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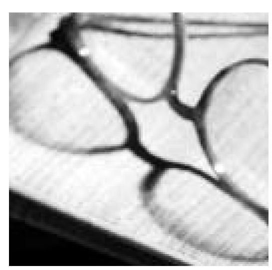


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The Cyclical Nature of North-South FDI Flows

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Abstract

In this paper, we examine how the business and interest rate cycles in developed countries affects FDI to developing countries. After aggregating flows into three big source areas (the U.S., Europe and Japan), we find FDI flows to be countercyclical with respect to both output and interest rate cycles in the first two, whereas in Japan they display either no cyclical behavior or mild procyclical behavior. This finding is consistent with the fact that FDI outflows and local investment tend to move in opposite directions during the cycles in the U.S. and Europe, reflecting investors' arbitrage among different investment opportunities. In sum, and contrary to what is usually claimed, we conclude that recessions in industrial countries are likely to increase FDI flows, particularly to those countries with close ties with the U.S. and Europe.

Keywords: Business Cycle, FDI
JEL Codes: F21, E22, F42

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1. Introduction

Over the last 15 years, flows of foreign direct investment around the world have been growing spectacularly. While international trade has doubled, flows of foreign direct investment (FDI) have increased by a factor of 10. The evolution of FDI flows to developing countries also contrasts with that of portfolio flows. While the latter grew very rapidly at the beginning of the decade, they dropped substantially in the second half of the 1990s. At the same time, FDI kept growing and in 2000 accounted for approximately 70 percent of private capital flows to developing countries (see Figure 1).

In the case of Latin America, the surge in FDI was even more spectacular. Starting 1993, the rate of growth of FDI has been around 30 percent per year. At the same time, other private flows grew very rapidly at the beginning of the decade, but fell steeply in 1995 following the Mexican crisis. As a consequence, while in 1993 and 1994 portfolio capital represented almost all the net private capital flowing into Latin America, since 1999 more than 80 percent of the net private capital flows into the region have been FDI (see Figure 2). Thus, when it comes to private external financing for Latin American countries, FDI has virtually become the "only game in town."

As a result, a "sudden stop" of FDI could have consequences for the sustainability of the region's finances that are comparable to those experienced after portfolio flows reversals, particularly at a time when the trade balances of heavily indebted Latin American economies are being negatively affected by the slowdown in industrial countries. In this context, the cyclical behavior of FDI flows becomes an issue of not only academic but also practical relevance.[1]

To what extent should we be concerned about the impact of recessions in the developed world on emerging economies' access to international capital? Does the interest rate cycle typically associated with countercyclical monetary policy in industrial countries play a role similar to that documented for the case of portfolio capital (Calvo et al., 1993)? While there is a growing literature that studies the host country determinants of FDI inflows (e.g., Lim, 2001, Stein and Daude, 2001, Levy Yeyati et al., 2002), empirical work on source country determinants on FDI outflows is much more limited.

Previous attempts to study the relationship between FDI and the source country's economic cycle have focused on aggregate data on FDI flows and used the US cycle as a proxy for the source country cycle (see for example Reinhart and Reinhart, 2001 and Calvo et al., 2001).[2] Yet, the US represents no more than 30 percent of total outflows of FDI from OECD countries and a similar fraction of total inflows into non-OECD countries.

In this paper, we extend previous empirical work on the cyclical nature of FDI by using a dataset on bilateral FDI flows from OECD countries based on the OECD's *International Direct Investment Statistics*. The dataset covers flows from 22 source countries to 56 (developed and developing) host countries, starting in 1980. This database allows us to estimate the cyclical effects in a much more precise manner, capturing both source and host characteristics, and unveiling patterns that were hidden in aggregate FDI data.

The main findings of the paper can be summarized as follows: (i) FDI flows from the US and Europe move coutercyclically with respect to the business cycle of the source country. The opposite is true for Japan; (ii) the interest rate cycle of the source country is an important determinant of FDI flows;[3] and (iii) FDI and local investment are negatively correlated, indicating that these two forms of investment are substitutes.

In all cases, FDI appears to be more sensitive to the evolution of interest rates than it is to output fluctuations, which appears to suggest that FDI is in this regard no different from the more volatile portfolio flows. However, we do not find a significantly positive correlation between portfolio and direct investment.

The rest of the paper is organized as follows. Section 2 sets forth the main arguments underpinning the link between business cycles in the source country and the behavior of outward FDI flows. Section 3 describes the data and the empirical

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[1] The expression "sudden stop," recently popularized by Calvo to refer to a sudden and large reduction in the inflow of international capital (see, e.g., Calvo, 2002), was first used to describe this phenomenon in Dornbusch et al. (1995).

[2] While Albuquerque et al. (2002) focus on the world cycle, most of their cycle proxies are also intimately related to the U.S. economy. Lehmann (2002) studies the push and pull determinants of FDI using firm-level data.

