeneity treatment through dynamic panel estimation.

[45] We treat all the explanatory variables as endogenous and accordingly, use 'gmmystyle' instruments within the dynamic panel data context. We pay careful attention to standard dynamic panel analysis issues, such as the credibility of Hansen's and autocorrelation (AR) tests. Following the rule of thumb, our number of instruments are lower than the number of country groups in regressions. Our 'laglimits' are three to six, and we 'collapse' the instrument matrix in Stata.

From a different perspective, it is not entirely surprising that our dynamic panel estimation results are aligned with the MRA predictions. The fact that the coefficient of the lagged dependent variable is estimated to be around 0.95 indicates that our dynamic panel estimation still approximates a growth process, which was the focus of the MRA.

5 Discussion and Conclusions

The effect of FDI on economic growth has been of significant interest for decades. FDI is said to be an important source of savings and capital accumulation for the host economy, creating positive spillovers, facilitating labour training and backward and forward linkages across sectors, as well as being a conduit for the transfer of technology and organisational knowhow. A corpus of cross-country empirical literature has analysed the FDI–growth relationship, delivering mixed results. This has raised the question: do theoretical predictions point towards a real relationship, or are the perceived effects of FDI only wishful thinking?

This paper first conducts a detailed assessment of 880 FDI–growth estimates reported in 108 econometric studies, known as the MRA. These estimates refer to almost the whole population of published results in the literature. Using primary data from a global sample of 140 countries over the period 1970–1999, our empirical analysis in a subsequent step indeed corroborates several variations predicted by the MRA regarding differing findings in econometric studies. Thus, considering the accumulated evidence in its entirety, accounting for variations exhibited by numerous models, and netting out the effects of sampling error, the MRA permits a specification that can best fit the FDI–growth relationship. Exploiting the implied model and covering the 1970–2009 period, our own econometric analysis in the final step yields strongly significant ‘informed’ estimates for the FDI–growth linkage.

Our approach identifies six robust and clear conclusions regarding the cross-country FDI–growth relationship. First, FDI has, on average, a positive global effect on economic growth that is of statistical significance. Second, this effect exhibits stronger within-region variation than within-country variation. That is, a region, as a larger unit, might host sufficiently different types of FDI that in turn demonstrate greater ability to enhance growth. Third, robust absorptive capacity variables are financial development and trade openness. Further, these two variables exhibit non-linearities in their absorptive capacity, such that FDI's positive effect on growth tapers off at very high levels of the latter two. Still, this finding suggests that theoretical predictions regarding FDI's positive effect on growth seem to rest a great deal on the absorptive capacity of the economy. Fourth, it is contemporaneous, not lagged, FDI that contributes more strongly to economic growth. Fifth, higher levels of FDI are associated with larger governments, more developed financial markets, lower inflation, higher levels of schooling, and higher levels of foreign aid. Sixth, the FDI–growth relationship holds globally as strongly as in developing countries because, contrary to theoretical predictions, no evidence is found that FDI benefits developing countries significantly more than countries in the developed world. These results are robust to 'external validation' facilitated by the dynamic panel estimation that also addresses the endogeneity problem in the FDI-growth relationship.

What are the implications for policy and future research? Alfaro et al. (2004) argue that the lack of development of local financial markets and human capital can adversely limit an economy's ability to take advantage of potential FDI benefits. The results of our paper suggest that while FDI increases growth, the full benefits of FDI might not be realised in the absence of well-functioning financial markets, higher levels of schooling, and international trade. Policymakers in host countries should aim to improve local conditions to attract FDI inflows, since better local conditions not only attract foreign companies but also allow host economies to maximise the benefits of

foreign investments. In addition, our results suggest that recent modelling practices appear to be on the right track in involving the absorptive capacity interactions in the analysis.

This paper has focused on the FDI–growth relationship investigated at the country level. It is important to note that the full gamut of theoretical predictions for the growth-enhancing effects of FDI, such as spillovers, externalities and technology transfer, is difficult to capture in cross-country models. Some modelling facts, especially the use of reduced-form specifications, coupled with sampling error and real variations in the relationship, also seem to undermine the functionality of the cross-country data. Nevertheless, our cross-country analysis detects a macroeconomic effect arising from essentially microeconomic actions. These suggest that while cross-country data should not necessarily be disregarded, the economic effects of FDI are likely to be stronger and more noticeable in the more disaggregated sectors of the economy. Again, the recent literature appears to be on the right track in employing more of the industry and firm-level data regarding the effects of FDI (e.g., Alfaro and Charlton 2007, 2009).

6. REFERENCES

Aitken, Brian J. and Ann E. Harrison, "Do domestic firms benefit from direct foreign investment," *American Economic Review* 89 (1999):605-18.

Alfaro, Laura, Areendam Chanda, Sebnem Kalemli-Ozcan, and Selin Sayek, "FDI and economic growth: The role of local financial markets," *Journal of International Economics* 64 (2004):89-112.

Alfaro, Laura and Andrew Charlton, "Growth and the quality of foreign direct investment: Is all FDI equal?" Harvard University Business School Working Paper 07-072 (2007).

Alfaro, Laura and Andrew Charlton, "Intra-industry Foreign Direct Investment," *American Economic Review* 99 (2009):2096-119.

Arellano, M., and S. Bond, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies* 58 (1991): 277-97.

Balasubramanyam, Vudayagiri N., M. Salisu and David Sapford, "Foreign direct investment and growth in EP and IS countries," *The Economic Journal* 106 (1996):92–105.

Baldwin, Richard, Henrik Braconier, and Rikard Forshid, "Multinationals, endogenous growth, and technological spillovers: Theory and evidence," *Review of International Economics* 13 (2005):945-63.

Basu, Parantap, Chandana Chakraborty, and Derrick Reagle, "Liberalization, FDI, and growth in developing countries: A panel cointegration approach," *Economic Inquiry* 41 (2003):510-16.

Blomstrom, Magnus, Robert E. Lipsey and Mario Zejan, "What explains growth in developing countries?" NBER Working Paper No. 1924, Cambridge, MA (1994).

Blomstrom, Magnus, Steven Globerman, and Ari Kokko, "The determinants of host country spillovers from foreign direct investment," CEPR Discussion Paper No. 2350 (2000).

Blundell, R. and S. Bond, "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics* 87 (1998): 115-43.

Borensztein, Eduardo, Jose De Gregorio, and Jong-Wha Lee, "How does foreign direct investment affect economic growth?" *Journal of International Economics* 45 (1998):115-35.

Card, David and Alan B. Krueger, "Time-series minimum-wage studies: A meta-analysis," *American Economic Review* 85 (1995):238-43.

Carkovic, Maria and Ross Levine, "*Does foreign direct investment accelerate economic growth?*" In: Moran, T.H., Graham, E.M. (Eds.), Does foreign direct investment promote development? Washington, DC (2005).

Cowden, Dudley J., "The multiple-partial correlation coefficient," *Journal of the American Statistical Association* 47 (1952):442-56.

De Gregorio, Jose, "Economic growth in Latin America," *Journal of Development Economics* 39 (1992):59-84.

De Mello, Luiz R., "Foreign direct investment-led growth: Evidence from time series and panel data," *Oxford Economic Papers* 51 (1999):133-51.

Disdier, Anne-Celia and Keith Head, "The puzzling persistence of the distance effect on bilateral trade," *The Review of Economics and Statistics* 90 (2008):37-48.

Doucouliagos, Chris and Mehmet Ulubasoglu, "Democracy and economic growth: A meta-analysis," *American Journal of Political Science* 52 (2008):61-83.

Durham, J. Benson, "Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth," *European Economic Review* 48 (2004):285-306.

Easterly, William, "How much do distortions affect growth?" *Journal of Monetary Economics* 32 (1993):187-212.

Everitt, Brian S., Sabine Landau and Morven Leese, *Cluster Analysis*, London: Arnold (2001).

Feld, Lars P. and Jost Henrich Heckemeyer, "FDI and Taxation: A meta-study," CESifo Working Paper No. 2540 (2009).

Görg, Holger and Eric Strobl, "Multinational companies and productivity spillovers: A meta-analysis," *The Economic Journal* 111 (2001):F723-F739.

Greene, William, *Econometric Analysis*, London: Prentice-Hall (2000).

Havranek, Tomas and Zuzana Irsova, "Estimating vertical spillovers from FDI: Why results vary and what the true effect is," *Journal of International Economics* 85 (2011):234-44.

