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The growth effects of greenfield investment and mergers and acquisitions in developing countries

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An FDI is an FDI is an FDI?
The growth effects of greenfield investment and mergers and acquisitions in developing countries[★]

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Abstract: We explore the effect of foreign direct investment on economic growth in developing countries, distinguishing between mergers and acquisitions ("M&As") and "greenfield" investment. A simple model captures the key difference between the two types of FDI: unlike greenfield investment, M&As partly represent a rent accruing to previous owners, and do not necessarily contribute to expanding the host country's capital stock. The model suggests that greenfield FDI has a stronger impact on growth than M&A sales. This hypothesis is supported by our empirical results, which show that greenfield FDI enhances growth, while M&As have no effect, at best.

Keywords: Growth, foreign direct investment, mergers and acquisitions, greenfield investment.
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1. Introduction

Foreign direct investments (FDI) are usually considered a desirable form of capital inflows. First, they are believed to directly add to the host countries' capital stock and to substantially contribute to the transfer of managerial and technological expertise (Kose et al., 2010). Second, they are presumed to be more stable and less prone to reversals than other forms of capital flows (Levchenko and Mauro 2007, Tong and Wei 2009). For these reasons, FDI is often viewed as the financial equivalent of "good cholesterol" (Hausmann and Fernández-Arias, 2001) or the "poster child for the benefits of financial globalization" (Kose et al., 2006, p.27).

Given the overall enthusiasm about FDI, it is not surprising that numerous studies have tried to identify the empirical effect of foreign direct investment on growth (see, e.g., Borensztein et al. ,1998, Alfaro et al. ,2004, 2010, Carkovic and Levine , 2005, Bloningen and Wang, 2005, Lensink and Morissey, 2006, Aizenman et al., 2011). However, to date no consensus has emerged on whether the expected positive influence can actually be found in the data. In their metastudy, Doucouliagos et al. (2010) count that only 43% of the regressions they survey report a significantly positive coefficient, while 17% are significantly negative and 40% insignificant. These diverse results may reflect the heterogeneity of studies in terms of methodologies, samples and specifications. What is often overlooked, though, is that not only empirical work on FDI is heterogeneous. FDI itself is.

The official benchmark definition of foreign direct investment specifies that a financial-account transaction is counted as FDI if a company's stake in a subsidiary exceeds ten percent (OECD, 2008a). However, this definition pools together two very different forms of foreign investment: *greenfield investment*, whereby foreign investors build a new productive unit from scratch, and *mergers and acquisitions* (M&As), whereby foreign investors acquire existing assets. While the former implies an accumulation of capital, the latter is essentially a transfer of ownership. These two forms of foreign investment are fundamentally different, and there is no reason to *a priori* believe that their effects on host countries' capital stock, productivity, and growth are the same. This, however, is the restriction that standard regressions impose when they relate growth to total FDI inflows, and it is the gap we are trying to fill with this paper.

Distinguishing between greenfield investment and M&A sales is particularly important for developing countries: in these countries, the average reliance on FDI flows has increased remarkably over the past decades. During the same period, the relative importance

of the two entry modes has varied substantially across countries.[1] Accounting for the *composition* of FDI flows may therefore improve our understanding of the relationship between financial liberalization and a country's growth performance. This, in turn, may offer guidance on whether public policies should target a particular form of FDI or encourage all forms of direct investment.

To our knowledge, the distinction between greenfield FDI and M&As has so far only been addressed by Calderón et al. (2004). However, their study focuses on the short-run interaction between the two types of FDI and output, whereas we want to explore whether those types differ in their effect on *long-run* growth. To achieve this goal, we start in Section 2 by presenting a simple model that supports the conjecture that greenfield FDI and M&A sales have different effects on economic growth: while in both cases the entry of foreign firms raises aggregate productivity, greenfield FDI expands the host country's capital stock, whereas M&A sales partly represent a rent that accrues to the firms' previous owners and does not result in additional investment. We thus conclude that a dollar of greenfield FDI has a stronger impact on the growth of output than a dollar of M&A-type FDI. After a first look at the data in Section 3, we describe our empirical strategy in Section 4. Section 5 reports a series of growth regressions using a panel data set that comprises a large number of developing countries and emerging markets. Our empirical results show that greenfield FDI has a significantly positive effect on economic growth, while M&A sales do not. As we demonstrate, this finding is robust across various definitions of greenfield FDI and across various subsamples. Moreover, it is neither driven by reverse causality nor by unobserved heterogeneity. Section 6 summarizes and concludes.

2. A Model of Greenfield Investment, M&As and Growth

In this subsection, we develop a simple model to analyze whether the impact of a given volume of FDI on economic growth depends on the *nature* of this FDI. While the mechanism we stress is not the only one that may give rise to a differential impact of greenfield investment and M&As, we believe that it highlights an important difference between the two types of FDI, and thus provides a useful motivation for the subsequent empirical analysis.

The economy we consider consists of n symmetric sectors. Every sector allows for a continuum of firms indexed on the unit interval, each of which produces a differentiated good

[1] In section 3, we will present data both on the overall evolution and on the composition of FDI inflows.

whose price is normalized to one. Whether a firm actually starts producing depends on its profitability. Firms are monopolists, and a firm's output at time *t*, y_t, is proportional to its profits, i.e. $y_t = \gamma \pi_t$ with $\gamma > 1$. Profits, in turn, are proportional to productivity, i.e. $\pi_t = \theta A$. In the spirit of the seminal contribution by Melitz (2003), the firm-specific productivity parameter A varies across firms. For simplicity, we assume that it is constant over time, and uniformly distributed on the unit-interval. The parameter θ , by contrast, depends on firm ownership: we assume that $\theta = 1$ if the firm is owned by domestic residents, and $\theta = \theta^F > 1$ if it is owned by foreigners.[2] Setting up a new firm is associated with a one-time fixed sunk cost κ which is identical across sectors.

In what follows, we will first consider the set of firms and sectoral output in *financial autarky*, i.e. before foreign investors are allowed to enter the domestic economy. We will then allow for FDI inflows into all sectors, distinguishing between two "regimes": In the "greenfield FDI regime", foreign investors are free to set up new firms, while the existing domestic firms keep being run by their domestic owners. In the "M&A regime", by contrast, all existing domestic firms in a sector are sold to foreign investors. We allow for the possibility that FDI into different sectors follows different regimes, but we assume that all FDI in a given sector follows the same regime. Our goal is to explore whether the impact of a given volume of FDI on sectoral output growth depends on the nature of this FDI, i.e. the choice of regime, and how the different types of FDI affect the growth of the entire economy.

