DOES FOREIGN DIRECT INVESTMENT PROMOTE GROWTH? RECENT EVIDENCE FROM LATIN AMERICA

Marta Bengoa

Blanca Sanchez-Robles*

Universidad de Cantabria

Abstract:

Recent research has stressed the role of technology as one of the crucial drive engines of growth. Not every country, however, has the same possibilities to access advanced technology. Many LDCs lack the necessary social infrastructure in order to innovate and must often recur to technology invented elsewhere. One of the channels whereby technology may diffuse from developed to developing countries is Foreign Direct Investment (FDI).

This paper designs and discusses a simple model in which FDI generates endogenous, non zero growth. In particular, FDI brings about growth because it offsets the tendency to decreasing returns to domestic capital exhibited by the production function. However, if the entrance of FDI is obstructed or precluded by policy measures in the host country, the growth rate of the latter will be smaller or even zero. The model also predicts that a policy shock intended to reduce the entry cost for multinationals may generate positive, endogenous growth in an otherwise stagnant economy.

Next, we present some empirical evidence obtained by exploiting a panel data from 18 Latin American countries over the period 1970-2000. Regressions of the growth rate of GDP per capita on FDI and a set of control variables seem to confirm the hypothesis that FDI promotes growth.

JEL Codes: O 40

The abundant research on economic growth that has flourished from the mid 80s onwards has underlined the role of endogenous technological progress as one of the main drive engines of growth (Romer, 1990; Grossman and Helpman, 1991; Aghion

• Corresponding author. Email: sanchezb@unican.esThe authors are grateful to X. Sala-i-Martin for helpful discussions over previous versions of this paper. The usual disclaimer applies.

and Howitt, 1992). However, the potential access to inventions and new designs is not homogeneous among countries. As the literature has also pointed out, some countries are capable to innovate and produce their own technology. Other, instead, may lack the necessary skills to generate new discoveries and implement them in the productive process. These countries, usually Less Developed Countries (LDCs), will have to benefit from the diffusion of the technology that is produced elsewhere.

In the last decades the literature has stressed a particular channel whereby technology may spill over from advanced to laggard countries, allowing the latter to grow at higher rates: i.e. the entrance of Foreign Direct Investment (FDI).

This point of view vividly contrasts with the common belief that was accepted in some academic and political spheres in the 1950s and 60s, according to which FDI was deleterious for the economic performance of LDC. Fortunately, the theoretical discussion that permeated part of the development economics of the second half of the 20th century has been approached from a new angle on the light of the New Growth Theory. Thus, the models built in this novel framework provide an interesting background in order to study the correlation between FDI and the growth rate of GDP.

This literature has developed various hypotheses that explain why FDI may potentially enhance the growth rate of per capita income in the host country. First, FDI is one of the main transmission vehicles of advanced technology from leaders to developing countries (Borensztein, De Gregorio and Lee, 1998).

In addition, FDI may ease the exploitation and distribution of raw materials that are produced in the host country, by means of helping improve the network of transport and communication. FDI may as well have a positive impact on the productive efficiency of domestic enterprises. Finally, FDI may also raise the quality of domestic human capital and improve the know-how and managerial skills of local firms, that have an opportunity to increase their efficiency by learning from and interacting with foreign firms (the so called *learning by watching* effect).

On empirical grounds, some recent contributions have detected a positive connection between FDI and growth. De Gregorio (1992) finds a positive and significant impact of FDI on economic growth in a panel of 12 Latin American countries over the period 1950-1985. Blomström, Lipsey and Zejan (1992) pursue a cross-country analysis of a sample of 78 developing countries. They report that the (positive) impact of FDI on growth is larger in those countries that exhibit higher levels of per capita income. Borensztein, De Gregorio and Lee (1998) suggest that FDI enhances economic growth by means of easing technological diffusion. This effect is detected in a set of 69 LDC over the years 1970-89. They also report a higher impact of FDI on growth than that of domestic investment. Balasubramanyam, Salisu and Sapsford (1996) employ a cross-country procedure to analyze 46 LDC in 1970-85. Their results suggest that FDI enhances growth in those cases in which the host country has adopted trade liberalization policies. Zhang (2001) documents a similar result. De Mello (1999) employs time series and panel data analysis over a sample of both OECD and non-OECD countries over the period 1970-1990. He claims that FDI has a positive impact on growth if there is complementarily between foreign and domestic investment. Bengoa and Sánchez-Robles (2003a) explore the correlation among FDI and economic growth in Latin America over the period 1970-1999. They also find a positive and significant impact of FDI on the economic growth of the countries of this area.

