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ABSTRACT

This paper investigates whether aggregate foreign direct investment (FDI), cross border mergers and acquisitions (M&A) and greenfield investments affects economic growth based on a panel data of 53 countries over the period 1996-2006. Both causality tests and single growth equations are applied to examine this relationship. The evidence suggests that there is bidirectional causality between FDI, M&A and growth. We can also conclude that economic growth Granger causes greenfields, but the reverse is not true. The estimation of the growth equation leads us to conclude that FDI through greenfield investments exerts a positive impact on economic growth in both developed and developing countries. Oppositely, M&A has a negative effect on the economic growth of developing countries, but insignificant on developed countries.

Keywords: Foreign Direct Investment, Cross Border Mergers and Acquisitions, Greenfield Investments; Economic Growth

JEL Classification: F23; F40; G34; O40

1. INTRODUCTION

In recent literature, much attention has been devoted to the impact of Foreign Direct Investment (FDI) on economic growth in host countries, especially in developing countries. This debate assumes special importance in view of recent changes in the composition and direction of FDI, and the liberalization policies towards FDI in those countries. Theoretically, the foundation for empirical studies on FDI and growth derives from either neoclassical models of growth or endogenous growth models. FDI in neoclassical growth models promotes economic growth by increasing the volume of investment and/or its efficiency. The new endogenous growth models assume that FDI raises economic growth through technology transfer, diffusion, and spillover effects.

The impact of FDI on growth is expected to be twofold. First, through capital accumulation in host economy, FDI is expected to be growth enhancing through encouraging the incorporation of new inputs and technologies in the production process. Second, through knowledge transfers, FDI is expected to augment the existing stock of knowledge in the recipient economy through labour training, skill acquisition and through the introduction of alternative management practices and organizational arrangements [Balasubramanyam, Salisu and Sapsford (1996) and De Mello (1999)].

Unfortunately, there is conflicting evidence in the empirical literature regarding the impact of FDI on economic growth. While some studies observe a positive influence of FDI on economic growth, others detect an insignificant or negative relationship. This controversy has arisen partially due to data insufficiency in both time and cross sections studies. One possible solution for this kind of problems regarding the analysis of FDI and growth is the use of panel data models [Bende-Nabende and Ford (1998); Bende-Nabende, Ford, Santoso and Sen (2003); De Mello (1999); Soto (2000); Nair-Reichert and Weinhold (2001); Buckley, Clegg, Wang and Cross (2002); Li and Liu (2005); Yang (2007)] to correct for continuously evolving country-specific differences in technology, production, and socioeconomic factors, thus eliminating many of the difficulties encountered in cross-country estimations. This allows the researchers to control for country-specific effects and include dynamic, lagged dependent variables which can help to control for omitted variables and endogeneity bias, respectively.

Although there is a vast literature assessing the impact of FDI on growth, very few has directly investigated the relationship between each FDI entry mode, namely mergers and acquisitions (M&A) and greenfield investments, and economic growth. This question assumes particular relevance in view of the increasing share that M&A has on global FDI and the concerns, in terms of economic development, that this entry mode, usually, causes on host countries.

Theoretically, the main contribution of this article consists in introduce, separately, Greenfield FDI and FDI through cross border M&A, to study the impacts that each entry mode has on host country's economic growth. Therefore, this paper seeks to contribute for a better understanding of this relationship and for a new approach that relate entry mode choice literature and growth theory.

This paper investigates whether FDI, and also cross border M&A and greenfields, affects economic growth in host countries. It differs from existing studies based on panel data models [for example, Nair-Reichert and Weinhold (2001); Buckley *et al.* (2002); Li and Liu (2005) and Yang (2007)] in the following aspects: i) it examines the relationship between FDI and growth through either Granger causality test applied to a panel data context or by estimation the growth equation; ii) using the esame approach, it also examines the impact of cross border M&A and greenfield investments on economic growth and, iii) the role of FDI, cross border M&A and greenfields in the developed and developing countries is compared.

The next section proceeds to offer a review of the literature on FDI and economic growth. Section 3 provides an introduction to the methodology and data used in the empirical study, Section 4 discusses the results and section 5 draws the conclusions.

2. LITERATURE REVIEW

In recent literature, much attention has been devoted to the impact of FDI on economic growth of host countries[1]. However, evidence in the existing literature on the

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[1] It is clearly beyond the scope of the present paper to review the vast literature on the FDI-growth relationship. The interested reader should refer to De Mello (1997; 1999) for a comprehensive survey of the nexus between FDI and growth as well as for further evidence on the FDI-growth relationship and, Blomström and Kokko (1998) for a critical review on the role of FDI in technology transfer.

causal relationships between FDI and economic growth is rather inconclusive. While some empirical studies indicate that FDI may have a strong positive effect on growth rates, others suggest that these positive effects may not occurred.

The majority of the studies at a macroeconomic level that investigates the relation between FDI and growth have showed that – subject to a number of crucial factors, such as human capital, initial GDP, the degree of openness, domestic investment – FDI has an ambiguous impact on overall economic growth. In the case of developing countries, the impact of FDI on growth is mainly positive, though.

However, macroeconomic analysis of the impact of FDI on growth is largely based on the single equation time averaged cross-country estimation approach, with or without instrumental variables [Nair-Reichert and Weinhold (2001)]. For example, Borensztein, De Gregorio and Lee (1998) developed an endogenous growth model in which FDI causes long run growth through its effect on the rate of technological diffusion from the industrialized world to the host country. They used seemingly unrelated regression (SUR) with instrumental variables (IV) estimation to conduct cross-country analysis of 69 countries with panel data averaged over two separated time periods 1970-1979 and 1980-1989. They concluded that FDI, by itself, has a positive but insignificant effect on economic growth. FDI is only an important determinant of economic growth when a country has a minimum threshold stock of human capital.

