4. FDI in and from emerging market economies

Interactive session

BOUNDS TESTING APPROACH: OUTWARD FOREIGN DIRECT INVESTMENT AND DOMESTIC INVESTMENT IN BRAZIL

Abstract

Policymakers have a dilemma of investment strategies. On the one hand, they encourage domestic companies to invest abroad as a way to become more competitive in international markets. On the other hand, there is a fear that encouraging outward foreign direct investment (OFDI) it could affect domestic investments. Previous studies on the relationship between OFDI and domestic investments had based on the context of developed countries, or when analyzing emerging markets, they focused on China, India or an aggregate of developing countries. This preliminary study investigates the long-run and short-run relationship between these investments in a different context of emerging markets, by analyzing the Brazilian case. We applied an econometric approach, namely Autoregressive Distributed Lag (ARDL), for the period from 1975 to 2013 based on the World Bank Database. We also applied an error correction model (ECM) for the selected ARDL model, finding a negative and significant correction term. The findings show that, in the long-run, each additional dollar spent on outward FDI has significant and positive impact of USD1.49 on domestic investment. Therefore, it does not support the notion that international expansion of multinational enterprises cause disinvest in the local market, but the inverse is found.

Keywords: Outward Foreign Direct Investment, Domestic Investment, Autoregressive distributed lag (ARDL), Error Correction model (ECM), Brazil.

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1. INTRODUCTION

In recent decades, the global economy has undergone significant changes that have transformed the international capital flow, due to factors, such as globalization (Alfaro et al., 2007) and higher competition among multinational enterprises - MNEs (Rangan & Drummond, 2004). In this context, foreign direct investment (FDI) plays an important role in this new scenario, because this is a mechanism in which firms can maintain their production control abroad, find new opportunities, maximize their values and exploit existing firm-specific advantages (Kuemmerle, 1999).

In addition, FDI can help to cover the country current account deficit, fiscal deficit and supplements inadequate domestic resources to finance both ownership change and capital formation (EBRD, 2001). According to the World Investment Report (2013), developing countries have increased their share of global outward foreign direct investment (OFDI) between 1970 and 2013 from 0.3%% to 39.2%. In this period, Latin American countries also have increased their share, but at slower growth rate from 0.14% to 2.29%. Essentially, this may concern to policymakers in order to assess a dilemma. On the one hand, they encourage domestic firms to invest overseas as a way to become more competitive in international markets. On the other hand, there is a fear that encouraging OFDI it could affect domestic investments. Thus, how domestic investment is affected by the foreign investment outflows, since the domestic investments can be an important tool to stimulate local economy?

There is considerable debate over investing on foreign market and the replacement of domestic activities, such as employment, capital investment or tax revenue, since the firms shift their local production to abroad. Stevens and Lipsey (1992) classified two forms in which OFDI may

have effect on the local economy. First, it is through financial markets, considering an inefficient financial market; the MNEs would transfer their capital to other countries, diminishing the amount of financial resources available in the local economy, implying that local firms would face difficulties to raise new financial resources. Second, it is through shifting their production to foreign market, which may be classified into three main reasons efficiency-seeking, market-seeking, and strategic asset–seeking (Dunning, 1993).

This distinction is important because it may have different impacts on economy. On one hand, if the MNEs displaces its production or exports to another country, this would have a negative impact on domestic investment. On the other hand, if the MNEs are asset-seeking, this would not have a negative impact on the local economy, since the firm is looking for unavailable resources in its market (Hejazi and Pauly, 2003). Therefore, depending on the type of international expansion and the country characteristics, the impact of OFDI on local economy may vary through negative or positive values.

Furthermore, previous studies investigated the influence of OFDI on domestic aspects using a sample of developed countries (Arndt et al., 2007; Herzer & Schrooten, 2008; Herzer & Nunnenkamp, 2011), as they are interesting to analyze whether the production transfer from a developed country to a developing country, could impact on domestic employment and productivity. Prior research also analyzed cases of emerging countries, but these studies focused particularly on China (Hsu et al., 2011; Huang & Hou, 2011), India (Girma et al., 2010) or an aggregate group of developing economies (Herzer, 2011; Al-Sadiq, 2013).

In this sense, this study investigates the relationship between OFDI and domestic investment and quantifies the extent to which OFDI really impact the domestic investment in a different emerging market context. This study looks at developing market's view, particularly from Brazil, the largest Latin America (LATAM) economy. The findings of this study may be useful

for determining the economic policies that stimulates both OFDI and the domestic investments. Moreover, it can be a source for internal and external political planning, since we measure the relation between the OFDI and domestic investment.