To determine the number of firms that are active in **financial autarky**, we observe that there is a critical productivity level $\hat{A}$, which has to be exceeded to give a domestic investor an incentive to start a new firm. This threshold value is determined by the fact that the present value of future operating profits must equal the fixed cost of setting up the firm. It is implicitly defined by the following equation:

[2] The idea that foreign firms have a productivity advantage has been central to the theory of multinational firms since the early contributions on this topic, such as Caves (1974) and Hymer (1976). While the evidence on the relationship between foreign ownership and productivity is mixed for industrialized countries (Griffith, 1999, Griffith et al., 2004, Benfratello and Sembenelli, 2006), there is strong evidence that multinational firms in developing countries are characterized by a higher productivity (Aitken and Harrison, 1999, Arnold and Javorcik, 2009, Harrison and Rodríguez-Clare, 2010) and that they pay higher wages (Velde and Morrissey, 2003, Lipsey and Sjöholm, 2004, OECD, 2008b).

$$\sum_{t=1}^{\infty}\left(\frac{1}{1+r}\right)^{t}\pi\left(\hat{A}\right)=\kappa^{H} \tag{1}$$

In (1), the LHS represents the value of the firm, given by the stream of future profits, which are discounted at a constant interest rate *r*. The RHS reflects the fixed costs incurred by domestic investors. The superscript *H* indicates that these costs may be different for domestic and foreign investors. Using the fact that $\pi = A$, it is easy to show that the threshold value $\hat{A}$ is characterized by:

$$\hat{A}=r\,\kappa^{H} \tag{2}$$

Hence, only firms with $A \geq \hat{A}$ are operating under financial autarky. We assume that $\hat{A}<1$, i.e. there are *some* domestic firms operating in the initial situation. Note that the threshold value $\hat{A}$ remains constant as long as κ^{H} and *r* do not change, which we assume. The sectoral output under financial autarky at any point in time *t* is given by the following expression:

$$Y_t=\int_{\hat{A}}^{1}\gamma\,A\,dA \tag{3}$$

where the lower boundary $\hat{A}$ is given by (2).

At the end of period *t*, the sector is opened up to FDI inflows from abroad. In the "**greenfield FDI regime**", foreign investors are allowed to set up new firms, while existing firms keep operating.[3] To determine the volume of sectoral FDI in that regime, we observe that there is a critical productivity level $\tilde{A}$, which a potential firm has to exceed to attract a foreign investor. Allowing for the possibility that the sunk costs for foreign investors (κ^{F}) differ from κ^{H}, we can write

$$\sum_{s=t+1}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}\pi\left(\tilde{A}\right)=\kappa^{F} \tag{4}$$

[3] For simplicity, we abstract from the possibility that foreign producers crowd out domestic firms, and also ignore potential productivity spillovers from foreign to domestic firms.

Recall that foreign owners have a productivity advantage. The threshold value $\tilde{A}$ is therefore given by the following expression:

$$\tilde{A} = \frac{r\,\kappa^F}{\theta^F} \tag{5}$$

We focus on the interesting case that $\hat{A} > \tilde{A}$.[4] This condition requires that the productivity advantage of foreign-owned firms dominates a potential disadvantage in setting up a firm abroad, i.e. $\kappa^F / \theta^F < \kappa^H$. It is in line with the traditional theory of multinational firms which posits that foreign firms must have a productive advantage to compensate for the cost of investing abroad (Caves, 1974, Hymer, 1976).

The volume of period-*t* greenfield FDI in a given sector is equal to the sum of all fixed costs that foreign investors incur to start new firms:

$$FDI_t^{GRF} = \int_{\tilde{A}}^{\hat{A}} \kappa^F \, dA \tag{6}$$

The sector's output in period *t*+1 is given by the sum of all firms' outputs, i.e.:

$$Y_{t+1}^{GRF} = \int_{\hat{A}}^{1} \gamma A dA + \int_{\tilde{A}}^{\hat{A}} \gamma \theta^F A dA \tag{7}$$

with $\hat{A}$ given by (2), and $\tilde{A}$ by (5). Due to our assumption that $\hat{A} > \tilde{A}$, greenfield investment expands the range of goods produced in the sector under consideration, i.e. there is an adjustment at the *extensive margin*.

While the "greenfield FDI" regime is characterized by foreign investors setting up *new* firms, the "**M&A regime**" is characterized by *existing* firms in a sector being sold to foreign owners. In that regime, the volume of FDI inflows does not reflect aggregate fixed costs, but foreign investors' willingness to pay. This willingness, in turn, reflects firms' value, which is

[4] Without this assumption, foreign investors would have no incentive to enter the domestic market, and FDI inflows would be zero.

equal to the present value of their future profits.[5] Total FDI in a given sector at time t under the "M&A regime" is then given by:

$$FDI_t^{M\&A} = \int_{\hat{A}}^{1} \frac{\theta^F A}{r}\, dA \tag{8}$$

and sectoral output in period t+1 is given by:

$$Y_{t+1}^{M\&A} = \int_{\hat{A}}^{1} \gamma\, \theta^F A\, dA \tag{9}$$

Note that the M&A regime does not result in an adjustment at the extensive margin, i.e. the set of operating firms is left unchanged. However, in contrast to the greenfield FDI regime, *all* firms benefit from the productivity advantage associated with foreign ownership.

Our goal is to determine, which type of FDI has a stronger impact on sectoral output. This is stated in the following lemma:

Lemma 1: Writing $\frac{Y_{t+1}^k}{Y_t} = \beta^k \frac{FDI_t^k}{Y_t}$ with $k \in \{GRF, M\&A\}$, it holds that $\beta^{GRF} > \beta^{M\&A}$.

Proof: To show this result, we need to demonstrate that $Y_{t+1}^{GRF} / FDI_t^{GRF} > Y_{t+1}^{M\&A} / FDI_t^{M\&A}$. Using the expressions in (6) to (9) we see that this is the case if

$$\frac{\gamma \int_{\hat{A}}^{1} A\, dA + \gamma \int_{\tilde{A}}^{\hat{A}} \theta^F A\, dA}{\int_{\tilde{A}}^{\hat{A}} \kappa^F\, dA} > \frac{\gamma \int_{\hat{A}}^{1} \theta^F A\, dA}{\int_{\hat{A}}^{1} \frac{\theta^F A}{r}\, dA}$$

Simplifying these expressions and solving the integrals on the LHS yields

$$\frac{0.5\left[1 - \hat{A}^2 + \theta^F\left(\hat{A}^2 - \tilde{A}^2\right)\right]}{\hat{A} - \tilde{A}} > r\,\kappa^F$$

Invoking (2) we can rewrite this as

$$\frac{0.5\left[1 - \hat{A}^2 + \theta^F\left(\hat{A}^2 - \tilde{A}^2\right)\right]}{\hat{A} - \tilde{A}} > \theta^F \tilde{A}$$

[5] We assume that every firm meets an infinite number of potential buyers, such that all the bargaining power rests with the seller, and the firm's price reflects the buyers' reservation price.

Using standard algebra yields

$$0.5\left[\frac{1-\hat{A}^2}{\hat{A}-\tilde{A}}+\theta^F\left(\hat{A}+\tilde{A}\right)\right] \quad > \quad \theta^F\tilde{A}$$

which is equivalent to

$$\frac{1-\hat{A}^2}{\hat{A}-\tilde{A}} \quad > \quad \theta^F\left(\tilde{A}-\hat{A}\right)$$

Given the critical assumption that $\hat{A}>\tilde{A}$, the LHS is strictly positive, while the RHS is strictly negative. This concludes the proof.