Hedges, Larry V. and Ingram Olkin, *Statistical Methods for Meta-Analysis*, London: Academic Press (1985).

Hendry, David F., *Dynamic Econometrics*, Oxford: Oxford University Press (1995).

Hox, Joop J., *Multilevel Analysis: Techniques and application*, Mahwah, NJ: Lawrence Erlbaum (2002).

Hunter, John and Frank Schmidt, *Methods of meta-analysis: Correcting error and bias in research findings*, London: Sage (2004).

Irsova, Zuzana and Thomas Havranek, "Determinants of horizontal spillovers from FDI: Evidence from a large meta-analysis," *World Development* 42 (2013):1-15.

Iwasaki, Ichiro, and Masahiro Tokunaga, "Macroeconomic impacts of FDI in transition economies: A meta-analysis", *World Development* 61 (2014): 53-69.

Levine, Ross, "Financial development and economic growth: Views and agenda," *Journal of Economic Literature* 35 (1997):688-726.

Mosley, Paul, John Hudson, and Sara Horrell, "Aid, the public sector and the market in less developed countries," *The Economic Journal* 97 (1987):616-41.

Nair-Reichert, Usha and Diana Weinhold, "Causality tests for cross-country panels: A new look at FDI and economic growth in developing countries," *Oxford Bulletin of Economics and* Statistics 63 (2001):153-71.

Papanek, Gustav F., "Aid, foreign private investment, savings, and growth in less developed countries," *The Journal of Political Economy* 81 (1973):120-30.

Razin, Assaf and Efraim Sadka, *Foreign direct investment: Analysis of aggregate flows*, Princeton and Oxford: Princeton University Press (2007).

Sadik, Ali T. and Ali A. Bolbol, "Capital flows, FDI, and technology spillovers: Evidence from Arab countries," *World Development* 29 (2001):2111-125.

Stanley, Tom D., "Wheat from Chaff: Meta-analysis as quantitative literature review," *Journal of Economic Perspectives* 15 (2001):131-50.

Stanley, Tom D. and Stephen B. Jarrell, "Meta-regression analysis: A quantitative method of literature surveys," *Journal of Economic Surveys* 3 (1989):54-67.

UNCTAD, *World Investment Report 1999: Foreign Direct Investment and the Challenge of Development*, New York and Geneva: United Nations (1999).

Wang, Chengang, Xiaming Liu and Yingqi Wei, "Impact of openness on growth in different country groups," *The World Economy* 27 (2004):567-85.

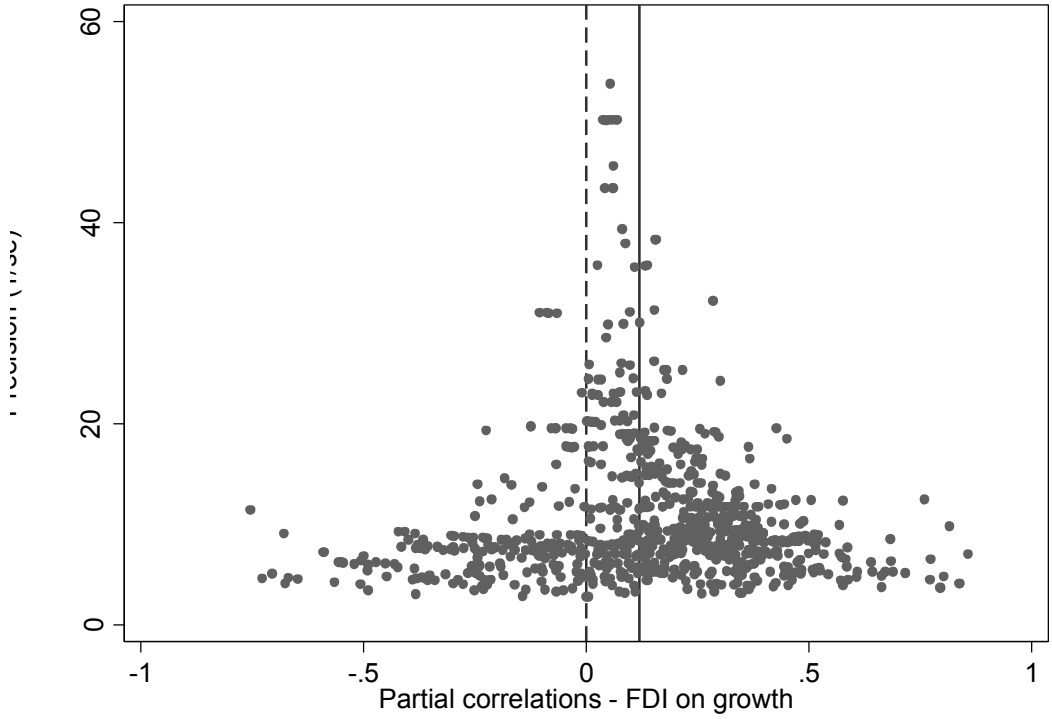
World Bank, *Global Development Financial Report*, The World Bank: Washington (2001).

World Bank, Weekly Global Economic Brief, No 66, 28 October 2010 (2010).

World Bank, *World Development Indicators Online Database*, The World Bank: Washington, (2011).

Zhang, Kevin Honglin, "How does foreign direct investment affect economic growth in China?" *Economics of Transition* 9 (2001):679-93.

Figure 1: Funnel Plot of Partial Correlations of FDI on Economic Growth (n = 880)



Note: The dashed line indicates the position of a zero effect. The vertical continuous line indicates the value of the precision weighted average partial correlation (+0.12).

Table 1: Average Partial Correlations of FDI on Economic Growth

Statistic	*All estimates (1)*	*Only studies without FDI interactions (2)*	*Only studies with FDI interactions (3)*	*Excluding top and bottom 5% estimates (4)*	*Only estimates controlling for endogeneity (5)*	*Only estimates using data for developing countries (6)*	*Only estimates from papers published after 2000 (7)*
Un-weighted, β_0	0.15 (0.10 to 0.20)	0.12 (0.06 to 0.18)	0.25 (0.20 to 0.31)	0.16 (0.12 to 0.19)	0.19 (0.10 to 0.27)	0.15 (0.09 to 0.22)	0.17 (0.10 to 0.24)
Weighted by precision, β_0	0.12 (0.09 to 0.15)	0.10 (0.07 to 0.13)	0.20 (0.22 to 0.28)	0.12 (0.09 to 0.15)	0.16 (0.09 to 0.22)	0.12 (0.09 to 0.15)	0.12 (0.08 to 0.16)
Number of Studies	108	94	14	102	31	77	69
Number of estimates	880	695	185	790	150	543	492
Total Sample Size	149990	102061	47929	146366	23877	81018	109512

Note: Each cell reports the key estimate from separate regressions from Equation 1. Row 1 does not use weights. Row 2 uses precision (the inverse of the estimate's standard error) as weights. All cells use cluster-adjusted standard errors. Figures in brackets are 95% confidence intervals.