The findings of this study may differ from the ones obtained from developed economies (Arndt et al., 2007; Herzer & Schrooten, 2008; Herzer & Nunnenkamp, 2011) and other developing countries (Girma et al., 2010; Herzer, 2011; Hsu et al., 2011; Huang & Hou, 2011; Al-Sadiq, 2013). We can still have different results among LATAM countries, since the economic liberalization process in LATAM occurred at different times and forms (Bosworth & Collins, 1999; Agosin & Machado, 2005; Ali, 2013), among others. Furthermore, the FDI flows and domestic investments can vary due to political reasons or economic cycles, thus it is important to make an in-depth analysis in a country as Brazil.

2. LITERATURE REVIEW

There is a vast literature about the MNEs in which encompasses a variety of explanation for the internationalization process. Usually, the theoretical framework is divided into two main strand lines: macro and micro. The macro theories address the economic factors which may determine the firm's FDI decision, for instance, the determinants of FDI may be economic growth rate (Borensztein et al., 1998), exchange rate (Takagi & Shi, 2011), interest rate (Alfaro et al., 2010), political situation (Jensen, 2008) among others.

The micro theories address the topic at firm's perspective. We highlight the pioneering work of Hymer (1976), which characterizes FDI as a strategy in which oligopolistic companies try to increase their market power abroad, reducing competition by placing barriers advantages to entry. The internalization theory of MNEs (Buckley & Casson, 1976; 2009) asserts that because of the market imperfection the companies have incentive to internalize their production. Vernon (1966, 1979), who describes the FDI through four stages of production cycle. Hennart (1982)

with transaction cost, who tries to explain the internalization process assuming market imperfections and specific firms' advantages. Finally, Dunning (1981, 1993, 1999) who developed the eclectic paradigm or also called OLI model, referring to three types of advantages: ownership, localization and internalization. Dunning (1999) argue that the MNEs should have a certain type of advantage in order to compete with local companies. These theories are the cornerstone of International Business (IB).

In more recent studies, scholars have been investigating whether the FDI flows generate a positive or negative effect on host economy. Borensztein et al. (1998) test the effect of FDI on local economies. They apply a cross-country regression from developed countries to 69 developing countries and conclude that the FDI has a positive impact on economy only when the host economy has a threshold stock of human capital. Nevertheless, the effect of the outward FDI is still an opened question, especially in developing economies' view.

Regarding to quantify the effects of OFDI on domestic investment, some econometrics techniques have been applied. Desai et at. (2005) investigate the impact of OFDI on domestic investment for U.S. and OECD countries. In US, the authors find that the variables are complementary, resulting one-dollar invested in foreign investment leads to 3.5 dollars of additional domestic capital spending. However, in OECD, the variables are substitutes.

Herzer and Schrooten (2007) using ARDL approach find that OFDI has positive long-run effects on gross capital formation in U.S. and for Germany the authors conclude that this relation exists only in short-run. Mainly, scholars try to understand the internalization process into developed countries perspective.

Nevertheless, there are also studies that have been focus on developing markets. Bosworth and Collins (1999) have investigated the impact of inward FDI on domestic investment considering 58 developing economies during the period from 1978 to 1995, covering countries in Latin

America, Asia and Africa. The authors have provided evidence that an increase of one-dollar inward FDI implies an increase of about 50 cents in domestic investment.

Trevisan et at. (2002) investigate the impact under three dimensions (macroeconomic, microeconomic and institutional) on FDI flows for seven Latin America economies during 1988-1999. The authors find that the only domestic product, privatization programs and consumer prices index are considered significant factors in FDI decision process, which means that the institutional dimension are not significant. However, Nonnenberg and Mendonça (2005) investigate 33 countries and find out that institutional factors are important. Amal and Seara (2007) claim that in Latin America the dominated strategy is the market seeking. There are researchers that focused on Brazil, such as Laplane and Sarti (1999), Lima Junior and Jayme Junior (2006; 2008), De Neri e Laplane (2009) and Concer et al. (2010), but these scholars investigated the relationship between FDI and its determinants.

Next section, we are going to present the methodological procedure, including detailed description of variables used in the analysis and model specification of the empirical study. For the modeling procedure and its statistics we use E-views.