Alfaro (2003) also used 47 cross-country regressions over the time-averaged 1981-1999. Following Borensztein, De Gregorio and Lee (1998) and Carkovic and Levine (2002), she looked at the direct effect of the different types of FDI on economic growth, through the estimation of a growth regression, in which FDI was included as an explanatory variable. Additionally, she included a group of controls variables like initial GDP, domestic investment, human capital, degree of openness, inflation rate, etc. This paper finds that FDI inflows to the different sectors of economy (primary, manufacturing and services) exert different effects on economic growth. FDI inflows into the primary sector tend to have a negative effect on growth, whereas FDI inflows in the manufacturing sector a positive one. The evidence from the service sector is ambiguous.

There are potential drawbacks to the approach adopted by most of the studies we have reviewed. In this way, Nair-Reichert and Weinhold (2001) and Carkovic and Levine

(2002), criticize the existing work for being plagued by econometric problems such as simultaneity and omitted variable bias. First, models estimated with time-averaged data lose dynamic information and, due to both the lack of dynamics and insufficient degrees of freedom, run increased the risk of omitted variable bias. Second, contemporaneous correlation across the cross-section does not imply causality, and thus these models may suffer from endogeneity biases.

One possible solution to those problems discussed above is the use of panel data estimation. This allows the researchers to control for country-specific effects and include dynamic, lagged dependent variables, which can also help to control for omitted variable and endogeneity bias, respectively. Additionally, as stated by Nair-Reichert and Weinhold (2001), a cross section analysis without good instrumentation will be unable to distinguish between the hypotheses that increased FDI has led to increased growth, versus the hypothesis that good growth has attracted additional FDI.

So, recent approaches tried to analyze the FDI-growth relationship through either the estimation of a growth equation or through causality tests in a panel data context.

For example, De Mello (1999) estimated the impact of FDI on capital accumulation, and output and total factor productivity growth in host countries, using a panel data of OECD and non-OECD countries in the period 1970-1990. Although FDI is expected to increase long run growth via technological upgrading and knowledge spillovers in host countries, the evidence suggests that the extent to which FDI is growth-enhancing depends on the degree of complementarity and substitution between FDI and domestic investment.

Yang (2007) also uses a panel data of 110 countries over the period 1973-2002. The author adopted a growth equation in which the dependent variable (growth rate of real per capita GDP) was regressed against FDI and a list of control variables, such as Initial GDP, gross domestic investment, growth rate of population, average years of schooling as a proxy of human capital, trade openness, etc. The results reveal that the effect of FDI on growth is not uniform over time and across regions.

Buckely *et al.* (2002) employed both granger causality tests and growth equations to investigate the relationship between FDI and growth in China as a whole, and for 29 provinces in sub-samples, for 1989-1999. The results show that FDI favours growth in the economically stronger provinces, and that the full benefits of FDI are realized when competition in local markets is at its strongest level.

Nair-Rechert and Weinhold (2001) propose the use of a mixed fixed and random effect to analyze the causality relationship between FDI and growth, adopting a panel data of 24 developing countries. The results suggest that the relationship between investment, both domestic and foreign, and economic growth is highly heterogeneous. On average, they find a causal relationship from FDI to growth and there is some evidence that the efficacy of FDI is higher in more open economies, although this relationship is also highly heterogeneous across countries. The weakness of this work is that it only tests the causality from FDI to growth and not the reverse.

Nonnemberg and Mendonça (2005) found that economic growth exerts a positive impact on FDI inflows, but the reverse is not true. To conduct the study they employed Granger causality tests to a panel data of 33 developing countries, from 1975 to 2000.

Li and Liu (2005) applied both single equation and simultaneous equation system techniques to examine FDI-growth relationship in a panel data of 84 countries, over the period 1970-1999. The test results suggest that endogeneity between those two variables is not valid for the whole sample period, but only from the mid-80s.

Although the findings reviewed above collectively suggest that FDI could play, depending on economic and technological conditions in a host country, a crucial role on economic growth is likely to observe some differences when we consider each mode of entry, namely M&A and greenfield investments.

In spite of the vast literature on FDI-growth relationship, very few had highlighted the impact of each FDI mode of entry on host countries' economic growth. Among these, we only find some works that analyze, in a theoretical way, the potential impact of cross border M&A and greenfields on growth [UNCTAD (2000)].

A comparison of the effect of FDI through cross border M&A with that of greenfield FDI assumes that the two modes of foreign entry constitute alternatives from the perspectives of both host and home countries. In principle, and even in practice, this may be the case, but they are rarely perfect substitutes for each other. Following UNCTAD (2000), from a host country's perspective, substitutability depends on its characteristics, including its level of economic development, FDI policy, the institutional framework and specific circumstances.

The essential difference between cross-border M&A and greenfields is that the former by definition involves a transfer of assets from domestic to foreign hands and, at least initially, does not add to the productive capacity of host countries. This, in turn, leads to a range of concerns over insufficient resource transfers, lay-offs, asset stripping, and above all, adverse effects on market structure and competition. In spite of that, the theoretical arguments point out that, especially at the time of entry and in the short term, M&A (as compared to greenfield investments) may involves, in some aspects, smaller benefits or larger negative impacts from the perspective of host countries development.

However, over the longer term, when direct as well as indirect effects are taken into account, many differences between the impacts of the two modes diminish or disappear.

In the next section we will present the data and the methodology used in our study.