Table 2: Meta-Regression Analysis of the Effects of FDI on Growth

Moderator Variable	All studies (1)	Sensitivity analysis				
		All studies, un-weighted (2)	Top & bottom 5% removed (3)	Excluding single country studies (4)	Developing countries only (5)	Convergence & Investment only (6)
Constant	0.11	0.16	0.14	0.10	0.13	0.25
	(1.92)*	(2.59)**	(2.86)***	(1.74)*	(2.00)**	(2.79)***
Sample Size (x 100)	-0.006	-0.008	-0.006	-0.005	-0.007	-0.004
	(-5.77)***	(-3.18)***	(-5.63)***	(-3.95)***	(-2.86)***	(-2.45)**
Lag FDI	-0.12	-0.09	-0.11	-0.13	-0.07	-0.04
	(4.20)***	(-1.97)*	(-4.43)***	(-4.37)***	(-2.23)**	(-0.85)
Net FDI	0.18	0.17	0.10	0.20	0.10	-
	(2.14)**	(1.89)*	(1.95)*	(2.21)**	(1.68)*	
Growth of Per Capita Output	0.07	0.06	0.07	0.08	0.07	-0.01
	(3.26)***	(1.37)	(3.71)***	(3.16)***	(2.63)**	(-0.18)
Single Country	-0.07	-0.07	-0.08	-	-0.05	-0.06
	(-2.36)**	(-1.71)*	(-3.26)***		(-1.32)	(-1.30)
Western Europe	0.06	0.08	0.06	0.06	-	0.06
	(2.42)**	(1.85)*	(2.53)**	(2.39)**		(1.70)*
Middle East	-0.10	-0.13	-0.09	-0.10	-0.08	-0.13
	(-3.92)***	(-3.92)***	(-3.73)***	(-3.78)***	(-2.66)**	(-2.56)**
South-East Asia	-0.06	-0.07	-0.06	-0.05	-0.07	-0.07
	(-3.14)***	(-2.29)**	(-3.25)***	(-2.26)**	(-1.82)*	(-2.67)**
1981–1990	0.14	0.12	-0.05	0.14	0.12	0.11
	(2.77)***	(2.85)***	(-1.41)	(2.80)***	(2.02)**	(1.59)
2001–2005	-0.11	-0.21	-0.13	-0.09	-0.20	-0.25
	(-2.83)**	(-3.29)***	(-3.27)***	(-2.31)**	(-4.01)***	(-4.36)***
FDI x Financial Market	0.18	0.02	0.17	0.04	0.16	0.16
	(3.59)***	(0.26)	(3.38)***	(0.62)	(3.20)***	(2.93)***
FDI x Trade	0.11	0.06	0.09	0.10	0.27	0.04
	(4.40)***	(1.32)	(2.84)***	(4.36)***	(4.01)***	(0.87)
Government	0.07	0.05	0.06	0.06	0.05	0.05
	(3.21)***	(1.60)	(3.20)***	(3.01)***	(1.91)*	(2.14)**
Financial Market	-0.13	0.04	-0.12	0.03	-0.12	-0.09
	(-2.79)***	(0.55)	(-2.75)***	(0.40)	(-2.78)***	(-1.74)*
Inflation	-0.04	-0.06	-0.04	-0.04	0.03	0.01
	(-2.45)**	(-2.19)**	(-2.29)**	(-2.00)**	(0.82)	(0.24)
Foreign Aid	-0.08	-0.08	-0.09	-0.09	-0.11	-0.10
	(-2.39)**	(-1.57)	(-2.89)***	(-2.51)**	(-2.45)**	(-1.47)
Secondary Schooling	-0.08	-0.05	-0.08	-0.08	-0.06	-0.12
	(-2.93)***	(-1.11)	(-3.35)***	(-2.78)***	(-1.31)	(-2.90)***
Adjusted R-squared	0.56	0.24	0.63	0.59	0.58	0.60
N	838	839	754	711	540	318
K	103	103	97	75	77	39

Notes: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels, respectively. t-statistics reported in brackets using cluster adjusted standard errors. Precision is used to weigh each estimate, except in column 2. N is the number of estimates. K is the number of studies. Country composition of the sample used was not specified in five studies, hence, these studies could not be included in the MRA. Output suppressed: only general-to-specific modeling results are presented with this table.

Table 3a. Cross-Checking MRA

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Dependent Variable: Growth of Real GDP Per Capita										
FDI	0.227***	0.456***	0.410***	0.408***	0.296**	0.408***	0.517***	0.456***	0.364***		0.359***
	(3.140)	(3.716)	(3.671)	(3.606)	(2.531)	(3.235)	(4.076)	(3.710)	(3.191)		(2.862)
Fin. Dev.		0.00248		-0.00170	0.00354	0.000278	0.00546	0.00263	-0.00125	-0.00220	-0.00204
		(0.437)		(-0.326)	(0.606)	(0.0484)	(0.924)	(0.475)	(-0.235)	(-0.426)	(-0.386)
FDI*Fin. Dev.		-0.00223			-0.00328**	-0.00193	-0.00252	-0.00223	-0.00112		-0.00212*
		(-1.503)			(-2.380)	(-1.221)	(-1.609)	(-1.502)	(-0.971)		(-1.743)
Trade Open.		0.0109***	0.0122***	0.0122***	0.00702**	0.00863**	0.0129***	0.0110***	0.0131***	0.0122***	0.0109***
		(2.624)	(3.203)	(3.202)	(2.201)	(2.270)	(3.028)	(2.629)	(3.098)	(2.974)	(2.885)
FDI*Trade Op.		-0.00139**	-0.00202***	-0.00200***		-0.00119*	-0.00163**	-0.00139**	-0.00138**		-0.000912*
		(-2.044)	(-3.208)	(-3.130)		(-1.778)	(-2.319)	(-2.044)	(-2.202)		(-1.652)
Gov't Size		-0.0519**	-0.0458*	-0.0446*	-0.0449*		-0.0643**	-0.0518**	-0.0615**	-0.0551**	-0.0342
		(-2.033)	(-1.831)	(-1.755)	(-1.811)		(-2.403)	(-2.038)	(-2.450)	(-2.205)	(-1.017)
Inflation		-0.00194***	-0.00196***	-0.00197***	-0.00198***	-0.00200***		-0.00194***	-0.00155***	-0.00159***	-0.00213***
		(-6.577)	(-6.569)	(-6.542)	(-6.593)	(-6.585)		(-6.536)	(-9.288)	(-10.13)	(-5.091)
Sec. Schooling		0.00161	-0.000711	0.000761	0.00387	0.00110	-0.00301		0.0203	0.0235	0.0133
		(0.0923)	(-0.0425)	(0.0436)	(0.220)	(0.0630)	(-0.160)		(1.381)	(1.573)	(0.887)
Lagged FDI										0.246*	
										(1.760)	
Lagged FDI*Fin. Dev.										-0.00145	
										(-0.953)	
Lagged FDI*Trade Op.										-0.000747	
										(-1.026)	
Constant	3.364***	2.736***	3.738***	3.823***	3.749***	2.150**	2.781***	3.757***	2.358***	2.819***	2.740***
	(7.155)	(3.000)	(4.878)	(4.676)	(4.418)	(2.360)	(2.969)	(4.691)	(2.759)	(3.616)	(3.500)
Observations	807	630	631	631	630	630	630	630	513	513	768
R-squared	0.227	0.308	0.304	0.305	0.304	0.303	0.270	0.308	0.267	0.255	0.256
Number of countries	181	136	136	136	136	136	136	136	133	133	140
FDI part. Corr. (linear term)	0.11	0.15	0.15	0.14	0.10	0.13	0.16	0.15	0.14	0.08	0.10
Time period	1970-99	1970-99	1970-99	1970-99	1970-99	1970-99	1970-99	1970-99	1970-99	1970-99	1970-2004

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Five-year averaged panel.

Table 3b. Cross-Checking MRA, cont'd.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent Variable: Growth of Real GDP Per Capita									
FDI	0.475***	0.388***		0.478***	0.570***	0.509***	0.358**	0.438***	0.418***	0.405***
	(3.612)	(2.779)		(3.614)	(4.485)	(3.293)	(2.273)	(3.314)	(3.469)	(3.571)
Fin. Dev.	0.0207	0.0237*	0.0170	0.00434	0.00520	0.000598	-0.00433	-0.000149	0.00802	-0.000127
	(1.610)	(1.926)	(1.482)	(0.527)	(0.923)	(0.101)	(-0.681)	(-0.0255)	(1.268)	(-0.0244)
FDI*Fin. Dev.	-0.00418	-0.00517**		-0.00176	-0.00292*	-0.00171	-0.00351**	-0.00120	-0.00212	-0.00140
	(-1.457)	(-2.162)		(-0.696)	(-1.827)	(-1.039)	(-2.277)	(-0.749)	(-1.429)	(-1.120)
Trade Open.	0.00584	0.00299	0.00607	0.00743	0.0135***	0.00943**	0.00352	0.0124**	0.0137***	0.0134***
	(1.018)	(0.686)	(1.202)	(1.403)	(3.221)	(2.055)	(0.828)	(2.578)	(3.134)	(3.260)
FDI*Trade Op.	-0.000848			-0.00134*	-0.00176***	-0.00191*	-0.000122	-0.00179**	-0.00130*	-0.00153**
	(-1.015)			(-1.674)	(-2.592)	(-1.828)	(-0.209)	(-2.197)	(-1.882)	(-2.372)
Gov't Size	-0.0510	-0.0476	-0.0478	-0.0432	-0.0733***	-0.0476*	-0.0211	-0.0379	-0.0633**	-0.0627**
	(-1.600)	(-1.517)	(-1.579)	(-1.461)	(-2.895)	(-1.817)	(-0.586)	(-1.323)	(-2.451)	(-2.550)
Inflation	-0.00192***	-0.00194***	-0.00162***	-0.00196***	-0.00189***	-0.00193***	-0.00248***	-0.00241***	-0.00188***	-0.00149***
	(-6.380)	(-6.374)	(-10.10)	(-6.479)	(-6.390)	(-6.598)	(-3.918)	(-3.024)	(-6.640)	(-7.551)
Sec. Schooling	0.00741	0.0101	0.0373	0.0140	0.00581	0.00592	-0.0174	-0.00116	-0.00570	0.0182
	(0.269)	(0.367)	(1.618)	(0.584)	(0.327)	(0.336)	(-0.926)	(-0.0636)	(-0.323)	(1.303)
	(-1.592)	(-1.835)	(-0.970)	(-2.972)	(-0.678)	(-3.243)	(-1.954)	(-2.929)	(-3.672)	(-3.739)
Lagged FDI			0.289**							
			(2.027)							
Lagged FDI*Fin. Dev.			-0.00570*							
			(-1.774)							
Lagged FDI*Trade Op.			0.000426							
			(0.447)							
Constant	1.042	1.254	-0.0619	2.996***	2.546***	3.647***	4.221***	3.657***	3.611***	3.607***
	(0.876)	(1.061)	(-0.0600)	(2.947)	(2.676)	(4.251)	(3.894)	(4.013)	(4.152)	(4.415)
Observations	476	476	384	522	584	598	440	501	612	591
R-squared	0.300	0.298	0.260	0.290	0.352	0.295	0.349	0.325	0.309	0.263
No. of countries	109	109	106	107	127	128	99	112	131	115
FDI part. Corr (linear term)	0.17	0.13	0.11	0.16	0.19	0.14	0.11	0.15	0.14	0.15
Sample *excludes*	Developed	Developed	Developed	Europe	Middle East	S.East Asia	Africa	LAC	East Asia	CEEC