The remainder of the paper is as follows: Section 1 is devoted to design and discuss a model intended to provide some theoretical background to these (and other related) empirical results. The model is inspired in the contributions of Romer (1990), Rebelo (1991), Barro and Sala-i-Martín (1997) and Borensztein, De Gregorio and Lee (1998). Section 2 describes the empirical exercise pursued and summarizes its main results. Section 3 concludes.

1. The model

The main features of the model we present in this section are the following:

1.- Total production in the economy is elaborated taking as inputs the stock of capital in the host country (or domestic capital) together with the capital accumulated from the foreign direct investment entering into the country.

2.- Capital mobility is imperfect due, for example, to the existence of capital controls. This restriction, common in LDCs, entails that agents can not convert local asset in foreign currency at the official rate or, alternatively, that there are limits to this exchange[1]. As a consequence of this assumption there exists a wedge between domestic

[1] Similarly, it could be assumed that the country gets funds from abroad to finance just one part of its stock of capital, whereas the rest (the domestic component) is financed with local saving (Barro, Mankiw and Sala-i-Martín, 1995).

and international interest rates, the former being larger. In turn, higher rates of returns in host countries will attract FDI inflows into them – provided that policy measures do not discourage them - until the point in which both rates coincide.

3.- FDI implies the entrance of capital goods of more advanced technology into the country. Technical progress in the model is thus linked to this particular sort of investment.

1.1. Assumptions

There is only one consumption good in the economy, which is sold in competitive markets at a price normalized to one for simplicity. The rate of saving, s, is exogenous and constant. The production function of Y is of the form

(1) $$Y = AK^{a}F^{1-a} \qquad 0<\alpha<1$$

Where A captures various aspects related with the efficiency in the economy as, for example, the institutional framework (Basu and Weil, 1998). In other words, and following the terminology of Abramovitz (1986) A is a proxy of the social capacity of the host economy. K is domestic capital and F is the stock of capital accumulated through FDI. Labor does not appear in the production function in order to keep the analysis tractable. For the same reason, there is no population growth. α and $1-\alpha$ are the elasticities of output with respect to K and F respectively. We omit the subscript t in order to alleviate notation.

Following Romer (1990), we can think of F as composed by N varieties of intermediate capital goods x_i. In this regard, the entrance of new FDI entails an increase in the availability of intermediate goods available in the host county. Technological progress is captured by an increase in the number of available varieties of intermediate goods. This feature of the model implies that FDI is the channel whereby the host country can access *state of the art* technology[2]. However, in this paper we do not consider explicitly the disaggregation of F in different capital goods because it increases the complexity of the analysis substantially without altering the main conclusions.

[2] For a model that explicitly considers FDI as made up by different varieties of capital goods, see Bengoa and Sanchez-Robles, (2003b).

The production function described in (3) exhibits decreasing returns in each of the inputs, K and F, and constant returns to scale in K and F considered together.

Let us assume that a foreign firm is trying to decide whether to undertake an investment project in this country or not. The firm will invest in this country as long as the rate of return of a new variety of intermediate goods (net of the cost associated to the entrance in the country) exceeds the interest rate prevailing in the international market r^w.

We can think of this entry cost as the payment of fees, legal procedures, paperwork, and other outlays entailed by the adaptation of the managers of the firms to the local environment of the host country.

The entry cost will be assumed to be a percentage ϕ of the profits of the firm. It will typically depend on the attitude of the host country to the entrance of new firms: more outward oriented country will fix smaller values of ϕ. Hence, a new firm will entry into the local economy if the productivity of the new project net of the entry cost exceeds the world interest rate (equation 2):

$$(2) \qquad (1-\phi)\frac{\partial y}{\partial N_{FDI}} > r^w$$

Taking derivatives in (1) with respect to N_{FDI} and plugging its value in (2) yields:

$$(3) \qquad (1-\phi)\, A\, K^{\alpha}\, (1-\alpha)F^{-\alpha} > r^w$$

If condition (3) is fulfilled, new firms will come into this country, therefore increasing the number of available varieties of capital goods. The increase in F, in turn, decreases the marginal productivity of new varieties of capital until the point in which the marginal productivity of a new type of good (net of the entry cost) equals the world interest rate. Notice that this assumption prevents a massive entry of foreign firms in the local economy.