The economic intuition behind our finding is straightforward: while both types of FDI are growth-enhancing (since foreign ownership comes along with higher productivity), the additional sectoral output generated *per dollar of FDI* is higher in the greenfield FDI regime. This is because, in this case, the initial payment of greenfield investors is smaller than the firms' value (which is proportional to its output), while M&A inflows exactly reflect this value, generating a rent for their previous owners. Hence, engaging in M&As – i.e. purchasing an existing firm – is more expensive than setting up a firm from scratch in our model, and this depresses the ratio of future output to FDI.

Lemma 1 states that – for a given amount of FDI – output growth is higher if a sector adopts the greenfield FDI regime than in case of the M&A regime. What is left to do is to characterize the relationship between *economy-wide* greenfield FDI and M&A sales (as a share of total output) and the aggregate growth rate. This is accomplished in the following proposition:

Proposition 1: The total volume of greenfield FDI (relative to GDP) has a stronger effect on aggregate output growth than the total volume of M&A sales (relative to GDP).

Proof: We assume that $m \leq n$ sectors adopt the greenfield FDI regime, while the remaining (n - m) sectors adopt the M&A regime. Denoting sector i's growth rate between periods t and $t+1$ by $g_{i,t}^k = Y_{i,t+1}^k / Y_{i,t}$ with $k \in \{GRF, M\ \&\ A\}$ and invoking the initial symmetry of all sectors we can write the growth rate of aggregate output $g_{y,t}$ as

$$g_{y,t} = \frac{1}{n}\left(\sum_{i=1}^{m} g_{i,t}^{GRF} + \sum_{i=m+1}^{n} g_{i,t}^{M\&A} \right)$$

Combining this expression with the fact that

$$g_{i,t}^{k} = \beta^{k} \frac{FDI_{i,t}^{k}}{Y_{i,t}}$$

yields

$$g_{y,t} = \frac{1}{n}\left[\sum_{i=1}^{m} \beta^{GRF} \frac{FDI_{i,t}^{GRF}}{Y_{i,t}} + \sum_{i=m+1}^{n} \beta^{M\&A} \frac{FDI_{i,t}^{M\&A}}{Y_{i,t}} \right]$$

Aggregating across sectors and invoking symmetry results in

$$g_{y,t} = \beta^{GRF} \frac{FDI_{t}^{GRF}}{Y_{t}} + \beta^{M\&A} \frac{FDI_{t}^{M\&A}}{Y_{t}}$$

Lemma 1 stated that $\beta^{GRF} > \beta^{M\&A}$. Hence, the marginal impact of greenfield FDI (relative to GDP) on the economy's growth rate is higher than the marginal impact of M&A sales. This concludes the proof.

Our model emphasizes a particular reason why greenfield FDI and M&A sales may differ in their impact on growth – namely, that every dollar of greenfield FDI expands productive capacity, while a large share of M&A sales merely represents a rent that accrues to incumbent owners. In reality, however, some of the assumptions on which our analysis is based may not be satisfied, and this may either reinforce or dampen the superior impact of greenfield FDI.

On the one hand, we have abstracted from spillover effects, through which the presence of foreign multinationals may enhance the productivity of domestic firms.[6] If greenfield FDI is associated with stronger spillovers – e.g. because new plants are more innovative and technology-intensive than existing ones (Marin and Bell, 2006, Marin and Sasidharan, 2010) – the discrepancy between the two types of FDI in terms of their effect on growth may be even stronger than suggested by our model.

[6] See the discussion in Blomström and Wolff (1994), Aitken and Harrison (1999), Javorcik (2004), Haskel et al. (2007) as well as Keller and Yeaple (2009).

On the other hand, our theoretical framework may be too harsh on M&As by assuming that the proceeds from the sale of domestic firms are spent on anything but capital.[7] If a share of those proceeds is spent on domestic investment then M&As will also contribute to capital accumulation, and this may affect the ranking of the two types of FDI. Finally, the growth effects of greenfield FDI may be weaker or even negative if new firms disrupt existing domestic supply chains (Rodríguez-Clare, 1996), or reduce the productivity of domestic firms (Aitken and Harrison, 1999). Again, this would imply that the difference between greenfield FDI and M&A sales is muted or even reversed.

3. Greenfield FDI vs. Mergers and Acquisitions: A First Look at the Data

Data on total FDI inflows and on sales of assets associated with mergers and acquisitions ("M&A sales") are provided by UNCTAD (2007, 2008) for a large number of countries. We follow Calderón et al. (2004) in defining "greenfield FDI" inflows as the difference between total FDI inflows and M&A sales.

*** Insert Figure 1 around here ***

A look at Figure 1 suggests that M&A sales as a share of total FDI in developing countries increased substantially around the turn of the millennium – due, probably to a wave of mergers and acquisitions in the context of large-scale privatizations. Conversely, the stark decline of M&As in the years 2002 and 2003 is in line with the notion that business-cycle and financial conditions in the US and Europe may be an important determinant of this type of capital inflows, as di Giovanni (2005) argues. Total FDI, by contrast, has proven to be quite resilient during this period.

Our approach to interpret the difference between total FDI inflows and M&A sales as "greenfield investment" is straightforward if we are inspired by a model in which all FDI takes place simultaneously and reflects either the acquisition of domestic firms or the setting up of new subsidiaries by foreign multinationals. However, when taking this model to real-

[7] Recall that once existing firms have been sold in the "M&A regime", domestic investors, knowing their low productivity level, have no incentive to further expand the set of firms. Mencinger (2003) presents some evidence for EU candidate countries that sales of domestic assets were spent on consumption and imports. This suggests that our notion is not too far-fetched, and that the proceeds from privatizations largely went into consumption.

world data, we need to address a number of potential problems: First, there might be an issue with the timing of transactions. As UNCTAD (2007, p.92) emphasizes, "... M&A statistics are those at the time of the closure of the deals, […]. The M&A values are not necessarily paid out in a single year." To mitigate that problem, we transform our data into five-year averages. The rationale for choosing that strategy is that the bulk of the value of announced deals should be disbursed by the end of a five-year period.

The second issue concerns the fact that a large share of FDI flows reflects payments *within* existing firms. The IMF defines total FDI inflows as the sum of equity purchases, reinvested earnings, and other capital flows – with the latter predominantly reflecting intra-company loans. Given this disaggregation, it is not obvious that the difference between total FDI and M&A sales coincides with the conventional idea of (capital-stock enhancing) greenfield investments. To gauge the relative importance of these components, Figure 2a offers a more detailed view on FDI inflows to developing countries and emerging markets for the time span we consider. While these data are taken from the IMF's Balance of Payments Statistics, Figure 2b presents the data provided by UNCTAD, with "greenfield FDI" defined as the difference between total FDI inflows and M&A sales.

*** Insert Figure 2 around here ***

First, these figures illustrate that the IMF's and UNCTAD's data on aggregate FDI inflows roughly coincide.[8] They also show that, while the contribution of reinvested earnings and other capital is important, equity inflows represent by far the largest component of total FDI. Finally, for our derivation of greenfield FDI to make sense, equity inflows should be at least as large as M&A sales. A comparison of Figures 2a and Figure 2b confirms this conjecture.