3. SAMPLE AND METHODOLOGY

3.1 Sample

In this paper we use a panel data of 53 countries from 1996-2006[2] to analyze the relationship between FDI and growth.

Based on a growth model, we examine the contemporaneous correlation of FDI, cross border M&A, greenfields and GDP growth (denoted GGDP).

We also check for evidence of Granger causality between each of the three investment series and growth.

Following Borensztein *et al.* (1998), Alfaro (2002), Yang (2007) and Nair-Neichert and Weinhold (2001)], we use a group of control variables, like gross domestic investment (GGDI), the degree of openness (OPEN), growth rate of population (GPOP) and the average years of schooling of adults (SCH), as a proxy of human capital.

[2] For greenfield investments we only have data for 2002-2006.

The three variables associated with inbound FDI were recently made available and published by UNCTAD (*FDI Statistical Database On-line* or *World Investment Report*), those related to GDP and openness (OPEN) come from the World Bank (*World Development Indicators On-line*) and IMF (*World Economic Outlook Database 2007*), respectively. Data on growth rate of population was taken from the United Nations Statistics Division (UNSTATS) and the data for human capital was taken from Barro and Lee (1996)[3]. A full list of variables and their definitions can be found in table 1, while table 2 lists the countries in the data set.

3.2 Methodology

3.2.1 Growth Model

The conventional approach to analyze the relationship between growth and FDI involves running regressions for the rate of GDP growth on the rate of FDI growth[4]. Often, additional explanatory variables are included in order to control for other influences upon the rate of economic growth. Following the contributions of Romer (1990) and others to the development of the new growth theory, and of Levine and Renelt (1992) to the search for a set of robust variables for modeling growth, has occurred a degree of convergence on the most appropriate empirical specification.

The "core explanatory variables" for economic growth identified in these and others studies include domestic investment, population growth, initial GDP, human capital and openness degree. For example, the studies of Buckley *et al.* (2002), Nair-Reichert and Weinhold (2001), Yang (2007) and Li and Liu (2005)] include these variables together with FDI inflow.

Additionally, since the main goal of this article is not only to investigate the impact of aggregate FDI on economic growth, but also the potential effect that each FDI mode of entry – cross border M&A and greenfield FDI – we will introduce two new

[3] The actualized version is available at International Development (CID) at Harvard University, http://www.cid.harvard.edu/ciddata.
[4] See Nair-Reichert and Weinhold (2001) and Buckley *et al.* (2002) for the advantages of using growth rates instead of levels.

variables associated with the growth rate of M&A and greenfields' inflows (denoted GM&A and GGREEN, respectively).

The following equation is used to assess the effect of FDI (through cross border M&A or through greenfields) on economic growth, where *i* refer to country and *t* to time period 1996-2006:

$$GGNP_{it} = \beta_0 + \beta_1\, GDP_{INITIAL\; it} + \beta_2\, X_{it} + \beta_3\, GGDI_{it} + \beta_4\, OPEN_{it} + \beta_5\, SCH_{it} + B_6\, GPOP_{it} + u_{it} \quad \text{[eq.1]}$$

where GGNP is the real GDP growth rate; $GDP_{INITIAL}$ refers to real GDP at the beginning period (in natural logarithmic); GGDI is the growth rate of domestic investment; OPEN measures the degree of openness; GPOP refers to population growth and SCH is the average years of schooling of adults, used as proxy of human capital. Variable X is used to incorporate the three investment series associated with the growth rate of FDI inflows. In this way, we have to estimate three different equations which obey to the general form of equation 1, where in each of them, we include the variables related to aggregate FDI (GFDI), cross border M&A (GM&A) and greenfield FDI (GGREEN).

Accordingly with previous studies on this area, positive relationships are expected between the dependent variable and the "core explanatory variables", with the exception of initial GDP. If the model specification is reasonable, the estimated coefficient β_2 will indicate the direction and magnitude of the impact of FDI, M&A and greenfields on economic growth.

In the estimation of this regression we will not only present the results for the total sample of 53 countries, but also for the two sub-samples of developed and developing countries.

It would be of great interest to estimate this model with a lag structure, although this would be unusual with panel data in circumstances such as our own. We have 53 observations in the full sample, but a relatively short time series covering 1996-2006. So, if we employed a dynamic panel model with lags, this would adversely affect the number of usable observations, particularly in the sub-samples.

In this context we will use the fixed effects model (FEM) and the random effects models (REM) for the estimation of our panel data. In order to choose the most appropriate estimator, we will use a statistic test, namely Hausman Test (1978). The Hausman statistic tests the null hypothesis that REM is appropriate for a particular sample compared to the FEM and allows us to decide which model gives the best estimation. Additionally, we will present standard errors corrected for heterocedasticity and covariance based on the White's (1980) heterocedasticity-consistent standard errors method.

Although our model captures the impact of the most important explanatory variables on economic growth, it does not capture the bidirectional relationship between FDI and growth. To this purpose we will use the Granger causality technique (1969) to study this relation.

3.2.2 Granger Causality

To study the bidirectional causality between economic growth and FDI (either through M&A or through greenfields), we will estimate a system of equations, where the endogenous variables are generated by a time stationary VAR (*m*) process in a panel data context [see Holtz-Eakin *et al.* (1988)]. In others words, he have to estimate an auto-regressive panel, where the set of endogenous variables includes the GDP (measured in logarithmic) (*Y*) and the series related to inflows FDI, namely FDI, M&A and GREEN[5], all of them, also measured in natural logarithmic, and will be represented by vector *X*.[6] We have to estimate three equations systems where the dependent variable is GDP in equation 2, while the inflows of all forms of FDI will be dependent variables in equation 3, as follows:

$$Y_{it} = \alpha_0 + \sum_{j=1}^{m} \alpha_j Y_{it-j} + \sum_{j=1}^{m} \beta_j X_{it-j} + \mu_i + \varepsilon_{it} \qquad i = 1, ..., N;\ t = 1, ..., T \qquad \text{[eq. 2]}$$

[5] See table 1 for variables' description.