More formally, the equilibrium condition in the capital markets can be described as follows:

(4) $(1\text{-}\phi)\ A\ K^{\alpha}\ (1\text{-}\alpha)\ F^{-\alpha} = r^{w}$

A further assumption that shall be made concerns the dynamics of domestic capital. The law of motion of domestic capital has the standard form

$$(5) \quad \dot{K} = sY - dK$$

Where a dot over a variable represents its derivative with respect to time, and δ is the depreciation rate in the economy.

1.2. Discussion of the model.

Consider a particular country whose policymakers are reluctant to the entrance of FDI. They will set a higher value of ϕ; in the extreme case, ϕ will be equal to one. Therefore, the rate of return of potential foreign firms, net of the entry cost, will be equal to zero. No FDI will enter into the country and the economy will behave like in the Solow (1956) model. Decreasing returns in domestic capital will drive this nation to a steady state with zero growth. To see this, recall that the equations governing the dynamics of this economy are the same as those corresponding to the Solow model:

$$(1') \quad Y = AK^{a} \quad 0<\alpha<1$$

$$(5') \quad \dot{K} = sY - dK$$

Alternatively, we could assume that there is an initial stock of FDI in the economy, but a change in its political conditions has impeded the accession of new multinationals. In this case FDI would be constant over time and the model would behave as well as a Solow model with no growth.

This situation can be changed, however, by a policy shock. If economic authorities decide to reduce the value of ϕ, some multinationals will find the country appealing since the expected rate of return, net of the entry cost, is now higher than the world interest rate. The country will start to attract new inflows of FDI and grow. Decreasing returns in F, however, will reduce the rate of return of an additional variety of intermediate good supplied by a multinational up to the point in which this rate of return coincides with the world interest rate. At that point the economy will be in a steady state equilibrium. The production function is homogeneous of degree 1 in F and K, and therefore the model behaves like an AK model. Thus, Y, K and F will grow at the same rate in the steady state[3].

To compute the rate of growth in the steady state, first we have to find out the ratio of domestic to foreign capital in equilibrium. This ratio can be obtained by operating in (4) and is as follows:

$$\frac{K}{F}=\left(\frac{r^{w}}{(1-f)(1-a)A}\right)^{\frac{1}{a}} \tag{6}$$

Next we divide expression (5) over K. The result is equation (7). Plugging in the ratio K/F as stated by equation (6), we get an expression of the rate of growth of the economy in terms solely of the parameters of the model, (8)

$$\frac{\dot{K}}{K}=sAK^{a-1}F^{1-a}-d=s\left(\frac{K}{F}\right)^{a-1}-d \tag{7}$$

$$\frac{\dot{K}}{K}=s\,A^{\frac{1}{a}}\left[\frac{(1-f)(1-a)}{r^{w}}\right]^{\frac{1-a}{a}}-d \tag{8}$$

The main messages conveyed by expressions (7) and (8) are the following:

1.- The combination of FDI and the stock of domestic capital warrants the existence of positive and endogenous rates of growth in the host country. The model is linear in F and K, and this property ensures the existence of endogenous growth by means of offsetting the decreasing returns to scale exhibited by K and F alone.

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[3] Intuitively, a foreign firm that settles down in the host country to provide, for example, phone facilities, will require the support of domestic capital (offices, machines to construct the network, and so forth) thus contributing to the increase of domestic K.

2.- The rate of growth in the economy is inversely related to the opportunity cost of investing in international capital markets (r^w). Thus, higher world interest rates will discourage the flows of direct investment among countries, hence reducing the rate of growth in LDCs.

3.- The rate of growth is also negatively correlated with the cost that the foreign firm has to pay in the host country, ϕ. Economic policy may thus influence the amount of inflows coming into the country by means of altering this cost. The parameter ϕ will be lower in outward oriented countries, which remove regulations to the entrance of FDI and ease the paperwork necessary for foreign firms to settle down into the country. The attraction of FDI will be encouraged in these nations and these economies will be able to grow at faster rates. Inward oriented countries, instead, will exhibit higher values of ϕ; they will be less appealing to FDI as a potential destiny and therefore grow at a slower pace.