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Time period: 1970-1999. Five-year averaged panel.

Table 4. MRA-Informed Econometric Analysis – Pooled OLS

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Growth of Real GDP Per Capita						
FDI	0.475**	0.437**	0.487***	0.387***	0.387***	0.382**	0.758***
	(2.452)	(2.317)	(2.951)	(2.649)	(3.846)	(2.971)	(4.740)
Fin. Dev.	0.0361***	0.0260*	0.0236**	0.0166	0.0166**	0.0212**	0.0181***
	(2.704)	(1.922)	(2.149)	(1.484)	(2.334)	(2.417)	(3.551)
Fin. Dev. Sq.	-0.0003***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(-3.388)	(-2.625)	(-3.880)	(-3.037)	(-3.782)	(-3.849)	(-7.856)
FDI*Fin. Dev.	0.00159	0.00399	-0.00152	-0.000138	-0.000138	-0.000504	-0.00135*
	(0.484)	(1.112)	(-0.872)	(-0.0801)	(-0.0667)	(-0.219)	(-1.785)
FDI*Fin. Dev. Sq.	-3.07e-05	-3.99e-05**	7.21e-06	2.02e-06	2.02e-06	5.00e-06	9.72e-06***
	(-1.624)	(-1.985)	(0.842)	(0.238)	(0.251)	(0.543)	(3.765)
Trade Open.	0.00170	0.00301	0.00180	-0.00135	-0.00135	-0.00746	-0.0170*
	(0.126)	(0.219)	(0.220)	(-0.168)	(-0.127)	(-0.707)	(-1.724)
Trade Open. Sq.	3.76e-05	2.38e-05	3.35e-05	3.10e-05	3.10e-05	6.07e-05*	0.000169**
	(0.601)	(0.380)	(1.030)	(1.023)	(0.805)	(1.850)	(2.895)
FDI*Trade Op.	-0.00225	-0.00327	-0.00252*	-0.00250**	-0.00250**	-0.00218**	-0.00921***
	(-0.916)	(-1.363)	(-1.830)	(-2.056)	(-3.015)	(-2.341)	(-5.191)
FDI*Trade Op. Sq.	9.80e-07	3.86e-06	1.70e-06	2.53e-06	2.53e-06	7.88e-07	2.82e-05***
	(0.121)	(0.482)	(0.555)	(0.939)	(0.952)	(0.313)	(4.455)
Gov't Size	-0.0600**	-0.0860***	-0.0287	-0.0425	-0.0425	-0.0394	-0.0600**
	(-2.138)	(-2.815)	(-0.885)	(-1.240)	(-1.652)	(-1.496)	(-2.467)
Inflation	-0.00187***	-0.00182***	-0.00215***	-0.00209***	-0.00209**	-0.00213**	-0.00107***
	(-6.300)	(-5.641)	(-4.828)	(-4.296)	(-2.666)	(-2.720)	(-3.793)
Sec. Schooling	0.00206	0.00380	0.00251	0.00726	0.00726	0.00839	0.0149
	(0.117)	(0.195)	(0.205)	(0.571)	(0.674)	(0.870)	(1.399)
Log In. Income		-0.216		-0.318**	-0.318*	-0.347*	-0.279*
		(-1.068)		(-2.181)	(-2.245)	(-2.012)	(-1.965)
Inv.		0.108***		0.137***	0.137***	0.145***	0.124***
		(4.126)		(5.419)	(8.563)	(11.69)	(9.032)
Constant	2.321**	2.988*	3.479***	2.881**	2.881	4.351**	4.408**
	(2.297)	(1.816)	(4.577)	(2.253)	(1.778)	(2.566)	(2.954)
Sample	1970-1999	1970-1999	1970-2009	1970-2009	1970-2009	1970-2009	1970-2009
Clustered S.E.	No	No	No	No	Yes	Yes	Yes
FDI disinvestments	Included	Included	Included	Included	Included	Removed	Removed
Outliers	Included	Included	Included	Included	Included	Included	Removed
Observations	630	599	907	871	871	836	790
No. of Countries	136						137
R-squared	0.327	0.375	0.256	0.312	0.312	0.323	0.315

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Five-year averaged panel. Period- and 10 different regional effects controlled throughout the regressions. Standard errors clustered at regional level where indicated. FDI disinvestments refer to negative FDI figures. Outliers refer to trade share in GDP greater than 200%.