[6] In this sub-section we use variables expressed in natural logarithmic and not their growth rates, because we lose less observations. Since we are going to estimate these equations through the first differences transformation, the variables will be estimated as follows: $\Delta GDP_t = GDP_t - GDP_{t-1}$, where GDP is measured in logarithmic, i.e. we have $\Delta LNGDP_t = LNGDP_t - LNGDP_{t-1}$, which approximately can be interpreted as the GDP growth rate.

$$X_{it} = \delta_0 + \sum_{j=1}^{m} \delta_j Y_{it-j} + \sum_{j=1}^{m} \gamma_j X_{it-j} + \eta_i + \nu_{it} \qquad i = 1, ..., N;\ t = 1, ..., T \qquad \text{[eq. 3]}$$

where i and t denote countries and time, respectively. For example, to test of whether X causes Y is simply a test of the joint hypothesis that $\beta_1 = \beta_2 = ... = \beta_m = 0$. If this null hypothesis is accepted, then it means that X does not cause Y. To account for the individual effects, the intercept is often allowed to vary with each unit in a panel analysis, which is represented as μ_i and η_i, in the above equations. The error terms ε_{it} and v_{it} are assumed to be independently distributed across countries with zero mean, but may be heteroscedastic across time and countries.

However, unlike time sections, where Granger technique was initially developed, the estimation by ordinary Least Squares (OLS) leads to biased and inconsistent estimators, in equations 2 and 3. The same result is obtained, if we apply Fixed Effects in each equation. Although including lagged dependent variables in the panel enables the estimation of the dynamics between the variables in study, Nickell (1981) shows that this leads to biased estimation, especially when N is much larger than T, like in this study.

To overcome the problem, two approaches can be used in a panel data context. The first consists in eliminating the individual effect by a first difference transformation, and then applying the method of instrumental variables (IV) [Anderson and Hsiao (1981)]. Indicating with Δ the first difference operator, equation 2 and 3, become equation 4 and 5, respectively as follow[7]:

$$\Delta Y_{it} = \sum_{j=1}^{m} \alpha_j \Delta Y_{it-j} + \sum_{j=1}^{m} \beta_j \Delta X_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \quad \text{[eq. 4]}$$

$$\Delta X_{it} = \sum_{j=1}^{m} \delta_j \Delta Y_{it-j} + \sum_{j=1}^{m} \gamma_j \Delta X_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \quad \text{[eq. 5]}$$

[7] Nair-Reichert and Weinhold (2001) used a similar approach, but they only analyzed one causality direction, from FDI to economic growth (equation 5).

In our particular case, we will have three equation systems in order to investigate the[8]:

1) Causality relationship between GDP and aggregate FDI:

$$\Delta GDP_{it} = \sum_{j=1}^{m} \alpha_j \Delta GDP_{it-j} + \sum_{j=1}^{m} \beta_j \Delta FDI_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \qquad \text{[eq. 6]}$$

$$\Delta FDI_{it} = \sum_{j=1}^{m} \delta_j \Delta GDP_{it-j} + \sum_{j=1}^{m} \gamma_j \Delta FDI_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \qquad \text{[eq. 7]}$$

2) Causality relationship between GDP and cross border M&A:

$$\Delta GDP_{it} = \sum_{j=1}^{m} \alpha_j \Delta GDP_{it-j} + \sum_{j=1}^{m} \beta_j \Delta M\ \&\ A_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \qquad \text{[eq. 8]}$$

$$\Delta M\ \&\ A_{it} = \sum_{j=1}^{m} \delta_j \Delta GDP_{it-j} + \sum_{j=1}^{m} \gamma_j \Delta M\ \&\ A_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \qquad \text{[eq. 9]}$$

3) Causality relationship between GDP and greenfield investments:

$$\Delta GDP_{it} = \sum_{j=1}^{m} \alpha_j \Delta GDP_{it-j} + \sum_{j=1}^{m} \beta_j \Delta GREEN_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \qquad \text{[eq. 10]}$$

$$\Delta GREEN_{it} = \sum_{j=1}^{m} \delta_j \Delta GDP_{it-j} + \sum_{j=1}^{m} \gamma_j \Delta GREEN_{it-j} + \Delta\varepsilon_{it} \qquad i = 1, ..., N;\ t = 2, ..., T \qquad \text{[eq. 11]}$$

Focusing on the equations 4 to 11, we can see that the errors $\Delta\varepsilon it$ are now correlated with some of the explanatory variables, and consistent estimation of the parameters requires some instrumental variables method as suggested by Anderson and Hsiao (1981).

However, the instrumental variables method (IV) as proposed by Anderson and Hsiao (1981), does not necessarily yield efficient estimates, since it does not make use of all the available moment conditions and also does not account for the differenced structure of the new errors terms.

Therefore, in this study, we employ an alternative approach which consists of applying the Generalized Method of Moments (GMM) proposed in Arellano and Bond (1991). This estimator proposes the using of variables with at least two lags, as

[8] All variables are defined in natural logarithmic.

instruments[9]. For panel dynamic models, this approach allows more efficient estimators than those obtained by the Anderson and Hsiao (1981) method.