2. Empirical results

Next, we have pursued an empirical exercise in order to test the connection between FDI and growth. Our sample is composed of a selection of 18 Latin American countries[4], and the temporal horizon is 1970-2000. Data sources are standard in the literature (i.e the Summers-Heston data basis, completed when necessary with data from IMF and the World Bank).

The reasons why we have focused in the analysis of the Latin American countries are several. On the theoretical level, the nations belonging in this area are developing countries but have already a minimum level of social capacity, in terms of human capital, financial intermediaries and a certain level of institutional stability, as compared, for example, with Africa. Notwithstanding this fact, the sample offers enough variability in order to capture the impact of different degrees of the aforementioned variables.

Second, the criticisms against FDI were made especially by Latin American economists belonging to ECLAC and for the specific case of Latin American countries. Although the unfriendly approach against multinationals that stemmed from this school

[4] The countries that encompass the sample are Argentina, Bolivia, Brasil, Chile, Colombia, Costa Rica, R. Dominicana, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panamá, Paraguay, Perú, Uruguay and Venezuela.

extended to other countries, it was perhaps more acute in Latin America. In our view, it is important to have specific evidence regarding the impact of FDI on growth for Latin American countries. This evidence, in turn, may be helpful for policy markers and social agents of these nations, inducing them to exploit the benefits that foreign flows may entail.

Third, we have to mention that our particular familiarity with these countries, and the fact of Spain being one of the main investors in Latin America, makes this area both more amenable and interesting for Spanish researchers. In particular, since 1995 two Spanish banks[5] have become the largest retail banks in the area.

Finally, while there are already a number of papers that explore the impact of FDI on developing countries, the number of articles that deal explicitly with Latin America is still insufficient, in our view.

In the empirical exercise we have estimated a linearized version of equation (7). The dependent variable is the rate of growth (computed over five years averages, in order to depurate the data from the influence of the business cycle). The regressors are:

a) FDI (in percentage of GDP). We have not included investment to avoid collinearity with FDI (the data available of investment already include the flows of FDI)

b) The level of efficiency in the economy A has been captured by several proxies. One of them is the index of economic freedom (ile) of the Fraser institute, which can be understood as a proxy both of the social capacity of the country and the attitude towards FDI. A larger value of the index means that the country is more outward oriented, less regulated and thus keener to the entrance of FDI. The black market premium (bm) is a measure of the degree of distortions in local markets. Inflation (infl) indicates lack of discipline and commitment of the policymakers with the stability of the economy. The ratio of public consumption to GDP (con) has also been included: a high value of this indicator will generally mean that the degree of intervention of the public sector in the economy is larger, and inputs' productivity will be lower. The debt service ratio (serv) is an indicator of the financial solvency of the country. Finally, we have also included other variables that are often considered in empirical research on growth, such as population growth (pop grw), and some human capital measures: enrolment at the primary (prima) and secondary (secun) levels.

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[5] Santander Central Hispano (SCH) and Banco Bilbao Vizcaya Argentaria (BBVA).

c) Time dummies associated to the years in which large flows of debt accrued to Latin America (1972-1975).

Table 1 displays the results obtained by estimating our baseline specification in levels. According to this preliminary result, FDI is positively and significantly correlated with economic growth. The test for second order serial correlation, however, suggest the presence of autocorrelation in the residuals.

We have tried to remove this autocorrelation by means of estimating the model in first differences (Table 2). FDI is again positively and significantly correlated with economic growth. Now the test for second order serial correlation[6] suggests that the null hypothesis of no autocorrelation can not be rejected at conventional levels[7]. Therefore the model in first differences appears as preferably on econometric grounds.

It seems reasonable and in accord with the model presented above to treat FDI as an endogenous variable. The next estimations proceed in this way. The method employed is the Two Stage Generalized Methods of Moments (GMM2), which is especially suited for this kind of analysis (Arellano and Bond, 1991). FDI is instrumented by its own lags. Results are displayed in Tables 3-5.

Table 3 replicates the estimation carried out before in terms of the regressors included. The sign and degree of significance of FDI remain as before. The Sargan test for the validity of instruments[8] suggests that FDI is adequately instrumented by its own lags.

Table 4 introduces an additional control variable, the Index of Economic Freedom. The index is positively and significantly correlated with growth, as should be expected. The sign and significance of the point estimate of FDI are robust to the introduction of this variable.