Table 5. Dynamic Panel Data Analysis – System GMM Estimation – 1970-2009

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent Variable: Level of Real GDP Per Capita									
Lagged Dep. Var.	0.958***	0.440***	0.978***	0.957***	0.949***	0.947***	0.971***	0.955***	0.947***	1.008***
	(38.96)	(3.888)	(52.45)	(31.88)	(36.25)	(38.18)	(38.02)	(37.29)	(41.29)	(52.65)
FDI	0.0612***	0.0611***	0.0541**	0.0556**	0.0565***	0.0663***	0.0735***	0.0597***	0.0718***	0.0642***
	(3.853)	(3.782)	(2.264)	(2.520)	(3.155)	(4.006)	(3.444)	(4.501)	(5.586)	(4.120)
Fin. Dev.	0.00448***	0.00688***	0.00261*	0.00335***	0.00402***	0.00477***	0.00593***	0.00495***	0.00537***	0.00327***
	(3.628)	(2.702)	(1.729)	(3.046)	(3.109)	(3.522)	(3.207)	(3.868)	(3.824)	(2.851)
Fin. Dev._Sq.	-0.00002***	-0.00003***	-0.00001	-0.00002***	-0.00002***	-0.00002***	-0.00003***	-0.00002***	-0.00003***	-0.00002***
	(-3.988)	(-2.794)	(-1.098)	(-3.127)	(-3.631)	(-3.831)	(-3.385)	(-4.198)	(-3.670)	(-3.296)
FDI*Fin. Dev.	-0.000135	-8.45e-06	-2.02e-05	-7.04e-05	2.20e-05	-0.000143	-0.0008**	-0.000158	-0.000154	-0.000210
	(-0.929)	(-0.0345)	(-0.145)	(-0.488)	(0.151)	(-0.966)	(-2.397)	(-1.193)	(-1.046)	(-1.602)
FDI*Fin. Dev. Sq.	6.98e-07	6.47e-07	2.68e-07	2.75e-07	-4.62e-08	6.46e-07	3.56e-06*	7.79e-07	9.44e-07	9.30e-07
	(1.046)	(0.599)	(0.292)	(0.427)	(-0.0712)	(0.968)	(1.846)	(1.254)	(1.265)	(1.523)
Trade Open.	-0.00387*	0.00275	-0.00152	-0.00262	-0.00502**	-0.00426**	-0.00314	-0.00445*	-0.00247	-0.000238
	(-1.889)	(0.891)	(-0.761)	(-1.149)	(-2.327)	(-1.983)	(-1.504)	(-1.936)	(-1.129)	(-0.135)
Trade Open. Sq.	1.78e-05*	-4.98e-06	9.52e-06	1.31e-05	2.30e-05**	2.22e-05**	1.57e-05*	1.83e-05*	1.08e-05	2.03e-06
	(1.930)	(-0.410)	(0.961)	(1.221)	(2.314)	(2.264)	(1.652)	(1.796)	(1.118)	(0.259)
FDI*Trade Op.	-0.0007***	-0.0008***	-0.0006	-0.0006*	-0.0007***	-0.0008***	-0.0004*	-0.0006***	-0.0009***	-0.0007***
	(-3.755)	(-4.386)	(-1.476)	(-1.659)	(-3.108)	(-4.272)	(-1.811)	(-3.524)	(-5.527)	(-4.048)
FDI*Trade Op. Sq.	2.4e-06***	2.5e-06***	1.81e-06	1.75e-06	2.08e-06**	2.78e-06***	1.22e-06	1.9e-06***	2.9e-06***	2.4e-06***
	(3.229)	(3.032)	(0.903)	(0.960)	(2.443)	(3.930)	(1.533)	(2.876)	(4.620)	(3.599)
Gov't Size	-0.00186	-0.000801	-0.00543	-0.00373	-0.000658	-0.00358	-0.00537	-0.00194	-0.000893	-0.00197
	(-0.527)	(-0.162)	(-1.525)	(-1.085)	(-0.184)	(-0.892)	(-1.078)	(-0.591)	(-0.250)	(-0.860)
Inflation	-0.000165	0.000121	-0.000126	-0.000111	-0.000151	-0.000167	-0.000202	-0.000203	-0.000174	-1.39e-05
	(-1.345)	(1.362)	(-1.531)	(-1.143)	(-1.321)	(-1.386)	(-1.311)	(-1.104)	(-1.370)	(-0.186)
Sec. Schooling	0.00303**	0.0166***	0.000803	0.00263**	0.00356***	0.00378***	9.63e-05	0.00340**	0.00309**	-0.000220
	(2.436)	(3.255)	(0.757)	(2.019)	(2.666)	(2.999)	(0.101)	(2.501)	(2.407)	(-0.174)
Inv.	0.00914***	0.00492	0.0108***	0.0101***	0.00924***	0.00910***	0.0104**	0.00995***	0.00958***	0.00841***
	(3.337)	(1.281)	(3.229)	(3.526)	(3.153)	(3.115)	(2.568)	(3.397)	(2.739)	(3.341)
Observations	736	616	556	609	691	699	521	593	713	670
No. of countries	137	135	110	118	126	129	99	114	133	116
Hansen's J	0.259	0.116	0.149	0.197	0.172	0.232	0.176	0.341	0.149	0.236
AR(3)	0.437	0.361	0.136	0.155	0.698	0.385	0.525	0.208	0.653	0.178
No of instruments	90	89	104	90	90	90	90	90	90	90
Avg. # of obs. for each country	5.372	4.563	5.055	5.161	5.484	5.419	5.263	5.202	5.361	5.776
Level + Difference Equation	Yes	Only diff. eq.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample *Excludes*	-	-	Developed	Europe	Middle East	Southeast Asia	Africa	LAC	East Asia	CEEC

Robust z-statistics in parentheses. Standard errors clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1. All regressions include period dummies. Five-year averaged panel over 1970-2009. Because we use lag limits three to six, the relevant autocorrelation test is AR(3).

Figure 2: The Effect of FDI on Economic Growth Contingent on Financial Development

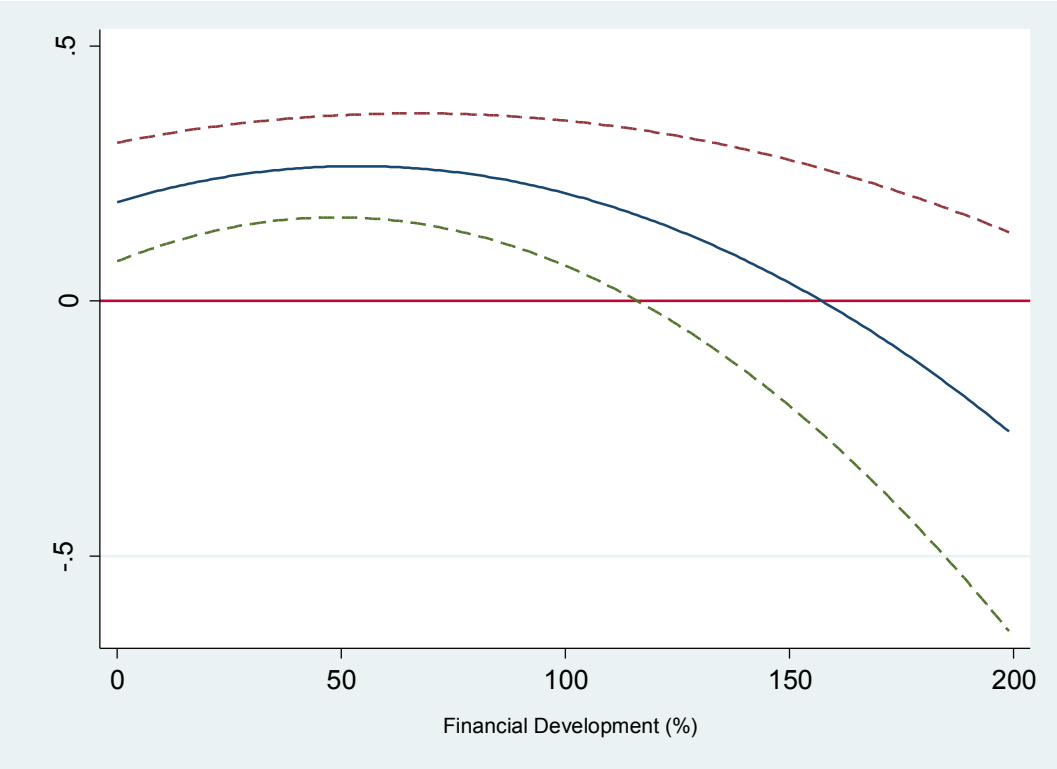
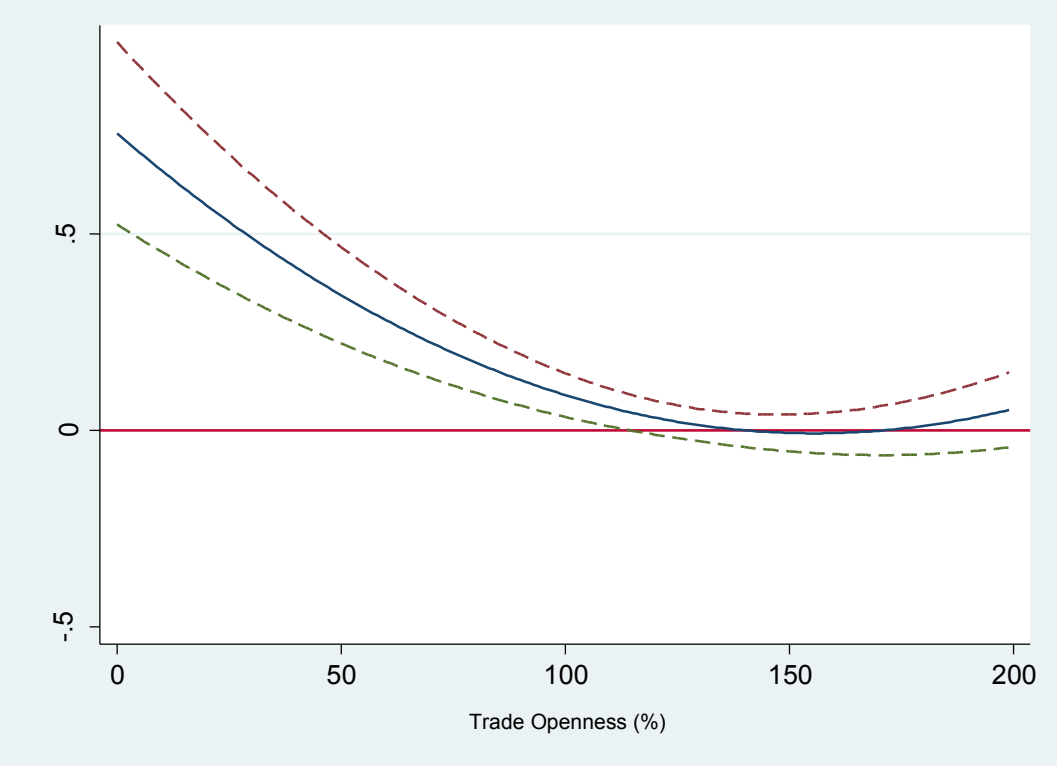


Figure 3: The Effect of FDI on Economic Growth Contingent on Trade Openness



APPENDIX A: STUDIES INCLUDED IN THE META-REGRESSION ANALYSIS NOT FOR PUBLICATION

Ahmad, E. and A. Hamdani (2003) The role of foreign direct investment in economic growth, *Pakistan Economic and Social Review*, XLI(1&2), 29–43.

