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Foreign Capital and Economic Growth in Mexico: Further Time-Series Evidence, 1970-2020

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Abstract

This paper tests whether changes in the accumulated stocks of gross FDI and net FDI (after subtracting net payments of profits and interest) have a positive or negative effect on Mexican economic growth over the 1970-2020 period. The novelty of the paper resides in the fact that it is one of the few in the extant literature to examine the effect of changes in the stock of net FDI on economic growth as opposed to changes in the stock of gross FDI. The focus on Mexico is based on the availability of time series data for a sufficiently long period of time (51 years) and on its strategic economic and geopolitical importance to the United States stemming from its membership in the USMCA. The first section examines the relevant literature and motivates the discussion of the economic importance of reverse flows in the Mexican case. This is followed by a presentation of the conceptual model and its empirical counterpart. The fourth section presents the results for an error correction model during the 1970-2020 period along with actual and in-sample (historical) forecasts generated by the model. Tests for reverse "causality" or precedence are undertaken via the VECM Granger Causality/Block Exogeneity test and they suggest that FDI flows lead economic growth rather than the reverse. The last section is the conclusion.

Keywords: Economic Growth; Foreign Direct Investment (FDI); Johansen Procedure; Net Payments of Interest and Profits; Pantula principle; VECM Granger Causality/Block Exogeneity Test

J.E.L. Codes: O10, O40, O57

1. Introduction

The debate on the relationship between foreign direct investment and economic growth has exhibited considerable interest and controversy in the fields of development and international economics. Several empirical papers have been undertaken to establish whether there is a significant positive (negative) economic link between these variables and whether the line of "causation" runs from FDI to economic growth or vice versa (see Benetrix, et al., 2023; and Paul and Feliciano-Cestero, 2021). The rationale for assessing the impact of FDI stems from the purported benefits arising from inflows of FDI to developing nations in the form of additional financing for private capital formation, the direct transfer of managerial and technological knowledge, and the inducement to innovate (learning-by-doing) it generates for domestic firms as they face greater competition from foreign firms (see Aitken & Harrison, 1999; Aurangzeb & Stengos, 2014; Cicea, & Marinescu, 2020; De Mello, Jr., 1997; Ram and Zhang, 2002; Ramirez, 2006; and Vohra, 2001). The (potential) positive correlation between FDI and economic growth is also dependent on the country's level of economic development, its institutional-legal framework, as well as the specific time period in question (see Alfaro et al., 2004; Borensztein et al., 1998; and Bruno et al., 2018). Critics of FDI, on the other hand, argue that these inflows have a negative effect on economic growth because they lead to substantial reverse flows of profits, dividends, and interest, the transfer of capital-intensive technology, and/or eliminates domestic enterprises via intense competition (as a result of TNCs' monopoly over state-of-the art technology) [see Chang, 2008; Cypher and Dietz, 2020; Green, 2013; Green, 2005; and Kumar, 2007]. It is argued that the combined negative effects of these factors could offset the positive effects alluded to above.

In this connection, Mexico has attracted vast amounts of foreign capital over the past decades as a result of its embrace of market-based, outward-oriented reforms (see Chang, 2008; ECLAC, 2023; Green, 2005; Kumar, 2007; Ramirez 2023; and UNCTAC, 2024). The country dismantled its ISI model of industrial development following the debt crisis of the early eighties and fully embraced the neoliberal model with the passage and implementation of both the NAFTA and USMCA (United States-Mexico-Canadian Trade Agreement, formerly NAFTA). Given the country's highly liberal policies towards the regulation of foreign capital and the repatriation of profits, it has also experienced huge outflows of profits and interest in recent years. ECLAC (2023) reports that net payments of profit and interest for Mexico during the 2015-22 period averaged $32.4 bn, while net inflows of FDI over the same period averaged $34.4 bn, slightly above the outflows. These reverse flows are not only large in absolute terms but relative to the country's GDP (averaging 2.8 percent over the period in question) and gross fixed capital formation (averaging 11.4 percent) [see ECLAC, 2023; and UNCTAD, 2024]. In fact, for the 2015-2022 period, instead of contributing to the financing of private domestic capital formation, FDI has actually diverted resources away from the financing of grows fixed capital formation (author's calculations).