The different estimations reported in Table 5 have considered alternative control variables. Two main messages can be summarized from this table. First, FDI is in all cases positively and significantly correlated with growth. Second, control variables have the expected signs. Black market premium, inflation, population growth, debt service and public consumption exhibit a negative correlation with growth. Human capital measures, instead, display a positive link with GDP growth. In all cases the diagnostic

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[6] Under the null hypothesis of no second order autocorrelation in the residuals, the test is distributed as a N(0,1).

[7] First order serial correlation appears in estimation in first differences by construction. It should not be regarded as a symptom of poor specification of the model.

[8] Under the null hypothesis of validity of instruments, the test is distributed as a $X_{p-k}^{2,}$ where p is the number of instruments and k the number of (non-endogenous) regressors in the estimation.

tests suggest both the validity of the instruments employed and the absence of second order serial correlation.

In addition, we have also included a dynamic version of the model, in which the growth rate in t is assumed to depend on the growth rate in the previous period (Table 6). Both the t statistic and the Wald test of the lagged growth rate suggest that this variable is not significantly different from zero. Nonetheless, this result can be attributed to the fact that we are working with averages over five years. Thus it is plausible that growth at date t is not influenced noticeably by growth at date t-5.

The results obtained by this analysis can be summarized as follows:

1. The coefficient of FDI is quite similar in all cases and significant at conventional values.
2. The rest of the variables included as regressors have the expected signs and are significant at conventional values. The index of economic freedom and the proxies of human capital have a positive impact on growth. Instead, black market premium, inflation, public consumption, debt service and population growth display a negative correlation with economic growth.
3. The dynamic model presented in Table 6 does not seem a good approximation to our data since the first lag of the growth rate is not significant.

3. Concluding remarks

Generally speaking, LDCs lack the necessary background – in terms of educated population, infrastructure, liberalized markets, economic and social stability and so forth - in order to be able to innovate and generate new discoveries and designs. Accordingly, they will have to benefit from the diffusion of technology that is produced elsewhere. One of the ways whereby this technological diffusion from the leaders countries to LDC may take place is the entrance of FDI.

This paper describes and discusses a simple model whose main prediction is that FDI may act as a drive engine of endogenous growth. FDI in this model warrants the entrance of more advanced technological intermediate goods in the economy, hence bringing about increases in the stock of domestic capital and in the total level of output. An important prediction of the model is that policy measures can be critical in order for a country to grow or stagnate. A policy shock that reduces the entry cost for multinationals can induce positive, endogenous growth in a country otherwise condemned to a steady state of zero growth.

Next, the paper presents the results from a panel data analysis of 18 Latin American countries. FDI is positively and significantly correlated with economic growth in all estimations. This basic finding carries over when different techniques or control variables are considered in the estimations, lending robustness the main hypothesis of the paper: i.e. FDI enhances economic growth.

Policy conclusions are straightforward: by easing the conditions that regulate the entry of foreign investment in developing countries, governments may attract this kind of investment and favor faster rates of growth in their countries. In contrast, inward oriented policies that preclude the entry of foreign investment may condemn the countries in which they are implemented to situations of no growth and poverty.

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Table 1. FDI and growth in Latin America (1970-2000). Estimation in levels.

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LEVELS
Number of firms:     18      Sample period is 1970 to 2000
Observations:       108      Degrees of freedom:       101

Dependent variable is:     growth

RSS =      0.047606           TSS =      0.068456
Estimated sigma-squared (levels)  =      0.000471

Wald test of joint significance:       6.028928   df =   1     p = 0.014
Wald test - jt sig of time dums:      36.526099   df =   5     p = 0.000

     Wald test selected by user:       6.028928   df =   1     p = 0.014
     Testing:     fdi

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST        0.020037        0.005423        3.694689        0.000220
     fdi        0.437400        0.178139        2.455388        0.014073
     D71       -0.008451        0.007246       -1.166295        0.243495
     D72       -0.037511        0.007255       -5.170611        0.000000
     D73       -0.025255        0.007237       -3.489734        0.000484
     D74        0.009652        0.007339        1.315179        0.188450
     D75        0.024895        0.008817        2.823600        0.004749

Test for  first-order serial correlation:   3.248  [   18 ]    p = 0.001
Test for second-order serial correlation:   1.683  [   18 ]    p = 0.092
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Software:DPD98 for Gauss, Arellano and Bond (1998). Standard errors and test statistics robust to heteroskedasticity.