To summarize, our empirical investigation will be divided in three parts. Firstly, we estimate the equations 6 to 11, in order to analyze the causal relationships between economic growth and FDI, M&A and greenfields. Secondly, we regress the growth model specified in equation 1 for the total sample, and finally, the role of developed and developing countries are compared, regarding the impact of FDI (either through M&A or greenfields) on economic growth.

4. EMPIRICAL RESULTS

In this section we discuss the estimation results. At first we present the results of Granger causality tests in a context of panel data.

4.1 Granger Causality

One of the assumptions of the application of Granger technique was that the endogenous variables were generated by a time stationary VAR (*m*) process.

Therefore, before proceeding to estimate the equations 6 to 11, we carry out unit root tests to examine whether the variables are stationary. It is now generally accepted that the commonly used unit root tests such as the Dickey-Fuller and the augmented Dickey-Fuller lack power in distinguishing the unit root null from the stationary alternatives. Using panel data unit root tests is one way of increasing the test power based on a single time series. The Levin and Lin (1992), the revised Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) tests are the most widely used methods for panel data unit root tests in literature.

However, given the limitations of Levin and Lin methods, since it depends crucially on the somewhat restrictive independence and identical assumptions across individuals, we decide to use in our study, the Im, Pesaran and Shin (IPS) test. Im,

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[9] In our particular case, since we have a short time period, especially in greenfields' case, we will use only two lags.

Pesaran and Shin (2002) relax the identical assumption and estimate an augmented Dickey-Fuller test equation for each individual. As Li and Liu (2005) states, this test is more powerful than the Levin and Lin method.

In this study, we use the *t-bar* test of IPS for unit root in the data, and the results are presented in table 3.

(Insert Table 3)

These show that only GDP series is not stationary on levels, confirming a presence of a unit root. Therefore, when we use the first difference of the series, it becomes stationary. All the other variables are stationary.

This way, since we will conduct the Granger causality test through the application of GMM, which uses as instruments variables with at least two lags, (in our particular case we use only two lags), we have to confirm that all the variables included in the estimation are stationary and that the results are not spurious.

Next, the estimation results of equations 6 to 11 are reported in table 4, for testing the bidirectional causality between FDI, cross border M&A, greenfields and GDP. We applied the GMM proposed by Arellano and Bond (1991) to a panel data context.

(Insert Table 4)

From the results it is possible to obtain the direction of causality between: i) GDP and FDI (eq. 6 and 7); ii) GDP and cross border M&A (eq. 8 and 9), and iii) GDP and greenfield investments (eq. 10 and 11), through the significance of the estimated coefficients.

In table 4 we have also conducted a specification test for the Arellano-Bond model – Sargan test (1958). This test verifies the existence of overidentifying restrictions, which tests the null hypothesis of the joint validity of instruments. Only in equation 11, the *p-value* of the Sargan test leads us to conclude that the instruments used are not valid in that equation. Probably, this result is a consequence of the few number of time-section observations included in the sample; in the case of greenfields (we only have data for 2002-2006). Since we use first and second differences in GMM estimation, the number of years includes decreases for two in the greenfields series.

The results show bidirectional causality between FDI inflows and GDP [10] (eq. 6 and 7) and between M&A and GDP (eq. 8 and 9). So, the results suggest that FDI, and particularly FDI through cross border M&A, causes economic growth, which in turn causes more FDI and M&A. However, the impact of M&A on economic growth is only significant for the second lag. Finally, given the limitations imposed by the short period of time available for greenfields, we can only confirm a unidirectional causality from GDP to greenfields. The reverse causality was not confirmed since the Sargan test leads to the rejection of the null hypothesis of overidentified restrictions.

Although the Granger Causality technique is commonly used in empirical studies to analyze the causal relationship FDI-growth, we can not forget that this test only indicates temporal relation and not endogeneity between the variables.

Therefore, in order to test if FDI, either through M&A or greenfields, influences economic growth, we will adopt a structural growth model, like that evidence in equation 1.

In the next section, the estimation results of growth model are discussed.

4.2 Growth Model

First we present the results for the total sample, and next for the two sub-samples of developed and developing countries.

4.2.1 Total Sample

The estimation results for the total sample are reported in table 5. We only show the results estimated by Fixed Effect method, since the values observed by Hausman test leads to the rejection of Random Effect method in all equations.

(Insert Table 5)

[10] Since all the variables are expressed in logarithmic in which we applied differences transformation, we can interpret the coefficients as growth rates, approximately.

Specification 5.1 refers to the basis model with the core variables. Almost all of these variables present identical results as those obtained in recent literature and empirical studies. As expected, the initial GDP has a negative sign, indicating that countries with lower initial GDP observe a fast economic growth. This result is in line with those obtained by Li and Liu (2005) and Yang (2007) and reflects the idea of economic convergence between countries. Additionally, a high level of openness (OPEN) and a high domestic investment growth (GGDI) are associated with a fact growth in GDP. All three coefficients estimates are statistically significant.

Oppositely, the variables related with population growth (GPOP) and with human capital (SCH) observe positive signs as expected, although insignificant. Compared to the existing literature on economic growth, the results obtained here are not surprising. While some studies report a strong evidence of a positive relationship between population growth and economic growth [Yang (2007)], others, like Li and Liu (2005) observe an insignificant relationship. With respect to human capital variable, there is still much controversy in the literature, which is a result of the sample used in each study. For example, Borensztein *et al.* (1998) and Li and Liu (2005) confirm a positive and significant relation between the two variables, but the same is not observed in Yang's work (2007).

In specification 5.2 we include the variable associated to FDI growth (GFDI), and the evidence suggests that FDI exerts a positive impact on GDP growth.