Nevertheless, our interpretation of the difference between total FDI inflows and M&A sales might be contested. It might be argued that, while equity inflows and reinvested earnings add to a (new or existing) firm's capital stock, this does not necessarily apply to intra-company loans labeled as "other capital" in the IMF's statistics. To meet this challenge, we will check whether our empirical results also hold for alternative measures of greenfield FDI: while we will predominantly focus on the measure introduced above – i.e. the difference between total FDI inflows and M&A sales – we will also use the difference between total FDI

[8] At the country level, the correlation between quinquennial FDI inflows from the two sources is 99.7 percent.

inflows and M&A sales *less other capital*, as well as the difference between *equity* inflows and M&A sales. As we will demonstrate, our key results do not hinge on our particular definition of greenfield investment.

4. A Disaggregated View on the Growth Effects of FDI: Empirical Strategy and Data

4.1. The Regression Equation

In what follows, we will estimate variants of the following regression equation:

$$\ln y_{it} - \ln y_{i,t-1} = \alpha + \beta \ln y_{i,t-1} + \gamma\ FDI_{it}^{M\&A} + \delta\ FDI_{it}^{Greenfield} + \sum_{k=1}^{N} \varphi_k x_{it}^k + \xi_t + \varepsilon_{it} \qquad (10)$$

where the left-hand side is the growth rate of real per-capita GDP in country *i* over a five-year period, $\ln y_{i,t-1}$ is the (log of) initial per-capita GDP at the start of that period, $FDI_{it}^{M\&A}$ and $FDI_{it}^{Greenfield}$ are the two types of FDI inflows – mergers and acquisitions sales and "greenfield FDI" relative to GDP – in that period.[9] The set of control variables x_{it}^k that is used to avoid omitted variable bias will be described below. The time dummies ξ_t are meant to capture period-specific effects – such as global growth surges and recessions – that might blur the separate effect of FDI. Since the disturbance ε_{it} possibly does not have a constant variance, and since it is potentially correlated across time periods, our inference will be based on a cluster-robust covariance. Later on, we will also add *fixed effects* to account for unobserved heterogeneity. Moreover, we will confront the potential endogeneity of FDI with respect to growth by estimating (10) by two-stage least squares (2SLS).

Using five-year averages in growth regressions has first been suggested by Islam (1995) as well as Caselli et al. (1996). While the question whether a quinquennial structure is appropriate for discovering long-run growth effects might be debated, using a

[9] Our results do not hinge on our decision to use FDI (net) *inflows* instead of *total* net FDI flows – i.e. the difference between net inflows and net outflows. While some "emerging market multinationals" have engaged in large-scale foreign investment in the most recent past, FDI outflows are negligible for most of the countries and years in our sample. This is also reflected by a high correlation of 99 percent between (net) FDI inflows and total (net) FDI flows.

panel data set instead of the purely cross-sectional structure as in Barro (1991) offers the huge advantage of potentially controlling for unobserved heterogeneity.

4.2. Data

Our data set comprises some 80 low-income and middle-income countries.[10] Since we are predominantly interested in the growth effects of M&A-type FDI and greenfield-type FDI – with the latter defined as the difference between total FDI inflows and M&A sales – our sample is constrained by the availability of these data. As reported in Section 3, data on M&A sales as well as data on total FDI inflows are provided in the UNCTAD's World Investment Report (UNCTAD 2007, 2008), and are available on an annual basis since 1987. To estimate the parameters of equation (10), we are using the intervals 1987-90, 1991-95, 1996-2000, 2001-05.[11]

As for the normalization of FDI flows, we divide five-year averages of M&A/greenfield FDI (in current US dollars) by average GDP (in current US dollars) in the same interval. This yields the variables $FDI_{it}^{M\&A}$ and $FDI_{it}^{Greenfield}$. To demonstrate that our results do not hinge on that particular choice, we will also explore the effect of FDI relative to the recipient country's *population*.

We will report the results of using a *small* set of control variables and a *large* set of control variables.[12] The *small* set of control variables consists of growth determinants suggested by the human-capital augmented Solow model, as introduced by Mankiw et al. (1992): the average years of secondary schooling in the population, the average share of investment in GDP and the average population growth rate. As suggested by neoclassical growth theory, we expect secondary schooling and the investment share to have a positive effect on growth, while the population growth rate should have a negative effect.[13] For the large set of control variables, we add the average inflation rate (in logs), a standard measure of trade openness – exports plus imports relative to GDP – as well as the "Investment Profile"

[10] We start by excluding countries with less than one million inhabitants. As we will demonstrate below, this choice is inconsequential for our main results.

[11] Since data on M&A inflows are only available from 1987 on, the "five-year average" for the 86-90 period is actually a four-year average. As we will show below, our results do not hinge on this adjustment and do not change if we omit the first period.

[12] Details on the definition and the sources of all variables are given in the Data Appendix.

[13] Note that including both FDI and total investment (as a share of GDP) in the regression reduces the danger of overrating the effect of FDI.

indicator from the International Country Risk Guide, which reflects the risk of expropriation and of other activities that infringe on investors' property rights. Finally, we include a dummy for oil-exporting countries and regional dummies.[14]

5. A Disaggregated View on the Growth Effects of FDI: Results

5.1. Benchmark Results

While our focus is on the differential effect of greenfield-type FDI and M&As, we start by regressing growth on *total* FDI inflows relative to GDP and our control variables. The result is displayed in column (1.1) of Table 1. It turns out that total FDI has a significantly positive effect on growth: increasing average FDI/GDP over a five-year period by one percentage point raises growth during that period by 1.56 percentage points. This corresponds to an increase in the annual growth rate of roughly 0.3 percentage points – a non-negligible effect, which is much larger than the effect of the overall investment/GDP ratio.

*** Insert Table 1 around here ***

Column (1.2) of Table 1 suggests that the influence of total FDI is predominantly driven by its greenfield component: while the coefficient of greenfield FDI is significantly positive and higher than the coefficient of total FDI, M&A sales do not have a significant effect on growth.

The discrepancy between the two coefficients becomes even more pronounced when we add the other control variables in column (1.3). The coefficient of M&A sales now turns negative – though insignificant – while the coefficient of greenfield FDI increases substantially: raising greenfield FDI over GDP by one percentage point raises average annual growth by almost 0.5 percentage points.[15]

To check whether our results were driven by our definition of greenfield FDI as the difference between total FDI inflows and M&A sales, we used alternative approaches to identify greenfield FDI. Column (1.4) in Table 1 reports the results we got when we subtracted "other capital" inflows – mostly intra-company loans – from our original measure

[14] To improve the readability of our tables, we do not display the coefficients of the oil dummy, the regional and time dummies, as well as the constant. Those results are available upon request.