Table 2. FDI and growth in Latin America (1970-2000). Estimation in first differences.

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FIRST DIFFERENCES
Number of firms:     18      Sample period is 1970 to 2000
Observations:        90      Degrees of freedom:        84

RSS =      0.053728           TSS =      0.082265
Estimated sigma-squared (levels)  =      0.000320

Dependent variable is:     growth
Wald test of joint significance:      10.179519   df =   1     p = 0.001
Wald test - jt sig of time dums:      95.831900   df =   5     p = 0.000

     Wald test selected by user:      10.179519   df =   1     p = 0.001
     Testing:     fdi

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.008493        0.006247       -1.359463        0.174000
     fdi        0.417078        0.130724        3.190536        0.001420
     D72       -0.020584        0.010452       -1.969410        0.048906
     D73       -0.020809        0.007333       -2.837656        0.004545
     D74        0.024233        0.009752        2.484833        0.012961
     D75        0.006315        0.010892        0.579823        0.562034

Test for  first-order serial correlation:  -1.957  [   18 ]    p = 0.050
Test for second-order serial correlation:   0.946  [   18 ]    p = 0.344
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Software:DPD98 for Gauss, Arellano and Bond (1998). Standard errors and test statistics robust to heteroskedasticity.

Table 3. FDI and growth in Latin America (1970-2000). GMM2 Estimation in first differences

IV, FIRST DIFFERENCES

Number of firms: 18 Sample period is 1970 to 2000
Observations: 90 Degrees of freedom: 84

Dependent variable is: growth
Instruments used are:
CONST fdi(1,all) TIM DUMS

Wald test of joint significance: 25.295880 df = 1 p = 0.000
Wald test - jt sig of time dums: 3664.652274 df = 5 p = 0.000

Sargan test: 14.526956 df = 14 p = 0.411

Variable	Coefficient	Std. Error	T-Statistic	P-Value
CONST	-0.007598	0.003893	-1.951377	0.051012
fdi	0.502633	0.099937	5.029501	0.000000
D72	-0.025022	0.006762	-3.700294	0.000215
D73	-0.022603	0.005412	-4.176458	0.000030
D74	0.019900	0.003942	5.048412	0.000000
D75	0.007014	0.006598	1.063078	0.287747

Test for first-order serial correlation: -2.183 [18] p = 0.054
Test for second-order serial correlation: 0.963 [18] p = 0.336

Software:DPD98 for Gauss, Arellano and Bond (1998). Standard errors and test statistics robust to heteroskedasticity.

Table 4. FDI and growth in Latin America (1970-2000). GMM2 Estimation in first differences.

Number of firms: 18 Sample period is 1970 to 2000
Observations: 90 Degrees of freedom: 83

Dependent variable is: growth
Instruments used are:
CONST fdi(1,all) TIM DUMS

Wald test of joint significance: 25.071994 df = 2 p = 0.000
Wald test - jt sig of time dums: 273.421789 df = 5 p = 0.000
Wald test selected by user: 5.131951 df = 1 p = 0.023
Testing: fdi

Sargan test: 11.677873 df = 13 p = 0.554

Variable	Coefficient	Std. Error	T-Statistic	P-Value
CONST	-0.000467	0.003926	-0.118870	0.905378
fdi	0.346557	0.152980	2.265381	0.023489
ile	0.020647	0.009404	2.195654	0.028117
D72	-0.024436	0.006468	-3.778110	0.000158
D73	0.010993	0.006397	1.718323	0.085738
D74	-0.006716	0.011104	-0.604844	0.545283
D75	-0.030637	0.009531	-3.214402	0.001307

Test for first-order serial correlation: -1.785 [18] p = 0.074
Test for second-order serial correlation: 0.622 [18] p = 0.534

Table 5. FDI and growth in Latin America (1970-2000). GMM2 Estimation in first differences.