[3] We also find that, although to different degrees, output and interest rate cycles display significant comovement in each of the "big three" source areas on which we concentrate our analysis.

methodology used in the tests. Section 4 reports the main empirical findings. Finally, Section 5 discusses the results and concludes.

2. Why Should the Cycle Affect FDI?

There are different channels through which the business cycle could affect FDI outflows. On the one hand, during expansions (i.e., when the cyclical component of output is positive and large) firms typically have higher earnings to invest both at home and abroad. Through this *income effect*, we should expect FDI outflows to increase during the positive part of the cycle, in line with the increase in domestic investment. Thus, according to this argument, FDI should display the same procyclical behavior extensively documented for domestic investment.

However, firms are expected to allocate their investment according to the relative rates of return at home and abroad. To the extent that the marginal productivity of capital tends to behave procyclically, expansions should induce a *substitution effect* that reduces FDI, as foreign investment prospects become relatively less attractive. This substitution, a simple consequence of the investors' arbitrage between different investment options, is no different from the interest rate effect reported in Calvo et al. (1993) for the case of portfolio capital in Latin America.

In addition, the behavior of FDI flows has to take into account the evolution of financing costs at home and abroad. Since a large fraction of the foreign operations of FDI is financed in the source's financial market, interest rate cuts at the source should have a positive influence on FDI outflows, particularly when the destination is a developing economy with limited access to international capital. In turn, inasmuch as monetary authorities in the source country can run a countercyclical monetary policy, FDI should increase during recessions at the source, reflecting the cyclical evolution of local funding costs.

Thus, the overall effect of the business cycle in industrial economies on FDI towards developing countries is not obvious and remains, ultimately, an empirical question. In particular, it should depend not only on the evolution of investment returns in originating countries but also on the cyclical nature of interest rates in those countries.

3. Data and Empirical Methodology

Our data comprises gross bilateral FDI flows originating in OECD countries, compiled in the OECD *International Direct Investment Statistics*.[4] The panel reports annual data from 1980 to 1999 covering 22 source countries and 56 host countries, and yielding a total of 1,232 country pairs and 22,213 observations. As our focus is on the impact of business cycles at the source on flows to developing economies, we restrict our attention to pairs for which the source is an industrial economy and the recipient is a non-industrial one.[5] For simplicity, we refer to these observations (which can be interpreted as flows between high-income countries and the rest of the world), as North-South FDI flows.[6] Of these, and for reason that will be become clear later on, we restrict our attention to flows originating in the US, Japan and European OECD countries.[7] Finally, approximately 25 percent of our country pairs report no FDI flows during the whole sample period. This absence of flows may be due to factors that cannot be captured by our regression (e.g., trade embargoes, closed capital accounts or other institutional factors), potentially biasing our results. To address this concern, in what follows we drop these observations, reducing our final sample to 19 source countries, 451 North-South pairs and 7,688 observations. Table 1 presents the summary statistics.

Our empirical strategy is loosely based on the gravity model that is a standard specification in the empirical literature on the determinants of bilateral trade, and has also been recently used in the analysis of FDI location.[8] In its simplest formulation, it states that bilateral trade flows (in our case bilateral FDI flows) depend on the product of the GDPs of both economies and the distance between them, in analogy to Newton's gravitational attraction between two bodies. Typical variables added to augment the canonical gravity specification in the trade literature include GDP per capita or

[4] For example, a positive flow figure from the US to Mexico measure FDI flows of US residents to Mexico, without netting out FDI flows from Mexican residents to the US. A negative flow, in turn, corresponds to US residents' divestments in Mexico.

[5] In other words, while we include flows from the UK or the US to Venezuela, we do not consider flows from the UK to the US or vice versa. See the Appendix for a list of industrial and non-industrial economies in our sample.

[6] We come back to North-North flows later on.

[7] We do this for consistency with the results based on this three originating sources presented below. The excluded source countries (Australia, Canada and New Zealand) represent on average less than 4.5 percent of all flows, and their inclusion does not alter the results.

population, as well as dummies indicating whether the two countries share a common border, a common language, past colonial links, common currency, etc.

Given that our main interest in this paper lies in the cyclical nature of FDI, we use a modified version of the standard gravity model. More precisely, we use a log-linear trend GDP (to proxy for its long-run level) instead of the source country's GDP, to highlight the impact of expansions and recessions at the source (i.e., periods in which output deviates from this long-run level) on FDI flows.