This short paper is one of the first in the literature to test whether changes in the accumulated stocks of gross FDI *and net FDI* (after subtracting payment of profits and interest) have a positive or negative effect on Mexican economic growth over the 1970-2020 period. The focus on Mexico is based on the availability of time series data for a sufficiently long period of time

(51 years) and on its strategic economic and geopolitical importance to the United States stemming from its membership in the USMCA (formerly the NAFTA). The paper is organized as follows. The first section discusses the conceptual framework utilized to estimate the impact of FDI on economic growth. The next section presents the estimated empirical model used in this study. This is followed by a presentation of the results for an error correction model during the 1970-2020 period along with actual and in-sample (historical) forecasts generated by the model. Tests for reverse "causality" or precedence are undertaken via the VECM Granger Causality/Block Exogeneity test. The last section is the conclusion.

2. Conceptual Framework

In order to investigate the relationship between foreign direct investment (FDI) and economic growth in the Mexican case, this paper utilizes a standard aggregate production function in which the stock of foreign capital along with labor and the stock of private domestic capital enter as inputs into the following general production function:

$$Y = f(L, K_p, K_f) \quad (1)$$

where Y is aggregate real output and L, K_p, and K_f represent, respectively, labor, private capital, and foreign capital. Taking total differentials of (1) in log form, and manipulating the expression slightly (see Ram 1987; and Vohra, 2001) the growth equation in logarithmic form is obtained as:

$$y_t = \beta_1 l_t + \beta_2 k_{pt} + \beta_3 k_{ft} \quad (2)$$

where lower case letters denote growth rates of the respective variables, viz., $y_t = \ln Y_t - \ln Y_{t-1}$, and so on. By adding a constant and stochastic term (2) can be estimated as follows:

$$y_t = \alpha + \beta_1 l_t + \beta_2 k_{pt} + \beta_3 k_{ft} + \varepsilon_t \quad (3)$$

where the estimated coefficients are elasticities and they represent annual percentage change in output growth with respect to the percentage change in the growth rates of the included variables. It is anticipated that β_1 and β_2 will be positive, while β_3 can be positive or negative depending on whether the growth rate of foreign capital complements or substitutes for the growth rate of private domestic capital (see De Mello, Jr., 1997; Ram, 1986; and Ramirez, 2006).

3. Empirical Model

Before estimating the model in equation (3), it is first necessary to determine whether the individual variables in level form are stationary, and if not, whether there exists a long-term relationship among the variables in level form that is stationary or I(0), despite each variable being individually non-stationary or I(1). (Note 1) If no long-term relationship is present, then the model in equation (3) will determine the short-run relationship between economic growth and FDI. However, if a unique long-term relationship exists, then equation (3) can be estimated as an error-correction (EC) model; that is, a model that includes both a short-term relationship among the included variables and an adjustment to the long-run relationship of the relevant variables (in level form) denoted by the lagged EC_{t-1} term (see Asteriou and Hall, 2021). The following model was estimated for the Mexican economy over the 1970-2020 period:

$$y_t = \alpha + \beta_1 l + \beta_2 k_{pt-i} + \beta_3 k_{fgt-i} [k_{fnt-i}] + \beta_4 r_{t-1} + \beta_5 EC_{t-1} + \beta_6 D_1 + \beta_7 D_2 + \varepsilon_t \quad (4)$$

where lower case letters denote the growth rates of the *natural logarithms* of the relevant variables; y denotes the growth rate of real GDP (1970 pesos); l is the growth rate of the labor force (proxied by the economically active population); k_p is defined as the growth rate of the stock of private capital (1970 pesos); k_{fg} and k_{fn} denote, respectively, the growth rate of the gross and net stocks of FDI capital; (Note 2) r represents the growth rate in total remittances (received) and is included in the estimated equation because these flows have become important in both absolute and relative terms in recent decades; (Note 3) EC_{t-1} refers to the error correction (obtained from the unique cointegrating equation)(Note 4) and it is expected to be negative; and D_1 is dummy variable for the economic and political crises years 1976, 1982-83, 1995, 2001-02, 2008-09, and 2020, while D_2 is a dummy variable for the petroleum-led expansion of 1978-81. Except for the dummy variable, D_1, and the EC_{t-1} term, the remaining variables are expected to have a positive effect on the growth rate in real output.