3. METHODOLOGY

3.1. Data description and variables

The annually time series is collected from the World Bank´s World Development Indicator (2013) over the period 1970-2013, comprising 43 sample data. This period include the global expansion of FDI flows as well as the Brazilian expansion economy. In addition, this long historical data may favor the validity of the statistics tests. The variables are defined as domestic investment (I), gross domestic product (Y) and outward Foreign Direct Investment (OFDI). Following Feldstein (1995); and, Herzer and Schrooten (2007), we use as a proxy for the

domestic investment gross capital formation – it consists of value of new or existing acquisitions of fixed assets by the private and public sectors in a country.

3.2. Model specification

The Autoregressive Distributed Lag (ARDL) bounds testing procedure has several advantages over the traditional co-integration techniques: (1) the method uses a single equation, which reduces the number of parameters to be estimated; (2) the ARDL approach is more statistically significant for small sample sizes (Ghatak and Siddiki 2001); (3) This method does not require that regressors are integrated at the same order, this means that it could be either I(0) or I(1). Following Desai et al. (2005); and, Herzer and Schrooten (2007), we can write the investment equation as:

$$\left(\frac{I}{Y}\right)_t = a_1 + a_2 t + a_3 \left(\frac{OFDI}{Y}\right)_t + \varepsilon_t \qquad (1)$$

Where $(I/Y)_t$ denotes gross capital formation as share of GDP, *a's* are the coefficients, *t* is a linear trend, $(OFDI/Y)_t$ denotes net outflows of FDI from the host economy to the rest of the world as percentage of GDP and ε_t the white noise term.

We also estimate the error correction of the ARDL model, as follows:

$$\Delta\left(\frac{I}{Y}\right)_t = b_1 + b_2 t + b_3 \left(\frac{OFDI}{Y}\right)_{t-1} + b_4 \sum_{i=1}^{k} \eta_i \Delta\left(\frac{I}{Y}\right)_{t-1} + \sum_{i=0}^{k} \gamma_i \Delta\left(\frac{OFDI}{Y}\right)_{t-1} + \varepsilon_t \qquad (2)$$

Where b, η, γ are coefficients, *t* is the trend, Δ is the difference operator and ε_t the white noise term.

4. EMPIRICAL RESULTS

Before applied the ARDL analysis, there is a need to make a number of tests that are described as the follows.

4.1. Stationary test

The ARDL approach does not require a stationary test, but we need to ensure that none of the time series is integrated at order 2 or higher. According to Outtara (2004), if the series are I(2), the F-Statistics provided by Pesaran et al. (2001) are no longer valid, since the bounds tests assume that the variables are either I(0) or I(1). Therefore, we apply the Augmented Dickey–Fuller (ADF) test to determine the order of integration to avoid spurious regression. The results show that the domestic investment is I(0) and OFDI is I(1). It is worth noting that we could not apply the Johansen methodology under mixture integration levels.

[Table 1 about here]

4.2. Bounds tests for Co-integration

The results from the unit root test indicate that we can carry on the procedure by investigating the presence of co-integration among the variables. We estimate the existence of long-run relationship between OFDI and gross capital formation by applying the ARDL bound testing approach. To verify if the model needs a trend, we estimate equation (2) with and without a trend term. Thereby, the trend component is added to the model. A dummy (D94) variable was created in 1994 in order to account for the Brazil trade liberalization program.

Additionally, it was determined the number optimal lag length of the variables based on the Schwarz Information Criterion (SIC), which gives the optimal lag equals one for the model. The ARDL test is based on the joint F-statistic which its asymptotic distribution is non-standard, so we test the long-run relationship between $(I/Y)_t$ and $(OFDI/Y)_t$ in the equation (2) under the null hypothesis $H_0: b_1 = b_2 = b_3 = b_4 = 0$ (there is no co-integration between the variables) against the alternative hypothesis $H_1: b_1 \neq b_2 \neq b_3 \neq b_4 \neq 0$ (there is co-integration between the variables) by OLS.

There are two sets of critical values, the upper bound critical values, which assumes that all variables are I(1) and the lower bound critical values, which assumes that all variables are I(0). If the F-statistic calculated lies between the lower and upper bounds, the test is inconclusive. However, if the calculated F-statistic is greater than the upper bound, the null hypothesis of no long-run effect is rejected and if it lies below the lower bound we cannot reject the null hypothesis.