[15] A test of the hypothesis that the coefficients of the two types of FDI are identical yielded an F-statistic of 9.05, suggesting that the hypothesis could be rejected at the one-percent level.

of greenfield investment. In column (1.5), we used the difference between "equity inflows" (as reported by the IMF's Balance of Payments Statistics) and M&A sales. While the first approach resulted in a somewhat lower coefficient of greenfield investment and the second approach in a somewhat higher coefficient, the qualitative results from column (1.3) were largely unaffected.

Our model suggests relating the two types of FDI *divided by GDP* to countries' subsequent growth. However, this is not the only way to control for country size, and we wanted to test whether our main qualitative finding still occurs when we use total population to control for country size. Column (1.6) documents that we still find a substantial discrepancy between the two types of FDI when we look at inflows per capita.

While the result that greenfield FDI has a stronger effect on growth than M&A sales is in line with our model's predictions, the finding that M&A sales have *no effect at all* comes as a surprise. To explain this observation, we have to go beyond the model. First, our benevolent view of the productivity advances that come along with foreign ownership may not always be supported by the facts: if the transfer of firm ownership takes place in times of crises foreign investors need not be characterized by a higher ability to run a firm. They may simply have access to the cash that is denied to the firms' owners (Krugman, 2000, Loungani and Razin, 2001). Moreover, there may be adverse macroeconomic consequences of M&A-related capital inflows which dominate any productivity gain at the firm-level. As argued by Prasad et al. (2007) as well as Rodrik and Subramanian (2009), financial integration may do more harm than good by resulting in a real appreciation that reduces domestic firms' international price competitiveness.[16] While our model does not spell out such effects, its logic is compatible with this line of reasoning: while greenfield FDI does not generate any extra revenue for domestic residents – a plausible interpretation of the initial fixed cost would be that it simply reflects the imports of foreign machinery – M&A sales generate a rent to the firms' previous domestic owners. This rent is not spent on investment, since all attractive investment opportunities have already been exhausted. Hence, M&A sales are likely to result in increased

[16] The detrimental effect of an overvalued (real) exchange rate on economic growth is further explored by Rodrik (2008) who shows empirically that it results in an inflated nontradables sector and lower growth. Eichengreen (2008) makes a similar point.

consumption which, in turn, may result in a real appreciation.[17] If this appreciation dominates the potentially productivity-enhancing effect of foreign ownership M&A sales don't have a positive influence on growth.

5.2. Alternative Estimators

The findings presented in Table 1 may be biased due to country-specific variables, which are correlated with the regressors and which we could not account for explicitly (i.e. unobserved heterogeneity), or due to a reverse causal relationship between growth and FDI. To meet the problem of unobserved heterogeneity, we estimated equation (10) using the fixed effects estimator. Column (2.1) in Table 2 gives the results, indicating that our previous findings were not driven by omitted variable bias: while the coefficient of greenfield FDI is somewhat lower relative to the pooled OLS result, it is still quite close to the previous point estimate and – contrary to the coefficient of M&A sales – statistically significant.

*** Insert Table 2 around here ***

In a next step, we tackled the (potential) endogeneity problem head-on by using the two-stage-least squares (2SLS) estimator: we started by instrumenting greenfield FDI while treating M&A sales as exogenous. The instruments we used are: the initial number of telephone main lines per 1000 inhabitants as a measure of a country's infrastructure, a dummy for landlocked countries, the initial *stock* of FDI relative to GDP, the lagged growth rate of a weighted average of trading partners' GDP, the Fraser Institute's "Legal structure and Security of Property Rights" index, and the International Country Risk Guide's measure of corruption. The relatively high first-stage F-statistic of 7.78 indicates that these instruments are jointly relevant – a conjecture that is also confirmed by the low p-value of the Kleibergen-Paap test for underidentification. Finally, the p-value associated with Hansen's J-test shows that we should not reject the hypothesis that the instruments are exogenous.[18] The results in

[17] Mencinger (2003) studies eight EU-candidates countries over the period 1994-2001. During that period, acquisitions were the chief form of FDI in those countries. In line with the hypothesis that politically-motivated sales of public assets resulted in consumption and imports, Mencinger (2003) finds that FDI inflows did not affect overall investment, but were significantly related to a larger current account deficit and debt accumulation.

[18] In addition to the J test which tests the joint exogeneity of *all* instruments, we also ran "difference-in-Sargan" tests on individual instruments. For none of the variables could we reject the null hypothesis of exogeneity. These results are available upon request.

column (2.2) are interesting for (at least) two reasons: first, contrary to our expectation, using the 2SLS estimator results in a coefficient that does not differ too much from the OLS results. In fact, a formal test for the endogeneity of greenfield investment prevents us from rejecting the null hypothesis that this variable is actually exogenous.[19] Second, the coefficient resulting from 2SLS estimation is somewhat *higher* than the coefficient from OLS estimation in column (1.3), suggesting that – if it is biased at all – the OLS estimator *under*rates the influence of greenfield investment on growth. To control whether our results are an artifact of using weak instruments, we finally used the conditional likelihood ratio (CLR) approach developed by Moreira (2003) in order to compute confidence intervals and p-values that are robust with respect to weak instruments. The resulting estimates allow us to reject the null hypothesis that the coefficient of greenfield FDI is actually zero at the one-percent level.

In a next step, we instrumented M&A sales (relative to GDP), while treating greenfield FDI as exogenous.[20] The instruments we used capture factors that should be conducive to the acquisition of domestic firms by foreign investors: the development of domestic financial markets, proxied by the volume of domestic credit to the private sector relative to GDP (lagged by one period), the initial urban population as a share of the total population, and the Freedom House index of civil liberties. Again, these instruments perform reasonably well in terms of relevance and exogeneity. Interestingly, the point estimate of the coefficient of M&A-type FDI – displayed in column (2.3) of Table 2 – increases substantially when we use the 2SLS estimator, indicating that the OLS estimator yielded biased estimates. This observation is supported by a formal test, which suggests that, in the case of M&A inflows, we have to reject the hypothesis of exogeneity. However, the standard error of this variable is too high to conclude a significant influence – a finding that is confirmed when we compute weak-instrument robust standard errors following Moreira (2003).

When we treated *both* FDI variables as potentially endogenous, using the instruments described above, our previous results were mostly supported. However, the coefficient of M&A-type FDI in column (2.4) is much lower compared to a specification that treated

[19] The test is based on the difference of two Sargan–Hansen statistics: one for the equation in which the instrumented variable is treated as endogenous, and one in which it is treated as exogenous. It yielded a p-value of 0.22, suggesting that, for greenfield FDI, we cannot confidently reject the null hypothesis of exogeneity.

[20] Eichengreen (2008:19) argues that "the literature on mergers and acquisitions (a form of FDI) suggests that such activity depends on the internal resources of firms in the acquiring countries.[...] Hence, there will be a component of FDI in emerging markets that is exogenous with respect to economic conditions there." However, we did not want to take this conjecture for granted.

greenfield-FDI as exogenous, and the test for endogeneity of M&A-type FDI does no longer allow us to reject the hypothesis that mergers and acquisitions are exogenous. However, given the poor fit of the entire set of instruments as documented by the low F-statistics, this result has to be read with caution.