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IV, FIRST DIFFERENCES

Number of firms:     18      Sample period is 1970 to 2000
Observations:        90      Degrees of freedom:        83

Dependent variable is:     growth
Instruments used are:

   CONST fdi(1,all) TIM DUMS

Wald test of joint significance:     104.107137   df =   3     p = 0.000
Wald test - jt sig of time dums:     278.289281   df =   5     p = 0.000
       Wald test selected by user:    18.715907   df =   1     p = 0.000
     Testing:     fdi

                    Sargan test:      14.451353   df =  12     p = 0.273

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.006531        0.004131       -1.581148        0.113844
     fdi        0.724141        0.167386        4.326189        0.000015
      bm       -0.000486        0.000317       -1.531726        0.125590
     con       -0.080592        0.217956       -0.369763        0.711559
     D72       -0.024822        0.007967       -3.115647        0.001835
     D73        0.023248        0.006610        3.517189        0.000436
     D74        0.013411        0.005628        2.383017        0.017171
     D75       -0.013582        0.007992       -1.699496        0.089226

Test for  first-order serial correlation:  -1.910  [   18 ]    p = 0.056
Test for second-order serial correlation:  -0.090  [   18 ]    p = 0.928

Software:DPD98 for Gauss, Arellano and Bond (1998). Standard errors and test statistics
robust  to heteroskedasticity.
```

```
IV, FIRST DIFFERENCES

Number of firms:     18      Sample period is 1970 to 2000
Observations:        90      Degrees of freedom:        81

Dependent variable is:     growth

Instruments used are:

   CONST fdi(1,all) TIM DUMS

Wald test of joint significance:      36.438062   df =   4     p = 0.000
Wald test - jt sig of time dums:      96.935960   df =   5     p = 0.000

     Wald test selected by user:      23.411203   df =   1     p = 0.000
     Testing:     fdi

                    Sargan test:      10.277089   df =  11     p = 0.506

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.028486        0.005680       -5.015128        0.000001
     fdi        0.560579        0.115858        4.838512        0.000006
     ile        0.008192        0.111169        3.733440        0.000001
   secun        0.039317        0.056492        4.236299        0.000023
     con       -0.179900        0.127351       -2.412639        0.003862
     D72       -0.018731        0.005798       -3.230767        0.001235
     D73        0.033289        0.007390        4.504867        0.000007
     D74        0.043536        0.014803        2.940916        0.003272
     D75        0.007855        0.011608        0.676677        0.498611

Test for  first-order serial correlation:  -1.432  [   18 ]    p = 0.152
Test for second-order serial correlation:   1.363  [   18 ]    p = 0.173
```

```
IV, FIRST DIFFERENCES

Number of firms:     18      Sample period is 1971 to 2000
Observations:        90      Degrees of freedom:        81

Dependent variable is:     growth

Instruments used are:

   CONST fdi(1,all) TIM DUMS

Wald test of joint significance:      36.438062   df =   4     p = 0.000
Wald test - jt sig of time dums:      96.935960   df =   5     p = 0.000

     Wald test selected by user:      23.411203   df =   1     p = 0.000
     Testing:     fdi

                    Sargan test:      10.277089   df =  11     p = 0.506

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.028486        0.005680       -5.015128        0.000001
     fdi        0.560579        0.115858        4.838512        0.000001
     ile        0.008192        0.111169        3.833440        0.000025
   secun        0.239317        0.056492        4.236299        0.000023
     con       -0.179900        0.127351       -1.412639        0.157762
     D72       -0.018731        0.005798       -3.230767        0.001235
     D73        0.033289        0.007390        4.504867        0.000007
     D74        0.043536        0.014803        2.940916        0.003272
     D75        0.007855        0.011608        0.676677        0.498611

Test for  first-order serial correlation:  -1.432  [   18 ]    p = 0.152
Test for second-order serial correlation:   1.363  [   18 ]    p = 0.173
```

```
IV, FIRST DIFFERENCES

Number of firms:     18      Sample period is 1971 to 2000
Observations:        90      Degrees of freedom:        81

Dependent variable is:     growth

Instruments used are:

   CONST fdi(1,all) TIM DUMS

Wald test of joint significance:      16.682045   df =   4     p = 0.002
Wald test - jt sig of time dums:      35.318672   df =   5     p = 0.000

     Wald test selected by user:       7.784382   df =   1     p = 0.005
     Testing:     fdi