Thus, we use the Wald test to compare the F-statistic to the critical values obtained from Pesaran et al. (2001), since the calculated F-statistics in Table 2 are higher than the upper bound, we reject null hypothesis and accept the alternative hypothesis of co-integration at 5% significance level.

[Table 2 about here]

Furthermore, we perform some diagnostic tests to ensure that the regression is valid. The results can be seen from Table 3. Based on the results, we conclude that the residuals do not show any signs of non-normality, autocorrelation or heteroscedasticity, which are desired results.

[Table 3 about here]

4.3. Stability analysis for the model

In order to verify the stability of the long-run coefficients, we apply the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests. These results are presented in Figure 1, indicating that the estimated equation is stable over time, since the lines fall inside the critical bands of 5% significance.

[Figure 1 about here]

4.4. Estimating the long-run impact

The estimated coefficients of the long-run relationship are shown in Table 4.

[Table 4 about here]

Thus, dividing the estimated coefficients on $(OFDI/Y)_t$ by $(I/Y)_t$, we get 1.4933 (0.78076 / 0.522835). This means that one additional dollar spent on outward foreign direct investment leads to an increase of 1.49 additional dollars in gross capital formation in Brazil.

[Table 5 about here]

The error correction coefficient term of - 0.51, is highly significant at 1% and negative. This means that 51% of last year disequilibrium from the previous year converges back to equilibrium in the current year.

[Table 6 about here]

We also performed a stability test for the ECM model to verify that it is stable over time. As can be noted from Figure 2, the series falls within the bands, implying a stable model.

[Figure 2 about here]

5. PRELIMINARY CONSIDERATIONS

At this early stage of research, we have some preliminary considerations. We have applied the ARDL approach to examine the long-run and short-run relationships between domestic investment and outward FDI in Brazil over the period 1970-2013. The empirical results suggest that there is a positive long-run effect on domestic investment, implying that USD 1.00 increase in outward FDI leads to an increase of USD 1.49 in domestic investment in Brazil. For the short-run, the ECM coefficient of -0.51 suggests a quick speed of adjustment of last year disequilibrium adjust to equilibrium in the current year. These finding support that the MNEs

international expansion does not have a negative impact on the domestic investment. For policymakers, this findings show that an emerging market, such as Brazil, can continue to focus on OFDI policies. It encourages domestic companies to make foreign investment as a way to compete in the international market, seeking to develop new capabilities, to acquire brand recognition, and to access new markets and consumers.

The next steps for this research are to build a group of countries for analysis and comparison, to test for causuality directions, create sub-periods for testing the model and increase the number variables in the model to improve its explanation power for improving the consistency and robustness of the results.

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Table 1 – Unit roots Tests results

Variables	Level Critical Value	t-Statistic	First Difference Critical Value	t-Statistic	Results I(d)
I / Y *[Prob]*	-4.186481 [0.0561]	-3.4665741	-4.192337 [0.0000]	-6.964283	I(1)
OFDI / Y *[Prob]*	-4.252879 [0.0001]	-6.013576	-4.262735 [0.2568]	-2.664082	I(0)

* *Intercept and trend*

Table 2 – Results from bounds tests

Dependent Variable	Variables F-Statistic	95% Lower Bound	95% Upper Bound	Results
I / Y	6.589	5.17	6.15	Cointegration

Table 3 – Results of diagnostic tests

Test	Null Hypothesis	F-statistic	Prob.	Decision
Heteroskedasticity: Breusch-Pagan-Godfrey	Variance of residuals are homoscedastic	0.82768	0.5565	Accept
Breusch-Godfrey Serial Correlation LM:	Residuals are not auto correlated	0.14806	0.8630	Accept
Jarque-Bera	Residuals follow normal distribution	1.51893	0.4679	Accept

Table 4 – Estimated long-run coefficients by ARDL Approach

Regressors	Coefficients	Std. Error	T-Statistic.	Prob.
Constant	12.28099	3.594303	3.416795	0.0016
Trend	-0.094458	0.035875	-2.632987	0.0125
D94	1.902747	2.040097	0.932675	0.3574
$\Delta(I/Y)_t$	0.140111	0.165156	0.848357	0.4020
$\Delta(OFDI/Y)_t$	-0.963138	0.665716	-1.446771	0.1569
$(I/Y)_t$	0.522835	0.151283	-3.456006	0.0015
$(OFDI/Y)_t$	0.780760	1.000292	0.780532	0.4403
R-squared	0.30773			
DW-Stat	1.98255			
F-statistic / [Prob]	2.59305 [0.034800]			