From specification 5.3 and 5.4., we include the variables associated with the two FDI entry modes[11]. In 5.3, we test the impact of cross border M&A on GDP growth, and the sign of the coefficient is positive, although it is insignificant. This result can correspond to the ambiguous effect that M&A seems to exert on economic growth. With respect to greenfield investments (5.4), the evidence suggests that this kind of investments have a positive and significant impact on growth, in line with the theoretical arguments described above.

In sum, the results suggest that aggregate FDI, in particular FDI through greenfield investment, exerts a positive effect on economic growth. On the contrary,

[11] We choose to estimate the variables GM&A and GGREEN, separately. However, the joint regression of these two variables with the core variables included in specification 5.1, leads to similar results.

when FDI is done via cross border M&A, we do not find a significant relationship between this mode of entry and growth.

4.2.2 The Comparison of Developed versus Developing Countries

In table 6, we report the estimation results using the sub-samples of developed and developing countries[12] to compare the roles of FDI, cross border M&A and greenfields in these two groups.

(Insert Table 6)

Notice that most coefficients are qualitatively the same as those from the whole sample, although with some important differences.

As expected, the initial level of GDP has a negative impact on economic growth in both developed and developing countries. With a positive sign we have the variable related to domestic investment (GGDI). Both coefficients are statistically significant for both sub-samples.

The degree of openness and the population growth have both a positive sign, as expected, but only significant in developing countries.

One interesting finding is that the average years of schooling in adults, used as proxy of human capital, is negative but insignificant for developed countries. As Li and Liu (2005) state these results may be because this variable tends to be very high for all developed countries, and there is little variation across these countries. So, we can conclude that there is no strong correlation between this variable and GDP growth. Inversely, in developing countries, human capital variable shows a positive and significant sign, confirming the idea that human capital exerts a crucial role on the development of this group of countries [Borensztein *et al.* (1998)]. Identical conclusion was obtained by Buckley *et al*. (2002), which observed that human capital was only significant for the economic growth of less developed provinces in China.

Aggregate FDI has a positive and significant impact on economic growth in both developed and developing countries (6.2).

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[12] See Table 2 for the list of countries included in each sub-sample.

So, for both groups of economies, either foreign or domestic investment growth seems to exert a positive influence on economic growth of host countries.

However, when we decompose FDI in their two main components, namely M&A and Greenfield FDI, the conclusions we can obtain are quite different. For example, we witness a negative and significant impact of cross border M&A on economic growth, in developing countries. This result could confirm the theoretical argument described above that cross border M&A are often accomplished by adverse effects in host countries, especially in short time. For developed countries we do not find any significant relationship between these two variables.

Finally, with respect to the relation between greenfields and GDP growth, the results suggest, with no ambiguity, that this kind of entry mode is beneficial for both countries.

To sum up, the results of the estimation of the growth model, first for the total sample and next for the two sub-samples, allow us to conclude that aggregate FDI has a positive and significant impact on host countries' (developed or developing) economic growth. Identical conclusion is obtained for the greenfield investments. So, fast FDI growth, especially FDI through greendfield investments, increases the economic growth of host countries. The same is not true for cross border M&A. In this case, the effect on economic growth differs with the sub-sample used. In developed countries we do not find a significant relation between M&A and growth. Instead, in developing countries we do find a negative and significant effect of M&A on host countries' growth.

5. CONCLUSIONS

Many policy makers and academics contend that FDI can have important positive effects on host country's economic growth. In addition to the direct capital financing, FDI can be a source of valuable technology and know-how while fostering linkages with local firms, which can help jumpstart an economy. Based on these arguments, industrialized and developing countries have lowered their trade barriers and offered incentives to encourage foreign direct investment in their economies.

In fact, the empirical results obtained in this article seem to reflect that idea.

Based on a panel data of 53 countries over the period 1996-2006, the empirical evidence obtained allows us to conclude that FDI exerts a positive and significant impact on economic growth, of both developed and developing host countries. For that we applied both Granger causality tests and a structural growth model.

However, when we include in analysis greenfields and cross border M&A, as alternatives FDI entry modes, the results are not the same.

First, through Granger causality test we found evidence of bidirectional causality between M&A and growth. That is, if, on the one hand, the results confirm that economic growth affects M&A inflows, on the other hand, these inflows seem to influence positively the GDP growth. However, Granger causality technique has the disadvantage of only analyzing the temporal precedence between the variables, and not their endogeneity. Because of that, we decided to investigate the relationship between FDI (either through M&A or greenfields) and economic growth, by the estimation of a structural model growth. Therefore, based on growth equation's estimation, where we include M&A inflows as an explanatory variable, the results are quite controversy. For the total sample and developed countries, we did not find evidence that M&A exert a significant impact on the host country's growth. On the contrary, with respect to developing countries, we confirm the existence of a negative and significant relationship between these two variables.

Despite the limitations of the used data, which enables us to find bidirectional causality between greenfields and growth, evidence from growth equations suggests that this mode of entry seems to have a positive influence on the host country's economic growth. Indeed, this seems to be in line with most of the theoretical work, which argues that greenfields tends to more beneficial than M&A with respect to host country's development, especially in short time.

It would be of great interest to analyse the differences between the two modes of entry, in the long term. For doing so, it will be necessary to estimate the growth model through a dynamic panel data. However, this would require a larger time-section sample. Therefore, more work in this area is warranted, in particular, in terms of better data sets that will support exploiting the dynamic relationship between FDI (through M&A and greenfields) and growth.