Column (2.5) finally presents the results of applying the Blundell-Bond (1998) "Systems GMM" estimator to equation (10). The rationale for using this estimator is that this equation can be rewritten as

$$\ln y_{it} = \alpha + (1+\beta)\ln y_{i,t-1} + \gamma\ FDI_{it}^{M\&A} + \delta\ FDI_{it}^{Greenfield} + \sum_{k=1}^{N} \varphi_k x_{it}^k + \xi_t + \varepsilon_{it}\,, \qquad (11)$$

which reveals the presence of a lagged dependent variable on the right hand side. Applying the fixed effects estimator to such an equation results in biased estimates, since the error term is mechanically correlated with one of the regressors (Nickell, 1981). The "systems-GMM" estimator reacts to this problem by combining two equations: a first-differenced version of (11) is estimated using lagged levels of the regressors as instruments, and the original equation is estimated using lagged differences as instruments. Comparing the results in column (2.5) with those in column (2.1) indicates that ignoring the "Nickell bias" indeed led us to under-estimate the coefficient of the lagged dependent variable. More importantly, using the systems-GMM estimator also supports our key results that greenfield FDI has a significantly positive influence on growth while M&A sales have no effect. Interestingly, the estimated coefficient for $FDI_{it}^{Greenfield}$ is between the findings from the fixed effects and the 2SLS estimation and does not differ too much from the original OLS results.

5.3. Varying Samples

In order to explore whether the previous results were driven by a particular set of data points, we estimated equation (10) for various subsamples. We used the OLS estimator to run these regressions, but – given the findings of the previous subsection – also used 2SLS, treating M&A inflows as a potentially endogenous variable. As reported at the bottom of Table 3, we cannot reject the hypothesis that M&A inflows are *exogenous* for any of those subsamples.

*** Insert Table 3 around here ***

Columns (3.1) and (3.2) report the results of excluding upper-middle-income and low-income countries, respectively. While this modification chops off roughly 20 percent of all observations, our key findings are essentially unchanged: greenfield-FDI has a significantly positive effect on growth while there is no such effect for M&A inflows, with the influence of greenfield FDI being somewhat weaker in the "richer" subsample. These results hold regardless of whether we are using OLS or 2SLS.

As column (3.3) demonstrates, including "small" countries in the sample slightly increases the number of observations without altering our results. Column (3.4) reports the effect of focusing only on the years after the end of the cold war, i.e. from 1991 onward. Again, despite a substantial reduction of the sample, our qualitative findings are largely unscathed. Finally, we removed episodes in which countries where characterized by extreme macroeconomic instability, i.e. by an inflation rate of more than 40 percent.[21] Again, the coefficient of greenfield FDI, reported in column (3.5) of Table 3, does not deviate too much from the benchmark result, while M&A sales stay insignificant.[22] Given these results, we conclude that our key findings are robust with respect to various perturbations of the sample.

6. Concluding Remarks

Foreign direct investment (FDI) comes in different forms: its greenfield variant implies the creation of *new* productive units, while its M&A variant reflects a change of ownership of already *existing* firms. The goal of this paper was to explore whether two conceptually different types of FDI differ in their effects on economic growth. Our theoretical analysis suggests that they do: while the volume of greenfield FDI reflects the expansion of the host country's capital stock, M&A sales generate rents for the domestic firms' previous owners which are not channeled into new investment. Despite the productivity gain that is associated with foreign ownership, any dollar of M&A sales therefore has a weaker effect on growth than a dollar of greenfield FDI. Our empirical results support the model's key prediction: the growth effect of greenfield FDI (relative to GDP) is much stronger than the effect of M&A sales. This finding is robust across various estimation methods and subsamples.

[21] The threshold value of 40 percent was adopted following Reinhart and Rogoff (2004) who characterize countries during such episodes as "freely falling".

[22] The fact that the exclusion of "freely falling" episodes does matter for *some* variables is illustrated by the considerable drop of the t-statistic for the inflation rate. This echoes the finding of many cross-country growth regressions that the negative effect of inflation is predominantly driven by episodes of very high inflation (Barro, 1995).

Given the model's predictions, our empirical result that M&A sales have *no* growth effect *at all* comes as a surprise: as we argued above, this may be either due to factors that mute the productivity-enhancing effect of foreign ownership. Or it may be due to macroeconomic side effects – e.g. a real appreciation – that run against the firm-level increase in productivity. We believe that further exploring the various transmission channels through which different types of FDI affect growth offers ample scope for future research. Moreover, the large difference between M&As and greenfield investment demonstrates that we should have a deeper understanding of the economic and institutional forces that determine the composition of FDI inflows to individual developing countries.

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Data Appendix

Main variables

Growth of real per-capita GDP: Growth rate of GDP per capita in constant international dollars over five-year period. Source: Heston et al. (2009), series RGDPCH.

Initial GDP per capita: Natural logarithm of initial GDP per capita in constant international dollars. Source: Heston et al. (2009), series RGDPCH.

FDI/GDP: Net FDI inflows in US dollars divided by GDP (Five-year average). Source: UNCTAD (2008).

GDP: Gross Domestic Product in current US dollars. Source: World Bank (2010).

M&A sales/GDP: Mergers and acquisitions sales in US dollars divided by GDP (Five-year average). Source: UNCTAD (2007).

Greenfield FDI/GDP: Difference between *FDI/GDP* and *M&A sales/GDP*.

Other capital: Direct Investment Other Capital in Reporting Economy, net. Source: IMF (2010).

Equity: Direct Investment Equity in Reporting Economy, net. Source: IMF (2010).

Grf. FDI without other cap.: Difference between *Greenfield FDI* and *Other Capital* divided by *GDP* (five-year average).

Grf. FDI based on equity: Difference between *Equity* and *M&A sales* divided by GDP (five-year average).

Population: Population (Five-year average). Source: Heston et al. (2009), series POP.

M&A/sales/Pop.: Ratio of M&A sales and Population.

Greenfield FDI/Pop.: Ratio of Greenfield FDI and Population.

Secondary schooling: Number of years of secondary schooling of total population age 15 and older (initial value for five-year period). Source: Barro and Lee (2010).

Investment/GDP: Investment Share of Real Gross Domestic Product per Capita, current price (Five-year average). Source: Heston et al. (2009), series ci.

Population growth: Growth rate of population over five-year interval. Source: Heston et al. (2009).

Log(inflation rate): Logarithm of CPI inflation rate (Five-year average). Source: World Bank (2010).

Trade openness: Sum of exports and imports of goods and services divided by GDP (Five-year average). Source: World Bank (2010).

Investment profile: Rating of the government's attitude to inward investment as the sum of three sub-components, each with a maximum score of four points (very low risk) and a minimum score of 0 points (very high risk). The subcomponents are risk of expropriation or contract viability, payment delays and barriers on the repatriation of profits (Five-year average). Source: Political Risk Services Group (2008).

Oil: Dummy for 28 oil-exporting economies, referring to the period of 1970 - 2006, using the World Economic Outlook (WEO) and World Development Indicators (WDI) as well as Data on oil production and reserves obtained from BP Statistical Review of World Energy June 2007 as data sources. Source: Morsy (2009).