Ahn, S. and J-W.Lee (2007) Integration and growth in East Asia, *Monetary and Economic Studies*, December (Special Edition), 131–154.

Akinlo, A.E. (2003) Foreign direct investment and economic growth in Sub-Saharan Africa, *RivistaInternazionaldiScienzeeconomiche e Commerciali (RISEC)*, 50(4), 569–580.

Akinlo, A.E. (2004) Foreign direct investment and growth in Nigeria: An empirical investigation, *Journal of Policy Modeling*, 26, 627–639.

Alam, Md. S. (2000) Foreign direct investment and economic growth of India and Bangladesh: A comparative study, *The Indian Journal of Economics*, LXXX (1), No. 316, 1–15.

Alfaro, L., A. Chanda, S. Kalemli-Ozcan and S. Sayek (2004) FDI and economic growth: The role of local financial markets, *Journal of International Economics,* 64(1), 89–112.

Asafu-Adjaye, J. (2000) The effects of foreign direct investment on Indonesian economic growth, 1970-1996, *Economics Analysis and Policy*, 30(1), 49–62.

Asheghian, P. (2004) Determinants of economic growth in the United States: The role of foreign direct investment, *The International Trade Journal*, 18(1), 63–83.

Baharumshah, A.Z. and M. A-M.Thanoon (2006) Foreign capital flows and economic growth in East Asian countries, *China Economic Review*, 17, 70–83.

Balasubramanyam, V.N., M. Salisu and D. Sapford (1996) Foreign direct investment and growth in EP and IS countries, *The Economic Journal*, 106(434), 92–105.

Balasubramanyam, V.N., M. Salisu and D. Sapford (1999) Foreign direct investment as an engine of growth, *The Journal of International Trade and Economic Development*, 8(1), 27–40.

Basu P. and A. Guariglia (2007) Foreign direct investment, inequality, and growth, *Journal of Macroeconomics*, 29, 824–839.

Bende-Nabende, A. and J. Ford (1998) FDI, policy adjustment and endogenous growth: Multiplier effects from a small dynamic model for Taiwan 1959-1995, *World Development*, 26(7), 1315–1330.

Bende-Nabende, A., J. Ford and J. Slater (2001) FDI, regional economic integration and endogenous growth: some evidence from South-East Asia, *Pacific Economic Review*, 6(3), 383–399.

Bengoa M. and B. Sanchez-Robles (2003) Foreign direct investment, economic freedom and growth: New evidence from Latin America, *European Journal of Political Economy*, 19(3), 529–545.

Bengoa M. and B. Sanchez-Robles (2005) Policy shocks as a source of endogenous growth, *Journal of Policy Modeling*, 27, 249–261.

Berthélemy, J-C. and S. Démurger (2000) Foreign direct investment and economic growth: Theory and application to China, *Review of Development Economics*, 4(2), 140–155.

Bhandari, R., G. Pradhan, D. Dhakal and K. Upadhyaya (2007) Foreign aid, FDI and economic growth in East European countries, *Economics Bulletin*, 6(13), 1–9.

Borensztein E., J. De Gregorio and J-W. Lee (1998) How does foreign direct investment affect economic growth? *Journal of International Economics*, 45, 115–135.

Bornschier, V. (1980) Multinational corporations and economic growth: A cross-national test of the decapitalization thesis, *Journal of Development Economics,* 7, 191–210.

Bornschier, V., C. Chase-Dunn and R. Rubinson (1978) Cross-national evidence of the effects of foreign investment and aid on economic growth and inequality: A survey of findings and reanalysis, *The American Journal of Sociology*, 84(3), 651–683.

Bowen, J. (1995) Foreign aid and economic growth: An empirical analysis, *Geographical Analysis,* 27(3), 249–261.

Buckley, P.J., J. Clegg, C. Wang and A.R. Cross (2002) FDI, regional differences and economic growth: panel data evidence from China, *Transnational Corporations,* 11(1), 1–28.

Burke, P.J. and F.Z. Ahmadi-Esfahani (2006) Aid and growth: A study of South-East Asia, *Journal of Asian Economics*, 17, 350–362.

Campos, N.F. and Y. Kinoshita (2002) Foreign Direct Investment as technology transferred: Some panel evidence from the transition economies, *The Manchester School*, 70(3), 398–419.

Chakraborty, C. and P. Basu (2002) Foreign direct investment and growth in India: A co-integration approach, *Applied Economics*, 34, 1061–1073.

Chen, C., L. Chang and Y. Zhang (1995) The role of foreign direct investment in China's post-1978 economic development, *World Development,* 23(4), 691–703.
Chen, C-H. and H-L. Wu (2005) Determinants of regional growth disparity in China's transitional economy, *Journal of Economic Studies*, 32(5), 406–419.
Chen, J. and B.M. Fleisher (1996) Regional income inequality and economic growth in China, *Journal of Comparative Economics*, 22, 141–164.
Chen, Z., M. Lu, and J. Yan (2006) Reform, interaction of policies, and economic growth: Evidence from provincial panel data, *Frontier of Economics in China*, 1, 48–68.
Choe, J.I. (2003) Do foreign direct investment and gross domestic investment promote economic growth? *Review of Development Economics,* 7(1), 44–57.
Choong, C-K., Z. Yusop and S-C. Soo (2005) Foreign direct investment and economic growth in Malaysia: The role of the domestic financial sector, *The Singapore Economic Review*, 50(2), 245–268.
Chou, W.L. and K-Y. Wong (2001) Economic growth and international trade: The case of Hong Kong, *Pacific Economic Review*, 6(3), 313–329.
Collins, S.M. (2004) International financial integration and growth in developing countries: Issues and implications for Africa, *Journal of African Economies*, 13(2), ii55-ii94.
De Gregorio, J. (1992) Economic growth in Latin America, *Journal of Development Economics*, 39, 59–84.
de Mello, L.R.(1999) Foreign direct investment-led growth: Evidence from time series and panel data, *Oxford Economic Papers*, 51, 133–151.
deSoysa, I.D. and J.R. Oneal (1999) Boon or bane? Reassessing the productivity of foreign direct investment, *American Sociological Review*, 64(5), 766–782.
de Vita, G. and K.S. Kyaw (2007) Growth effects of FDI and portfolio investment flows to developing countries: A disaggregated analysis by income levels, *Applied Economics Letters*, 1–7.
Dhakal, D., S. Rahman, and K.P. Upadhyaya (2007) Foreign direct investment and economic growth in Asia, *Indian Journal of Economics and Business*, 6(1), 15–26.
Dixon, W.J. and T. Boswell (1996) Dependency, disarticulation, and denominator effects: Another look at foreign capital penetration, *The American Journal of Sociology*, 102(2), 543–562.
Dowling, J.M. and U. Hiemenz (1983) Aid, savings, and growth in the Asian region, *The Journal of Institute of Developing Economies,* 21(1), 3–13.
Durham, J.B. (2004) Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth, *European Economic Review*, 48(2), 285–306.
Dutt, A.K. (1997) The pattern of direct foreign investment and economic growth, *World Development,* 25(11), 1925–1936.
Fedderke, J.W. and A.T. Romm (2006) Growth impact and determinants of foreign direct investment into South Africa 1956-2003, *Economic Modelling*, 23, 738–760.
Firebaugh, G. (1992) Growth effects of foreign and domestic investment, *The American Journal of Sociology*, 98(1), 105–130.
Firebaugh, G. (1996) Does foreign capital harm poor nations? New estimates based on Dixon and Boswell's measures of capital penetration, *The American Journal of Sociology*, 102(2), 563–575.
Gao, T. (2002) The impact of foreign trade and investment reform on industry location: The case of China, *Journal of International Trade and Economic Development*, 11(4), 367–386.
Ghatak, A. and F. Halicioglu (2007) Foreign direct investment and economic growth: some evidence from across the world, *Global Business and Economic Review*, 9(4), 381–394.
Ghosh, B.N. (2003) Capital inflow, growth sustainability and financial debacles, *Managerial Finance*, 29(2/3), 73–97.
Greenaway, D., D. Sapsford, and S. Pfaffenzeller (2007) Foreign direct investment, economic performance and trade liberalisation, *The World Economy*, 30(2), 197–210.
Gupta, K.L. (1975) Foreign capital inflows, dependency burden and saving rates in developing countries: A simultaneous equation model, *Kyklos,* 28(2), 358–374.
Gyimah-Brempong, K. (1992) Aid and economic growth in LDCs: Evidence from Sub-Saharan Africa, *Review of Black Political Economy,* 20(3), 31–52.
Hansen, H. and F. Tarp (2001) Aid and growth regressions, *Journal of Development Economics*, 64, 547–570.
Hansen, H. and J. Rand (2006) On the causal links between FDI and growth in developing countries, *The World Economy*, 29(1), 21–41.
Haveman, J.D., V. Lei and J.S. Netz (2001) International integration and growth: A survey and empirical investigation, *Review of Development Economics*, 5(2), 289–311.
Hein, S. (1992) Trade strategy and the dependency hypothesis: A comparative of policy, foreign investment, and economic growth in Latin America and East Asia, *Economic Development and Cultural Change*, 40(3), 495–521.