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TABLES

Table 1 – Variables Definition

Variável	Descrição	Fonte
GGNP	Growth rate of GDP at market constant prices (constant 2000 US).	World Bank, *World Development Indicators On-line*, http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20398986~isCURL:Y~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html
GDP	Natural logarithmic of GDP at current prices (millions of US Dollars).	International Monetary Fund (2007), *World Economic Outlook Database 2007*, http://www.ifm.org/external/pubs/ft/weo/2007/02/weodata.
$GDP_{INITIAL}$	Natural logarithmic of the initial GDP at market constant prices (constant 2000 US).	World Bank, *World Development Indicators On-line*, http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20398986~isCURL:Y~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html
FDI	Natural logarithmic of FDI inflows (current prices, millions of US Dollars).	United Nations Conference on Trade and Development (UNCTAD), *FDI Statistical Database On-line*, http://stats.unctad.org/FDI.
M&A	Natural logarithmic of inward M&A (current prices, millions of US Dollars).	United Nations Conference on Trade and Development (UNCTAD), *FDI Statistical Database On-line*, http://stats.unctad.org/FDI.
GREEN	Natural logarithmic of the number of projects of greenfields realized by foreign firms in host countries.	United Nations Conference on Trade and Development (UNCTAD), *World Investment Report*, various years.
GFDI	Growth rate of foreign direct investment (current prices US).	United Nations Conference on Trade and Development (UNCTAD), *FDI Statistical Database On-line*, http://stats.unctad.org/FDI.
GM&A	Growth rate of inward M&A (current prices US).	United Nations Conference on Trade and Development (UNCTAD), *FDI Statistical Database On-line*, http://stats.unctad.org/FDI.
GGREEN	Growth rate of inbound greenfield investments (number).	United Nations Conference on Trade and Development (UNCTAD), *World Investment Report*, various years.
OPEN	Degree of openness. This index is given by the sum of exports and imports as a share of GDP.	International Monetary Fund (2007), *World Economic Outlook Database 2007*, http://www.ifm.org/external/pubs/ft/weo/2007/02/weodata

GGDI	Growth rate of gross domestic investment (current prices US).	World Bank, *World Development Indicators On-line* http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20398986~isCURL:Y~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html. For Taiwan, data come from: National Statistics of Taiwan, *Macroeconomics Database*, Republic of China (Taiwan), http://61.60.106.82/pxweb/Dialog/statfile1L.asp.
SCH	Average Years of Schooling in adults	The schooling data come from Barro, R. and Lee, J.W. (1996), "International Measures of Schooling Years and Schooling Quality, American Business Review, vol. 86, pp. 218-223. The updated version is available at the Centre for International Development (CID) at Harvard University, http://www.cid.harvard.edu/ciddata. The data is only available for the averaged periods of 1995-2000 and 2000-2005. Not available information for Luxembourg.
GPOP	Population annual growth rate.	United Nations Statistics Division (UNSTATS), http://unstats.un.org/unsd/demographic/default.htm. For Taiwan, data come from: National Statistics of Taiwan, *Macroeconomics Database*, Republic of China (Taiwan), http://61.60.106.82/pxweb/Dialog/statfile1L.asp.

Table 2 – List of Countries included in the sample 1996-2006

Sub-samples	Countries
Developed Countries (I)	Germany; Australia; Austria; Belgium; Canada; Denmark; Norway; Slovakia; Slovenia; Spain; United States; Estonia; Finland; France; Greece; Netherlands; Hungary; Ireland; Israel; Portugal; United Kingdom; Czech Republic; Sweden; Switzerland; Italy; Israel; Luxembourg; Japan and New Zealand.
Developing Countries (II)	South Africa; Argentina; Brazil; Bulgaria; Chile; China; Colombia; Croatia; Philippines; Hong Kong; India; Indonesia; Malaysia; Mexico; Peru; Republic of Korea; Romania; Russia; Singapore; Egypt; Turkey; Taiwan; Thailand and Venezuela.

Note: United Nations Criteria

Table 3 – Unit Root Test of Panel Data

Variables	Levels/ First difference	Im, Pesaran and Shin IPS W-stat	N
GDP	**Level**	**8,641**	**505**
		(1,000)	
	First Difference	**-4,093**	**470**
		(0,000)	
FDI	**Level**	**-4,756**	**503**
		(0,000)	
	First Difference	**-11,178**	**440**
		(0,000)	
M&A	**Level**	**-16,156**	**516**
		(0,000)	
	First Difference	**-8,203**	**548**
		(0,000)	
GREEN	**Level**	**-10,696**	**212**
		(0,000)	
	First Difference	**-219,672**	**159**
		(0,000)	
Null Hypothesis	**Presence of Unit Root I (1)**		

Notes: 1. All the variables are expressed in logarithmic. 2. Time period for the greenfields series is 2002-2006, for the rest of variables is 1996-2006. P-values in parentheses.