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.019648        0.009484       -2.071633        0.038300
     fdi        0.643976        0.230811        2.790051        0.005270
    infl       -0.000089        0.000827       -3.107060        0.000341
   secun        0.169106        0.107587        1.571815        0.115993
     con       -0.320899        0.124274       -2.582178        0.009818
     D72       -0.014020        0.012085       -1.160109        0.246004
     D73        0.024329        0.007331        3.318566        0.000905
     D74        0.024928        0.011360        2.194380        0.028208
     D75       -0.004522        0.012554       -0.360194        0.718702

Test for  first-order serial correlation:  -2.282  [   18 ]    p = 0.023
Test for second-order serial correlation:   1.037  [   18 ]    p = 0.300
```

```
IV, FIRST DIFFERENCES

Number of firms:     18      Sample period is 1971 to 2000
Observations:        90      Degrees of freedom:        81

Dependent variable is:     growth

Instruments used are:

   CONST fdi(1,all) TIM DUMS


Wald test of joint significance:      41.192262   df =   4     p = 0.000
Wald test - jt sig of time dums:      66.735231   df =   5     p = 0.000

     Wald test selected by user:      40.941336   df =   1     p = 0.000
     Testing:     fdi

                   Sargan test:      10.391005   df =  11     p = 0.496

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.025547        0.006962       -3.669206        0.000243
     fdi        0.625936        0.097825        6.398542        0.000000
  pop grw      -0.004428        0.000036       -4.505678        0.000083
   secun        0.231558        0.075544        3.065217        0.002175
     con       -0.242980        0.095610       -2.541372        0.011042
     D72       -0.019106        0.007387       -2.586484        0.009696
     D73        0.027498        0.005135        5.354665        0.000000
     D74        0.028962        0.008034        3.604719        0.000312
     D75       -0.001943        0.007483       -0.259669        0.795119

Test for  first-order serial correlation:  -1.913  [   18 ]    p = 0.056
Test for second-order serial correlation:   1.434  [   18 ]    p = 0.151
```

```
IV, FIRST DIFFERENCES

Number of firms:     18      Sample period is 1971 to 2000
Observations:        90      Degrees of freedom:        81

Dependent variable is:     growth

Instruments used are:

   CONST fdi(1,all) TIM DUMS


Wald test of joint significance:      22.559543   df =   3     p = 0.000
Wald test - jt sig of time dums:     153.667281   df =   5     p = 0.000

     Wald test selected by user:      13.582890   df =   1     p = 0.000
     Testing:     ide

                   Sargan test:      12.478505   df =  12     p = 0.408

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.017441        0.003707       -4.704872        0.000003
     ide        0.495232        0.134373        3.685497        0.000228
   prima        0.005701        0.067063        3.247157        0.000630
    serv       -0.015166        0.033725       -2.999709        0.000920
     D72       -0.023558        0.006086       -3.870660        0.000109
     D73        0.024520        0.005355        4.579016        0.000005
     D74        0.025198        0.004435        5.681038        0.000000
     D75       -0.005829        0.006901       -0.844731        0.398261

Test for  first-order serial correlation:  -2.000  [   18 ]    p = 0.045
Test for second-order serial correlation:   1.564  [   18 ]    p = 0.118
```

Table 6. FDI and growth in Latin America (1970-2000). GMM2 Dynamic Estimation in first differences.

```
IV FIRST DIFFERENCES

Number of firms:     18      Sample period is 1970 to 2000
Observations:        72      Degrees of freedom:        66

Dependent variable is:     growth

Instruments used are:

   CONST cre(2,all) TIM DUMS


TWO-STEP ESTIMATES

Wald test of joint significance:      20.510156   df =   2     p = 0.000
Wald test - jt sig of time dums:     274.426098   df =   4     p = 0.000

     Wald test selected by user:       0.831050   df =   1     p = 0.362
     Testing: cre(-1)

                    Sargan test:      11.874760   df =   8     p = 0.157

Variable      Coefficient      Std. Error     T-Statistic        P-Value
------------------------------------------------------------------------
   CONST       -0.031032        0.003316       -9.357575        0.000000
 grw(-1)        0.113318        0.124304        0.911619        0.361969
     fdi        0.863789        0.311636        2.771787        0.005575
     D73       -0.050465        0.010554       -4.781470        0.000002
     D74        0.042590        0.004849        8.784108        0.000000
     D75        0.003083        0.009941        0.310143        0.756452

Test for  first-order serial correlation:  -2.399  [   18 ]    p = 0.066
Test for second-order serial correlation:   0.199  [   18 ]    p = 0.842
```