4. Empirical Results

The results are reported in Table 1 below and, as anticipated, they show that the lagged growth rate in private capital stock (k_{pt-1}) has a positive and economically significant effect on output growth in all EC regressions. The effect of *gross* foreign capital stock (k_{fgt-3}) in eq. (1), i.e., without subtracting profit and dividend remittances, also has a positive and significant effect on the rate of output growth, *ceteris paribus*. (Note 5) On the other hand, the impact of the growth rate in *net* foreign capital stock (k_{fnt-3}) in eq. (2) on output growth is reduced by a factor of four and is marginally significant at the 10 percent level. The growth rate in total remittances is also economically and statistically significant and is comparable to that of foreign capital in all regressions except for eq. (1).

Of course, it is possible for the line of causation to run the other way, so I estimated a multi-variate VECM Granger Causality/Block Exogeneity test with 1-2 lags. The results in Table 2 for one lag suggest that the null hypothesis that k_f does not "Granger cause" y *can* be rejected at the 1% level for all three lags (p-value: 0.0038), while the reverse hypothesis that y does not "Granger cause" k_f *cannot* be rejected (p-value of at least 0.4083). Similar results were obtained when testing for "Granger causality" between the pairs y and k_p, viz., the line of "causality" runs from changes in k_p to changes in y. Interestingly, the results suggest that increases in kp and kf precede changes in l, but not the other way around. Finally, the estimates for the pairs k_f and k_p suggest that there is one-way precedence from kp to kf at the 5 percent level of significance (results for the other lags are available upon request).

Table 1. Mexico: Error Correction Model: Dependent Variable is Real GDP Growth Rate (y_t), 1970-2020

Variables	(1)	(2)	(3)	(4)
Constant	-0.04	-0.03	-0.02	-0.01
	(-4.65)**	(-2.08)**	(-2.30)**	(-1.98)**
l_{t-1}	0.59	0.61	0.29	0.32
	(2.33)**	(2.31)**	(2.77)**	(2.81)**
k_{pt-1}	0.76	0.73	0.73	0.70
	(3.42)**	(3.23)**	(7.11)**	(6.31)**
k_{fgt-3}	0.07	----	0.04	----
	(2.39)**		(2.40)**	
k_{fnt-3}	----	0.01	----	0.01
		(1.59)[a]		(1.52)[a]
r_{t-1}	----	----	0.03	0.03
			(4.42)**	(4.47)**
EC_{t-1}	-0.83	-0.84	-0.43	-0.41
	(-3.85)**	(-3.84)**	(-6.84)**	(-7.35)**
D_1	----	----	-0.06	-0.06
			(-8.11)**	(-7.26)**
D_2	----	----	0.07	0.07
			(11.61)**	(11.47)**
Adj R^2	0.62	0.61	0.84	0.83
SE	0.04	0.04	0.02	0.02
AC	-3.73	-3.71	-4.41	-4.32
SC	-3.50	-3.48	-4.07	-3.92
DW	1.95	1.93	2.20	2.20
B-G	1.36	0.79	1.86	2.09
F-Stat	14.05**	13.75**	25.02**	20.23**

Note: T-ratios are in parenthesis. *Significance at the 5%; **Significance at the 1%; [a] Denotes significance at the 10%. SE is the standard error of the regression. AC denotes Akaike info criterion; SB refers to Schwartz criterion; DW denotes the Durbin Watson statistic; and B-G is the Breusch-Godfrey serial correlation LM test.