Table 4 – Granger Causality for Panel Data

Explanatory Variables	FDI x GDP		M&A x GDP		GREEN x GDP	
	D.FDI (eq. 6)	**D.GDP (eq. 7)**	**D.M&A (eq. 8)**	**D.GDP (eq. 9)**	**D.GREEN (eq. 10)**	**D.GDP (eq. 11)**
L1_D.GDP	0,6167* (0,1035)	1,3910* (0,0030)	0,0895 (0,0931)	1,2944* (0,0029)	-0,7978*** (0,4338)	1,1121* (0,0427)
L2_D.GDP	0,3402** (0,1339)	-0,2914* (0,0025)	1,7019* (0,1156)	-0,1924* (0,0049)	0,9226* (0,3436)	-0,2590* (0,0443)
L1_D.FDI	0,2169* (0,0222)	-0,0083* (0,0016)				
L2_D.FDI	0,0536* (0,0113)	0,0127* (0,0019)				
L1_D.M&A			0,0720* (0,0191)	-0,0038* (0,0007)		
L2_D.M&A			0,0627* (0,0176)	0,0109* (0,0013)		
L1_D.GREEN					0,3668 (0,2629)	-0,0290** (0,0136)
L2_D.GREEN					-0,0984 (0,0669)	0,0011 (0,0112)
N	403	411	419	420	106	106
Sargan Test *p-value*	0,2250	0,1498	0,1730	0,1504	0,1119	0,0175

Notes: 1. Variables FDI, M&A and GREEN refer to the inflows of FDI, cross border M&A and greenfields, respectively. 2. All the variables are expressed in natural logarithmic. 3. Standard errors in parentheses. 4. D.VAR = VAR (t) – VAR (t-1), L1_D.VAR = VAR (t-1) – VAR (t-2), L2_D.VAR = VAR (t-2) – VAR (t-3). 5. *significant at 1%; **significant at 5%; ***significant at 10%.

Table 5 - Growth Equation

	Total Sample			
	(5.1)	**(5.2)**	**(5.3)**	**(5.4)**
C	-0,3274**	-0,3278**	-0,3326**	-1,4429*
	(0,1408)	(0,1408)	(0,1418)	(0,2639)
$GDP_{INItIAL}$	-0,0499*	-0,0497*	-0,0504*	-0,1219*
	(0,0153)	(0,0153)	(0,0154)	(0,0274)
GGDI	0,0960*	0,0961*	0,0959*	0,0859*
	(0,0058)	(0,0058)	(0,0058)	(0,0086)
OPEN	0,0241**	0,0242**	0,0247**	0,0113***
	(0,0010)	(0,0009)	(0,0010)	(0,0061)
SCH	0,0108	0,0109	0,0109	0,0532
	(0,0143)	(0,0143)	(0,0144)	(0,0460)
GPOP	0,9450	0,9606	0,9380	1,2273
	(0,6101)	(0,6104)	(0,6116)	(0,7154)
GFDI		0,0022**		
		(0,0010)		
GM&A			0,0003	
			(0,0009)	
GGREEN				0,0019*
				(0,0007)
Adjusted R^2	0,524	0,526	0,523	0,749
Hausman Test	25,285*	25,387*	26,280*	59,134*
F Stat.	10,972*	10,997*	10,725*	11,496*
N	508	508	506	201

Notes: 1. For this sample, a Hausman test favours Fixed Effects; therefore all models are estimated using a fixed effects method. 2. Values in parentheses are standard errors corrected for heterocedasticity using White (1980) method. 3. *significant at 1%; **significant at 5%; ***significant at 10%.

Table 6 - Growth Equation

	Developed Countries (I)				Developing Countries (II)			
	(6.1)	**(6.2)**	**(6.3)**	**(6.4)**	**(6.5)**	**(6.6)**	**(6.7)**	**(6.8)**
C	0,1561	0,1529	0,1539	-1,7074*	-0,9200*	-0,9222*	-0,9217*	-1,6919*
	(0,1497)	(0,1499)	(0,1418)	(0,3124)	(0,2296	(0,2297)	(0,2301	(0,3921)
$GDP_{INITIAL}$	-0,0258***	-0,0260***	-0,0263***	-0,1209*	-0,0842*	-0,0845*	-0,0843*	-0,1776*
	(0,0152)	(0,0152)	(0,0154)	(0,0262)	(0,0247)	(0,0247)	(0,0247	(0,0490)
GGDI	0,0468*	0,0471*	0,0459*	0,0491*	0,1045*	0,1044*	0,1046*	0,0983*
	(0,0092)	(0,0092)	(0,0058)	(0,0117)	(0,0075)	(0,0075)	(0,0075)	(0,0116)
OPEN	0,0543*	0,0542*	0,0567*	0,0272**	0,0123	0,0132	0,0125	0,0015
	(0,0012)	(0,0121)	(0,0122)	(0,0115)	(0,0138)	(0,0138)	(0,0138)	(0,0213)
SCH	-0,0365	-0,0362	-0,0367	-0,0248	0,0308**	0,0309**	0,0309**	0,0532**
	(0,0228)	(0,0225)	(0,0229)	(0,0175)	(0,0143)	(0,0143)	(0,0144)	(0,0260)
GPOP	1,4719**	1,5111**	1,4552**	1,3431**	1,4770	1,4639	1,5171	1,5233
	(0,5101)	(0,6070)	(0,6058)	(0,6318)	(0,9153)	(0,9157)	(0,9235)	(1,6747)
GFDI		0,0015***				0,0007***		
		(0,0009)				(0,0004)		
GM&A			0,0005				-0,0004**	
			(0,0007)				(0,0002)	
GGREEN				0,0032**				0,0081***
				(0,0012)				(0,0043)
Adjusted R^2	0,532	0,534	0,531	0,864	0,597	0,603	0,599	0,656
Hausman Test	84,870*	84,882*	83,561*	61,385*	19,039*	19,344*	19,044*	27,981*
F Stat.	10,652*	10,742*	10,413*	20,958*	13,355*	13,918*	13,547*	7,256*
N	273	273	271	105	235	235	235	96

Notes: 1. For this sample, a Hausman test favours Fixed Effects; therefore all models are estimated using a fixed effects method. 2. Values in parentheses are standard errors corrected for heterocedasticity using White (1980) method. 3. *significant at 1%; **significant at 5%; ***significant at 10%.

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