Instruments

Initial number of telephone main lines per 1000 inhabitants. Source: World Bank (2010).

Initial *stock* of FDI relative to GDP. Source: Lane and Milesi-Ferretti (2007).

Lagged growth rate of a weighted average of trading partners' GDP (five-year average). Source: World Bank (2010) and IMF (2010).

Fraser Institute index of legal structure and the security of property rights (five-year average). Source: Fraser Institute (2010).

International Country Risk Guide's measure of corruption (five-year average). Source: Political Risk Services (2008).

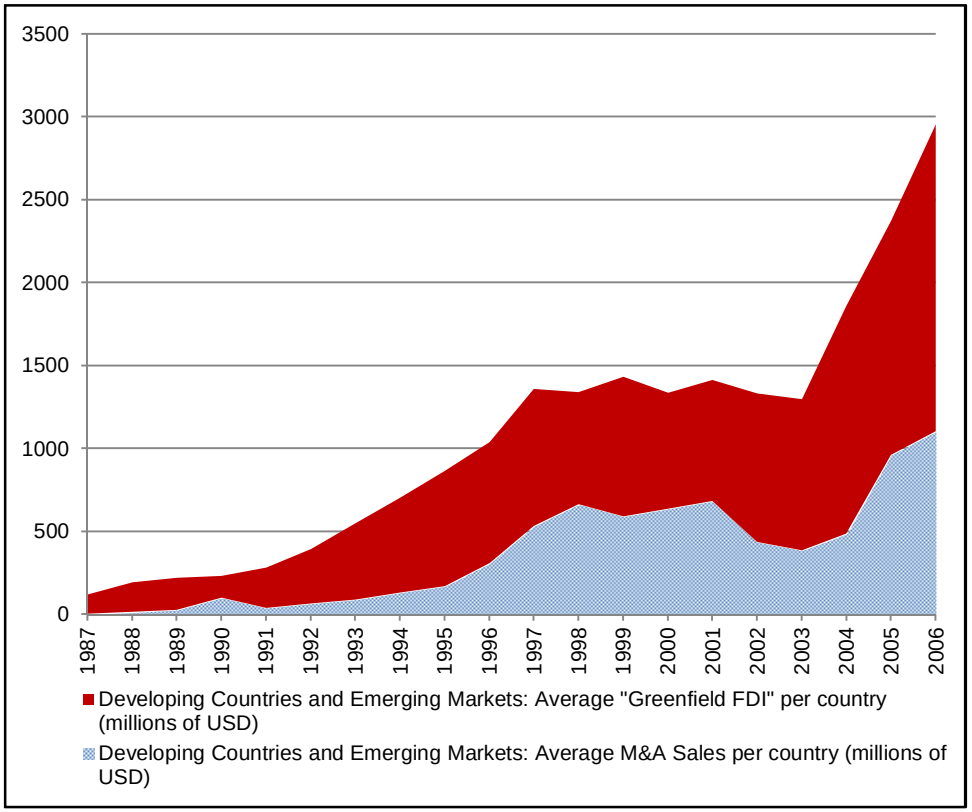
Domestic credit to the private sector as percentage of GDP. Source: World Bank (2010).

Initial urban population as percentage of total population. Source: World Bank (2010).

Freedom House index of civil liberties. Source: Freedom House (2010).

Figures and Tables

Figure 1: Greenfield FDI and M&A Sales in Developing Countries and Emerging Markets



Source: UNCTAD (2007, 2008).

Figure 2: FDI inflows – various disaggregations

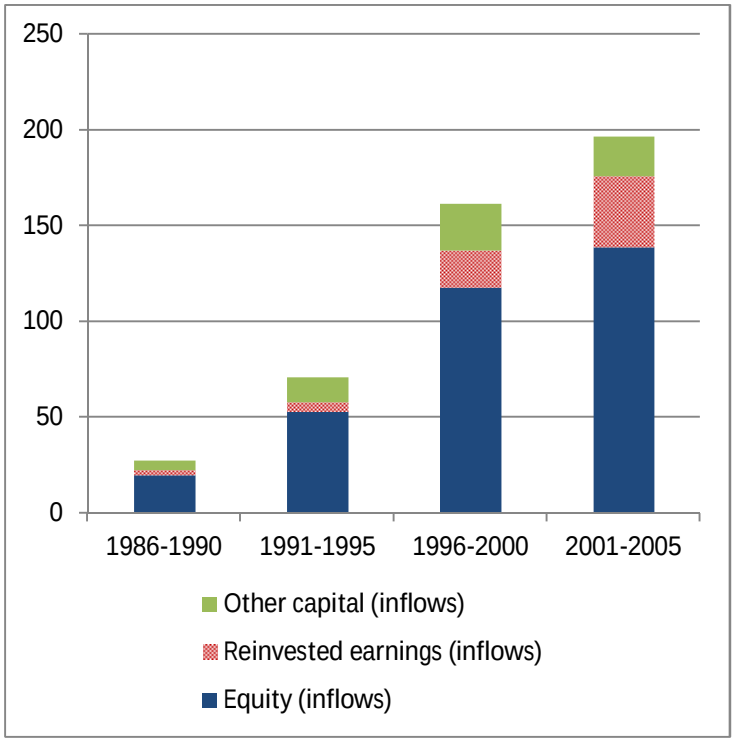


Figure 2a: Average total FDI inflows to low- and middle-income countries and its components (billions of US dollars). Source: IMF (2009).

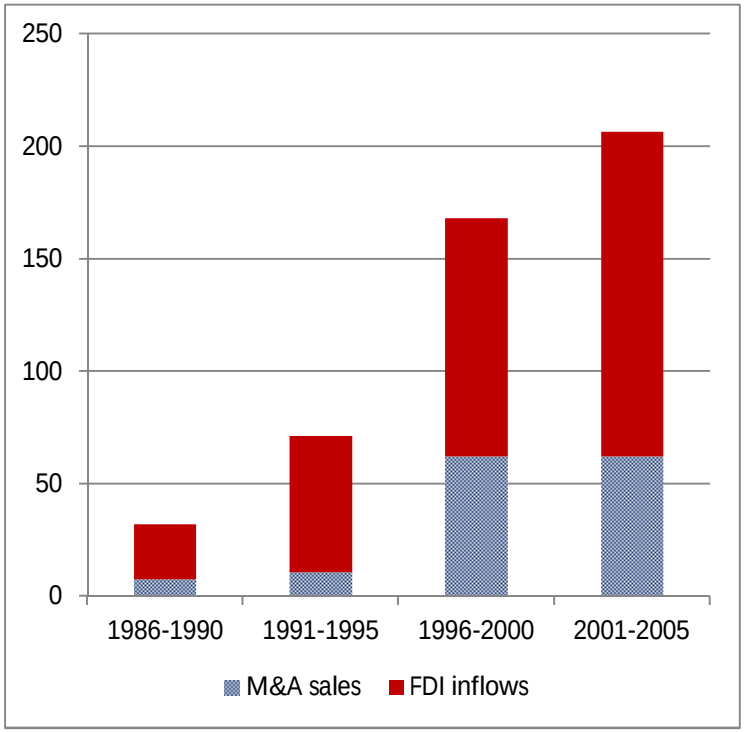


Figure 2b: Average total FDI inflows to low- and middle-income countries and its components (billions of US dollars). Source: UNCTAD (2007, 2008).