Turning to the EC regressions with the dummy variables, eqs. (3) and (4), it can be seen that they have their anticipated effects and are highly significant; in addition, their relative fit and efficiency is quite good (see Adj R^2, AC, SC, DW, B-G LM Test, and F stats) and, as the theory predicts, the EC terms are negative and highly significant. The coefficients of the EC terms in eqs. (3) and (4) suggest that a deviation from long-run output growth during the current year is corrected by about 41 to 43 percent in the next year, *ceteris paribus*. It can be readily seen that estimated equations are *robust* to the inclusion or exclusion of the dummy variables [compare eqs. (1) and (3)]. The EC regressions were also used to track the historical data on real GDP growth. Theil inequality coefficients (available upon request) are well below the threshold level of 0.3, and their variances, covariances, and bias statistics are very close to their theoretical values (see Theil, 1966). Figure 1 below, corresponding to eq. (3), indicates that the EC model is able to closely track the turning points of the actual series. It also reveals the poor economic performance of Mexico over the period in question.

Table 2. VEC Granger Causality/Block Exogeneity Wald Tests

Sample: 19702020

Included observation: 51

Dependent variable: y			
excluded	Chi-sq	df	Prob.
I	8.464970	1	0.0036
kp	4.597962	1	0.0320
kf	8.358860	1	0.0038
All	28.90350	3	2.3463
Dependent variable: I			
excluded	Chi-sq	df	Prob.
y	0.347180	1	0.5557
kp	5.576140	1	0.0182
kf	3.700170	1	0.0544
All	7.058780	3	0.0700
Dependent variable: kp			
Excluded	Chi-sq	df	Prob.
y	0.023562	1	0.8780
I	0.472622	1	0.4917
kf	0.135425	1	0.7128
All	0.509037	3	0.9169
Dependent variable: kf			
excluded	Chi-sq	df	Prob.
y	0.683510	1	0.4083
I	0.927540	1	0.3355
kp	4.517229	1	0.0335
all	4.638660	3	0.2002

Note: Estimations performed with Eviews 13.0.