Hermes, N. and R. Lensink (2003) Foreign direct investment, financial development and economic growth, *The Journal of Development Studies,* 40(1), 142–163.
Hsiao, C. and Y. Shen (2003) Foreign direct investment and economic growth: The importance of institutions and urbanization, *Economic Development and Cultural Change*, 883–896.
Jackman, R.W. (1982) Dependence on foreign investment and economic growth in the Third world, *World Politics*, 34(2), 175–196.
Jalilian, H. and J. Weiss (2002) Foreign direct investment and poverty in ASEAN region, *ASEAN Economic Bulletin*, 19(3), 231–252.
Kentor, J. (1998) The long-term effects of foreign investment dependence on economic growth, 1940-1990, *The American Journal of Sociology*, 103(4), 1024–1046.
Kentor, J. and T. Boswell (2003) Foreign capital dependence and development: A new direction, *American Sociological Review*, 68(2), 301–313.
Khawar, M. (2005) Foreign direct investment and economic growth: A cross-country analysis, *Global Economy Journal*, 5(1), 1–11.
Kohpaiboon, A. (2003) Foreign trade regimes and the FDI–Growth nexus: A case study of Thailand, *The Journal of Development Studies,* 40(2), 55–69.
Kosack, S. and J. Tobin (2006) Funding self-sustaining development: The role of aid, FDI and government in economic success, *International Organization*, 60, 205–243.
Kottaridi, C. (2005) The 'core-periphery' pattern of FDI-led growth and production structure in the EU, *Applied Economics*, 37, 99–113.
Laureti, L. and P. Postiglione (2005) The effects of capital inflows on the economic growth in the Med area, *Journal of Policy Modeling*, 27(7), 829–851.
Le, M.V. and T. Suruga (2005) Foreign direct investment, public expenditure and economic growth: the empirical evidence for the period 1970–2001, *Applied Economics Letters*, 12, 45–49.
Lensink, R. and O. Morrissey (2006) Foreign direct investment: Flows, volatility, and the impact on growth, *Review of International Economics*, 14(3), 478–493.
Li, K-W. and T. Liu (2001) Financial liberalisation and growth in China's economic reform, *The World Economy*, 24(5), 673–687.
Li, X., and X. Liu (2005) Foreign direct investment and economic growth: An increasingly endogenous relationship, *World Development*, 33(3), 393–407.
Lipsey, R.E. (2000) Inward FDI and economic growth in developing countries, *Transnational Corporations*, 9(1), 67–95.
Liu, X., P. Burridge and P.J.N. Sinclair (2002) Relationships between economic growth, foreign direct investment and trade: Evidence from China, *Applied Economics*, 34, 1433–1440.
Luo, C. (2007) FDI, domestic capital and economic growth: Evidence from panel data at China's provincial level, *Frontier of Economics in China*, 2(1), 92–113.
Mahdavi, S. (1990) The effects of foreign resource inflows on composition of aggregate expenditure in developing countries: A seemingly unrelated model, *Kyklos,* 43(1), 111–137.
Makki, S.S. and A. Somwaru (2004) Impact of foreign direct investment and trade on economic growth: Evidence from developing countries, *American Journal of Agricultural Economics,* 86(3), 795–801.
Mencinger, J. (2003) Does foreign direct investment always enhance economic growth? *Kyklos,* 56(4), 491–508.
Mosley, P., J. Hudson and S. Horrell (1987) Aid, the public sector and the market in less developed countries, *The Economic Journal*, 97, 616–641.
Mosley, P., J. Hudson and S. Horrell (1992) Aid, the public sector and the market in less developed countries: A return to the scene of the crime, *Journal of International Development,* 4(2), 139–150.
Most, S.J. and H. Van Den Berg (1996) Growth in Africa: Does the source of investment financing matter? *Applied Economics*, 28, 1427–1433.
Mullen, J.K. and M. Williams (2005) Foreign direct investment and regional economic performance, *Kyklos*, 58(2), 265–282.
Nair-Reichert, U. and D. Weinhold (2001) Causality tests for cross-country panels: A new look at FDI and economic growth in developing countries, *Oxford Bulletin of Economics and Statistics,* 63(2), 153–171.
Naudé, W.A. (2004) The effects of policy, institutions and geography on economic growth in Africa: An econometric study based on cross-section and panel data, *Journal of International Development*, 16, 821–849.
Obwona, M.B. (2001) Determinants of FDI and their impact in economic growth in Uganda, *African Development Review*, 13(1), 46–81.
Oliva, M.A. and L.A. Rivera-Batiz (2002) Political institutions, capital flows and developing country growth: An empirical investigation, *Review of Development Economics*, 6(2), 248–262.

Olofsdotter, K. (1998) Foreign direct investment, country capabilities and economic growth, *WeltwirtschaftlichesArchiv*, 134(3), 534–547.
Olomola, P.A. (2004) The FDI-growth hypothesis: A VAR model for Nigeria, *South African Journal of Economic and Management Sciences (SAJEMS)*, 7(1), 171–185.
Omran, M. and A. Bolbol (2003) Foreign direct investment, financial development and economic growth: Evidence from the Arab countries, *Review of Middle East Economics and Finance*, 1(3), 231–249.
Papanek, G.F. (1973) Aid, foreign private investment, savings, and growth in less developed countries, *The Journal of Political Economy,* 81(1), 120–130.
Ram, R. and K.H. Zhang (2002) Foreign direct investment and economic growth: Evidence from cross-country data for the 1990s, *Economic Development and Cultural Change*, 51(1), 205–215.
Rana, P.B. and J.M. Dowling (1988) The impact of foreign capital on growth: Evidences from Asian developing countries, *The Developing Economies*, 26(1), 3–11.
Reisen, H. and M. Soto (2001) Which types of capital inflows foster developing-country growth? *International Finance*, 4(1), 1–14.
Sadik, A.T. and A.A. Bolbol (2001) Capital flows, FDI, and technology spillovers: Evidence from Arab countries, *World Development,* 29(12), 2111–2125.
Sjöholm, F. (1999) Technology gap, competition and spillovers from direct foreign investment: Evidence from establishment data, *The Journal of Development Studies*, 36(1), 53–73.
Snyder, D.W. (1993) Donor bias towards small countries: An overlooked factor in the analysis of foreign aid and economic growth, *Applied Economics*, 25, 481-488.
Stoneman, C. (1975) Foreign capital and economic growth, *World Development*, 3(1), 11–26.
Sylwester, K. (2005) Foreign direct investment, growth and income inequality in less developed countries, *International Review of Applied Economics*, 19(3), 289–300.
Teboul, R. and E. Moustier (2001) Foreign aid and economic growth: The case of the countries south of the Mediterranean, *Applied Economics Letters,* 8, 187–190.
Tian, X., S. Lin and V.I. Lo (2004) Foreign direct investment and economic performance in transition economies: Evidence from China, *Post-Communist Economies*, 16(4), 497–510.
Trevino, L.J. and K.P. Upadhyaya (2003) Foreign aid, FDI and economic growth: Evidence from Asian countries, *Transnational Corporations,* 12(2), 119–135.
Tsai, P-L. (1994) Determinants of foreign direct investment and its impact on economic growth, *Journal of Economic Development*, 19(1), 137–163.
Wang, C., X. Liu and Y. Wei (2004) Impact of openness on growth in different country groups, *The World Economy*, 27(4), 567–585.
Yang, B. (2008) FDI and growth: A varying relationship across regions and over time, *Applied Economics Letters*, 15, 105–108.
Zhang, K.H. (1999) Foreign direct investment and economic growth: Evidence from ten East Asian economies, *EconomiaInternazionale*, 51(4), 517–535.
Zhang, K.H. (2001) How does foreign direct investment affect economic growth in China? *Economics of Transition*, 9(3), 679–693.
Zhang, K.H. (2006) Does international investment help poverty reduction in China? *The Chinese Economy*, 39(3), 79–90.
Zhang, Q. and B. Felmingham (2002) The role of FDI, exports and spillover effects in the regional development of China, *The Journal of Development Studies*, 38(4), 157–178.
Zhang, W. and Z. Zhu (2007) Empirical analysis on the effect of economic opening on China's economic growth, *Frontier of Economics in China*, 2(4), 623–643.
Zhao, C. and J. Du (2007) Causality between FDI and economic growth in China, *The Chinese Economy*, 40(6), 68–82.