Table 5 – Error Correction representation for the Selected ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.630198	0.807281	2.019368	0.0507
Trend	-0.074243	0.032808	-2.262933	0.0296
$\Delta(I/Y)_t$	0.181477	0.163648	1.108946	0.2746
$\Delta(OFDI/Y)_t$	-0.306857	0.448792	-0.683739	0.4984
ECT(-1)	-0.510751	0.151787	-3.364912	0.0018
Adjusted R2	0.180200			
DW-Stat	2.045897			
F-statistic / [Prob]	3.25305[0.022042]			

Table 6 – Results of ARDL-VECM model diagnostic tests

Test	Null Hypothesis	F-statistic	Prob.	Decision
Heteroskedasticity: Breusch-Pagan-Godfrey	Variance of residuals are homoscedastic	1.126710	0.3588	Accept
Breusch-Godfrey Serial Correlation LM:	Residuals are not auto correlated	0.489706	0.6169	Accept
Jarque-Bera	Residuals follow normal distribution	0.274504	0.8718	Accept

Figure 1 – CUSUM and CUSUMSQ:

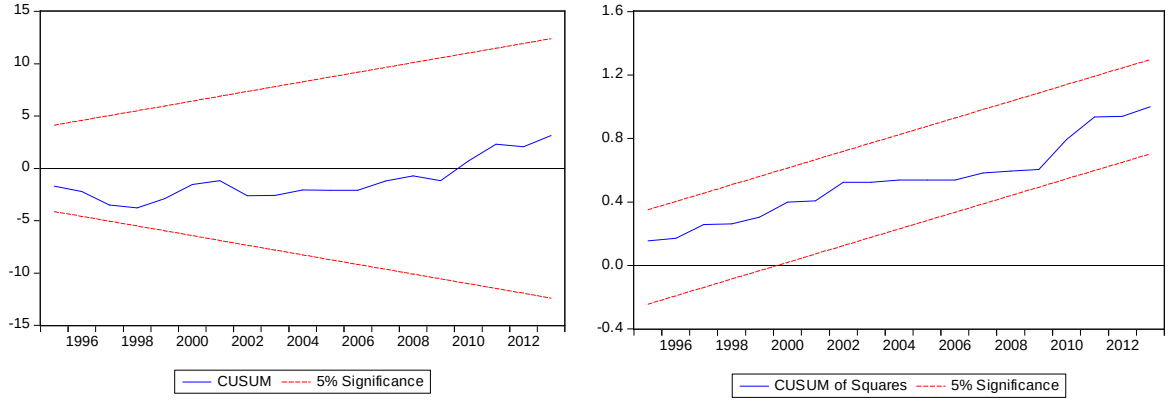
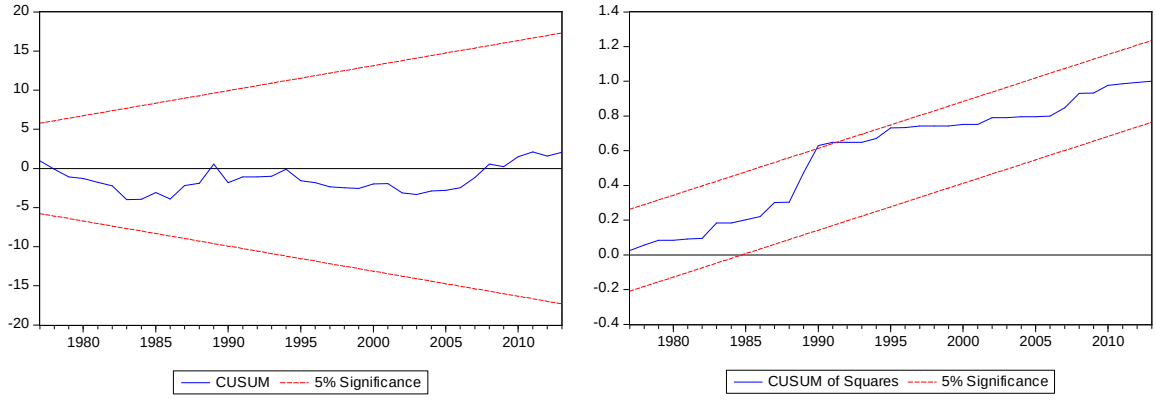
Figure 2 – CUSUM and CUSUMSQ (ECM):