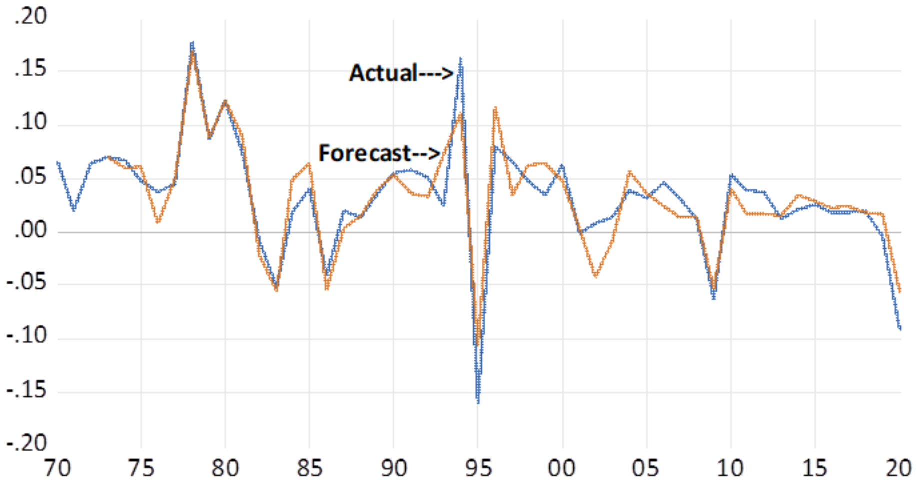

Figure 1. Actual and In-Sample Forecast for Real GDP Growth Rate, 1970-2020

5. Conclusion

This short paper has documented the sizeable transfer of resources out of Mexico in recent decades despite the country's impressive inflow of FDI. This unwelcome trend has accelerated since 2015 and represents foregone opportunities for private fixed capital formation, investment in human capital, and employment creation in a country that is desperately in need of all of them for economic growth and development. The econometric results suggest that, once remittances of profits and interest are accounted for, the economic impact of the growth rate in *net* foreign capital on the rate of output growth is reduced significantly. This is an important contribution to the literature because most empirical studies only test for the impact of gross FDI flows and do not explicitly take into account the reverse flow of profits and interest. The other included variables are statistically and economically significant and have their anticipated effects; the relative fit and efficiency of the error correction model is quite good and robust to the inclusion or exclusion of dummy variables, and it is able to effectively track the turning points of real GDP growth over the period under review. The issue of reverse "causation" or precedence is also addressed in this study and it is found that, in the case of Mexico over the period in question, FDI flows lead economic growth rather than the reverse, *ceteris paribus*. Finally, it is beyond the scope of this short paper to address the important question of whether the actual (potential) long-run benefits of foreign capital often touted by its advocates, in terms of financing capital formation and transferring technological and managerial knowhow, are able to offset the negative effects associated with the massive reverse transfers the country has experience in recent years.

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Notes

Note 1. Based on standard ADF and PP unit root tests and the KPSS confirmatory test (null hypothesis of a unit root is *reversed*), all the variables included in the underlying production function, Y, L, K_p, and K_f exhibit a unit root in *level* form but are stationary in first *difference* (results are available upon request). Also, in view of the fact that the *power* of these standard tests is compromised in the presence of structural breaks (see Asteriou and Hall, 2021), this study also undertook unit root tests with a structural break (intercept only). The results of these tests (available upon request) are consistent with those of the ADF, PP, and KPSS tests. The number of yearly observations (51) surpasses the threshold recommended by Granger and Newbold (1986) of 50 observations; failure to meet this threshold may compromise the power of the unit root (and cointegration) tests—not to mention distort the size or significance of the tests as well.

Note 2. The stocks of private domestic and foreign capital were generated via a standard perpetual inventory model of the following form: $K_t = K_{t-1} + I_t - \delta K_{t-1}$, where K_t is the stock of capital at time t, I_t is the flow of gross investment during period t, and δ is the rate at which the stock of capital depreciates in period t-1. The initial stocks of private and foreign capital were estimated by aggregating over 10 years of gross investment and assuming a rate of depreciation of 5%. For further details, see Ramirez, 2006, pp. 809-810, and 816; and Looney, 2001.

Note 3. Mexico is the largest recipient of remittance flows in Latin America (and the third largest recipient in the world, after India and China) and, not surprisingly, it also recorded a dramatic increase in these flows for the period under review, from a level of US$24.8 bn in 2015 to an estimated (preliminary) level of US$58.5 bn in 2022. In fact, remittance flows have become such an important source of foreign exchange earnings for the country over the last decade that they rank third, just behind Mexico's earnings from maquiladoras (assembly-line industry) and oil (see ECLAC, 2023; and UNCTAD, 2024).

Note 4. Utilizing the Johansen and Juselius (1990) method and the Pantula (1989) principle, it was determined that there is one *unique* linear combination (cointegrating vector) of these non-stationary variables that is I(0); i.e., there exists a stable and unique long-run relationship among the variables in logarithmic form. The Pantula selection procedure determined that there is one unique cointegrating vector and *Model 3* (out of five relevant ones) should be chosen because it is the *last* significant estimate *before* the null of no cointegration cannot be rejected. That is, the model selected is one with a dual constant, viz., one constant included in the cointegrating (long-run) level equation and another in the short-run (difference) dynamic equation. The likelihood ratio (LR) test suggests that the null hypothesis of no cointegration can be rejected at the 5% level (trace statistic = 32.74 > critical value (5%) = 29.79 (p-value: 0.0223). The presence of *one* unique cointegrating equation was used to generate the residuals (EC terms) used in the EC regressions reported in Table 1. Detailed results are available upon request.

Note 5. I tested the restriction that the sum of the elasticities of labor and private capital in the underlying production function is equal to 1. The Wald test (p-value: 0.2932) suggested that the assumption of constant returns to scale *cannot* be rejected. Results are available upon request.

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Data sharing statement

No additional data are available.