Table 1: OLS Regressions (Dependent variable: Growth of real per-capita GDP)

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS
Initial GDP per capita	-0.0291	-0.0252	-0.0864	-0.0982	-0.0960	-0.105
	(-1.376)	(-1.164)	(-4.328)***	(-4.963)***	(-4.818)***	(-5.145)***
FDI/GDP	1.555					
	(2.116)**					
M&A sales/GDP		0.392	-0.932	-0.745	-0.342	
		(0.473)	(-1.108)	(-0.973)	(-0.437)	
Greenfield FDI/GDP		1.888	2.290			
		(2.109)**	(4.013)***			
Grf. FDI without other cap.				1.788		
				(2.925)***		
Grf. FDI based on equity					2.569	
					(3.206)***	
M&A sales/Pop.						-0.231
						(-1.433)
Greenfield FDI/Pop.						0.358
						(3.284)***
Second. schooling	0.0297	0.0299	0.0347	0.0324	0.0342	0.0365
	(2.745)***	(2.756)***	(3.021)***	(2.612)**	(2.616)**	(3.011)***
Investment/GDP	0.342	0.319	0.238	0.206	0.173	0.306
	(2.021)**	(1.871)*	(1.491)	(1.234)	(1.079)	(1.770)*
Population growth	-1.316	-1.350	-3.472	-4.018	-3.759	-3.424
	(-0.843)	(-0.862)	(-2.381)**	(-2.936)***	(-2.730)***	(-2.303)**
Log(inflation rate)			-0.0321	-0.0161	-0.0157	-0.0339
			(-2.826)***	(-2.018)**	(-2.024)**	(-2.814)***
Trade openness			-0.0891	-0.0549	-0.0411	-0.0823
			(-2.655)***	(-1.724)*	(-1.412)	(-2.606)**
Investment profile			0.0409	0.0368	0.0378	0.0403
			(4.663)***	(4.020)***	(4.140)***	(4.390)***
Observations	298	298	264	244	246	264
Adjusted R-squared	0.218	0.220	0.444	0.409	0.427	0.420

Robust t-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Regressions include regional dummies and time dummies.

Table 2: Alternative estimators (dependent variable: growth of real GDP per capita)

	(1) FE	(2) 2SLS (FDI^{GRF} instr.)	(3) 2SLS ($FDI^{M\&A}$ instr.)	(4) 2SLS (Both FDI instr.)	(5) BB
Initial GDP per capita	-0.385	-0.0472	-0.0745	-0.0434	-0.121
	(-6.075)***	(-2.549)**	(-3.536)***	(-2.395)**	(-3.087)***
Greenfield FDI/GDP	1.662	2.678	2.363	2.654	2.002
	(2.379)**	(2.189)**	(3.465)***	(2.375)**	(1.841)*
M&A sales/GDP	-1.265	-0.166	5.692	3.030	-0.240
	(-1.286)	(-0.183)	(1.417)	(0.816)	(-0.183)
Investment profile	0.0362	0.0224	0.0264	0.0193	0.0446
	(2.816)***	(2.550)**	(2.419)**	(1.909)*	(3.771)***
Second. schooling	0.00415	0.0316	0.0297	0.0276	0.0421
	(0.0947)	(2.719)***	(2.200)**	(1.922)*	(2.027)**
Investment/GDP	0.346	0.165	0.392	0.180	0.438
	(0.932)	(1.114)	(2.234)**	(1.126)	(1.471)
Population growth	-1.065	-4.227	-2.291	-3.648	-4.237
	(-0.485)	(-2.805)***	(-1.605)	(-2.163)**	(-2.409)**
Log(inflation rate)	-0.0388	-0.0285	-0.0347	-0.0315	-0.0493
	(-3.377)***	(-3.512)***	(-3.310)***	(-3.615)***	(-3.656)***
Trade openness	0.137	-0.102	-0.137	-0.120	-0.128
	(2.432)**	(-3.193)***	(-3.404)***	(-3.173)***	(-2.323)**
Observations	264	213	252	210	264
Adjusted R-squared	0.485	0.438	0.391	0.482	
First-stage F-statistic		7.78	7.188	6.49/2.81	
Underidentification (p-value)		0.000	0.000	0.001	
Exogeneity instruments (p-value)		0.268	0.913	0.356	0.948
Exogeneity regressor (p-value)		0.221	0.054	0.19/0.40	
Robust coefficient/t-stat.		3.090	5.66		
		(2.46)**	(1.43)		
Second-order autocorr.(p-value)					0.214

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1; Regressions contain regional dummies and time dummies.

Table 3: Subsamples (dependent variable: growth of real GDP per capita)

	(1) Without upper middle income	(2) Without low income	(3) Incl. small countries	(4) Only 1991-2005	(5) Only Inflation < 40%
Initial GDP per capita	-0.0762	-0.0925	-0.0753	-0.0875	-0.0882
	(-3.566)***	(-2.799)***	(-3.969)***	(-4.328)***	(-4.168)***
M&A sales/GDP (OLS)	-1.064	-1.213	-0.401	-0.885	-1.204
	(-0.864)	(-1.298)	(-0.452)	(-1.023)	(-1.456)
Greenfield FDI/GDP	2.699	1.459	2.083	2.369	2.231
	(3.415)***	(2.217)**	(4.079)***	(3.511)***	(3.915)***
Second. schooling	0.0233	0.0440	0.0352	0.0254	0.0398
	(1.844)*	(3.497)***	(3.140)***	(2.200)**	(2.888)***
Investment/GDP	0.227	0.167	0.158	0.269	0.266
	(1.177)	(1.060)	(1.072)	(1.579)	(1.816)*
Population growth	-3.746	-4.488	-2.888	-2.656	-5.125
	(-2.470)**	(-2.119)**	(-2.014)**	(-1.441)	(-3.751)***
Log(inflation rate)	-0.0404	-0.0280	-0.0342	-0.0502	-0.0113
	(-3.234)***	(-2.369)**	(-3.078)***	(-3.562)***	(-1.348)
Trade openness	-0.111	-0.0596	-0.114	-0.114	-0.0400
	(-2.826)***	(-1.571)	(-3.265)***	(-3.333)***	(-1.353)
Investment profile	0.0460	0.0390	0.0411	0.0375	0.0289
	(4.487)***	(3.492)***	(4.779)***	(4.010)***	(3.423)***
M&A sales/GDP (2SLS)	5.086	4.334	5.18	2.611	3.717
	(1.05)	(1.02)	(1.20)	(0.91)	(1.05)
Observations	207	195	273	201	224
Adjusted R-squared	0.440	0.438	0.440	0.462	0.453

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1; Regressions contain regional dummies and time dummies.