APPENDIX B: Meta-regression moderator variable definitions

NOT FOR PUBLICATION

Variable Name	Variable Description	FDI-Growth	
		Mean	S.D.
Core-Method			
OLS	BD = 1: Ordinary Least Squares Method used – used as benchmark	0.762	0.426
2SLS	BD = 1: Two-Stage Least Squares Method used	0.073	0.261
3SLS	BD = 1: Three-Stage Least Squares Method used	0.037	0.188
GLS	BD = 1: Generalized Least Squares Method used	0.021	0.144
GMM	BD = 1: Generalized Methods of Moments Method used	0.058	0.236
SUR	BD = 1: Seemingly Unrelated Regression Method used	0.027	0.161
Sub-Method			
Causality	BD = 1: Granger Causality Tests used	0.059	0.236
ECM	BD = 1: Error Correction Model used	0.017	0.128
Fixed	BD = 1: Fixed Effects used	0.088	0.283
Random	BD = 1: Random Effects used	0.079	0.270
VAR	BD = 1: Vector Autoregression used	0.025	0.155
Data			
Cross-sectional	BD = 1: Cross-sectional Data used – used as benchmark	0.439	0.497
Panel	BD = 1: Panel Data used	0.514	0.886
Single	BD = 1: Single-country Time Series Data used	0.143	0.350
Length of average	Number of years data is averaged	7.25	7.95
Estimation			
Single	BD = 1: Single Estimation used – used as benchmark	0.874	0.332
System	BD = 1: System Estimation used	0.131	0.338
Non-Instrumental	BD = 1: Non-instrumental Estimation used – used as benchmark	0.795	0.404
Instrumental	BD = 1: Instrumental Variable Estimation used	0.197	0.398
Individual	BD = 1: Individual Effect used	0.141	0.349
Time effects			
1940s	BD = 1: Time effect during 1941–1950 included – used as benchmark	0.051	0.218
1950s	BD = 1: Time effect during 1951–1960 included	0.127	0.333
1960s	BD = 1: Time effect during 1961–1970 included	0.532	0.499
1970s	BD = 1: Time effect during 1971–1980 included	0.714	0.452
1980s	BD = 1: Time effect during 1981–1990 included	0.751	0.433
1990s	BD = 1: Time effect during 1991–2000 included	0.584	0.493
2000s	BD = 1: Time effect during 2001–2005 included	0.115	0.319
Area effects			
North America	BD = 1: Countries in North America region included in samples – used as benchmark	0.169	0.368
Africa	BD = 1: Countries in African region included in samples	0.543	0.500
Australasia	BD = 1: Countries in Australasia region included in samples	0.266	0.433
East Asia	BD = 1: Countries in East Asia region included in samples	0.550	0.500
CEECs	BD = 1: Central and Eastern Europe Countries included in samples	0.245	0.422
Latin America	BD = 1: Countries in Latin America region included in samples	0.543	0.500
Middle East	BD = 1: Countries in Middle East region included in samples	0.404	0.487
South-East Asia	BD = 1:Countries in South-East Asia region included in samples	0.464	0.497

Appendix B continues on next page

Appendix B: continued			
Variable Name	**Variable Description**	**FDI-Growth**	
		Mean	**S.D.**
South Asia	BD = 1: Countries in South Asia region included in samples	0.449	0.495
Western Europe	BD = 1: Countries in West Europe region included in samples	0.264	0.435
Developing	BD = 1: Developing Countries region included in samples	0.966	0.180
Measures of FDI			
FDI/GDP	BD = 1: Ratio of FDI to GDP used – used as benchmark	0.746	0.436
Gross FDI	BD = 1: Ratio of Gross FDI to GDP used	0.070	0.256
Growth FDI	BD = 1: Growth rate of FDI used	0.120	0.325
Lagged FDI	BD = 1: Lagged FDI used	0.107	0.309
Net FDI	BD = 1: Net FDI used	0.011	0.105
Growth	BD = 1: Growth rate of output used – used as benchmark	0.364	0.481
Growth per capita	BD = 1: Growth rate of output per capita used	0.599	0.490
Explanatory variables			
Convergence	BD = 1: Log initial GDP per capita or GDP included	0.546	0.498
Ratio of government consumption to GDP	BD = 1: Ratio of government consumption to GDP included	0.202	0.401
Ratio of investment to GDP	BD = 1: Ratio of investment to GDP included	0.712	0.453
Labor input	BD = 1: Labor input included	0.409	0.492
Ratio of trade to GDP	BD = 1: Ratio of trade to GDP included	0.423	0.494
Financial market	BD = 1: Financial market included	0.097	0.296
Inflation rate	BD = 1: Inflation rate included	0.124	0.329
Economic freedom	BD = 1: Index of economic freedom included	0.112	0.316
Democracy	BD = 1: Democracy included	0.041	0.199
Political instability	BD = 1: Political instability included	0.048	0.213
Foreign aid	BD = 1: Foreign aid included	0.136	0.343
FDI x Financial market	BD = 1: Intersection between FDI and financial market included	0.065	0.246
FDI x Ave Schooling	BD = 1: Interaction between FDI and average years of schooling included	0.017	0.128
FDI x Secondary	BD = 1: Interaction between FDI and secondary enrolment included	0.049	0.216
FDI x Trade	BD = 1: Interaction between FDI and trade included	0.017	0.128
Average years of schooling	BD = 1: Average years of schooling included	0.071	0.257
Literacy rate	BD = 1: Literacy rate included	0.056	0.229
Primary enrolment	BD = 1: Primary enrolment included	0.030	0.171
Secondary enrolment	BD = 1: Secondary enrolment included	0.202	0.401
Research and postgraduate	BD = 1 : Research and Postgraduate enrolment included	0.043	0.204
Other Variables			
Sample size	The number of observations used in the sample	170.5	325.5
Double log	BD = 1: If double log specification is adopted	0.373	0.288

BD means binary dummy, with a value of 1 if condition is fulfilled, and zero otherwise.

APPENDIX C: Data description and sources

NOT FOR PUBLICATION

Variable name	Variable Description	Source
Growth	Growth in real GDP per capita (%)	World Bank (2011)
FDI	Net FDI inflows as a percentage of host country GDP	World Bank (2011)
Log initial income	Log level of GDP per capita (constant US$)	World Bank (2011)
Investment	Gross domestic investment as a percentage of GDP	World Bank (2011)
Secondary schooling	Secondary school enrolment rate (Net)	World Bank (2011)
Inflation	Annual growth rate of the GDP deflator	World Bank (2011)
Government expenditure	General government final consumption expenditure as a percentage to GDP. It includes all government current expenditures for purchases of goods and services (including compensation of employees) as well as most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation.	World Bank (2011)
Trade openness	Trade is the sum of exports and imports of goods and services measured as a percentage of GDP.	World Bank (2011)
Financial development	Domestic credit to the private sector as a percentage to GDP. Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of no equity securities, and trade credits and other accounts receivable, which establish a claim for repayment. For some countries these claims include credit to public enterprises.	World Bank (2011)
FDI x Trade openness	The interaction between FDI inflows to GDP and Trade openness	World Bank (2011)
FDI x Financial development	The interaction between FDI inflows to GDP and Financial development	World Bank (2011)