In addition, we subsume time-invariant, pair-specific variables (such as bilateral distance or common language) into country-pair fixed effects, in order to isolate the dynamic effects leaving out the cross-sectional variation. Formally, we adopt the following specification:

$$LFDI_{sh,t} = \beta CYCLE_{s,t} + \beta IRATE_{s,t} + \gamma LTRY_{s,t} + \lambda LY_{h,t} + \alpha_{sh} + \tau_t + u_{sh,t} \qquad (1)$$

where $LFDI_{sh,t}$ is the log of outward FDI flows from country *s* (source) to country *h* (host) at time $t, CYCLE_{s,t}$ denotes the source country's cycle proxy, $LTRY_{s,t}$ is the log-linear trend of nominal GDP in country *s* (to capture the influence of non-cyclical income at the source) and $LY_{h,t}$, is the log of nominal GDP in country *h*, α_{sh} is a pair-specific fixed effect, and τ_t is either a year fixed effect or a time trend. Note that, while the cyclical component is computed from real GDP data, $LTRY_{s,t}$ and $LY_{h,t}$ are measured in the same unit as FDI, i.e., current dollar.[9]

As noted, business (and interest rate) cycles in the source can affect FDI through both an income and a substitution effect. While the income effect can be linked more naturally to the concept of "output gap" (that is, the difference between actual income and trend GDP) the substitution effect is more difficult to control for. Ideally, we would like to have a proxy for the marginal productivity of capital. In practice, we use different

[8] See, i.a., Eaton and Tamura (1994), Wei (1997, 2000), Lipsey (1999), Portes and Rey (1999), Blonigen and Davis (2000), Stein and Daude (2001), and Levy Yeyati et al. (2002).

[9] We do not decompose GDP in the host country between cycle and trend because we are interested in the business cycle in the source country, and most developing countries have very high GDP volatility, which

measures of the output cycle (including the output gap, and the difference between the current and the trend growth rate, closer to the concept of expansions and recessions as measured for the US by the NBER).[10]

We use the log-linear trend of real GDP to compute the output gap at the source country (OUTGAPS) and an expansion dummy (EXPS) that assumes the value of one when the difference between current and trend real growth (alternatively, the growth rate of the output gap) is positive, and zero otherwise.[11] The variable EXPS is close in nature to NBER and OECD-type of dating of the cycle. We use EXPS instead of "official" business cycle dating because the latter is only available for a limited set of countries. It is reassuring that the correlation between our discrete EXPS variable and the NBER and OECD dating is quite high, and that our findings are robust to the use of these alternative business cycle dating, as reported later in the paper.

According to the hypothesis underlying the substitution view of cyclical FDI outflows, FDI and domestic investment should behave asymmetrically, with the former falling whenever a rise in marginal productivity leads to an increase in the latter. In the final part of the paper we explore the link between domestic investment and FDI outflows.

As is standard practice in the gravity model, in Equation (1) we take the logs, rather than the level, of FDI flows as our dependent variable. There are several reasons for doing this. First, the log specification provides a useful normalization that reduces the weight of pairs with very large FDI flows. Second, it allows us to interpret the coefficients of our continuous variables as elasticities.[12] Lastly, it has typically provided the best-fit in gravity equations.

Taking logs of FDI flows, however, is problematic because a large number of observations are zero. Even after dropping pairs for which reported flows are zero throughout the period, nearly 50 percent of FDI observations are zero and about 6 percent of them are negative. The problem of observations that take a zero value is a typical one

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makes it very hard to identify a well-defined trend. However, all our results are robust to decomposing GDP in the host country.

[10] Note that these two different cycle measures need not be closely correlated.

[11] We additionally tested a discrete transformation of the output gap measure, with a one (zero) for positive (negative) gaps, with no significant variation in the results, omitted here for brevity.

in gravity equations, and it has been dealt with in different ways. Some authors simply exclude the observations in which the dependent variable takes a value of zero, for which the log does not exist (for example, Rose, 2000). A problem with this approach is that zero and negative values may convey important information (for instance, zero observations may be more likely during recessions) and dropping them could bias our results.

A natural alternative to by-pass this problem is to use a semi-log specification, at the cost of losing the constant elasticity estimates. Eichengreen and Irwin (1995, 1997) use a simple transformation to deal with the zeros preserving the advantages of the double-log model. They replace the dependent variable *log(y)* by *log(1+ y)*. In this way, regression coefficients can still be interpreted as elasticities when the values of trade are large, since *log(1+ x) ≈ log(x)*, but share the properties of the semi-log for small values of the dependent variable.

In fact, any transformation of the type $x = \log(a + x)$ with $x >> 0$ would work. However, $a = 1$ is a natural choice because it yields a fixed point at zero, i.e., $\log(1+x) = x$ at $x = 0$.[13] While the Eichengreen and Irwin transformation adequately deals with the zeros, it cannot deal with the problem of the negative values (negative values are not a problem for trade data). To be able to retain negative FDI flows, we propose the following transformation in the spirit of Eichengreen and Irwin:

$$LFDI = sign(FDI) \log(1 + |FDI|), \quad (2)$$

Note that the coefficients from an OLS regression using this transformation have the same properties of the transformation adopted by Eichengreen and Irwin (1997) and can still be interpreted as elasticities for large values of the dependent variable.[14] In addition, the function is continuous (see Figure 3) and its derivative with respect to FDI is symmetric around zero and always bounded between zero and one:

[12] The coefficients of discrete versions of our cycle variables have a different interpretation: they tell us the extent of changes in FDI flows when we go from recessions to expansions.

[13] A different version of this approach, used by Eaton and Tamura (1994) and Wei (2000), uses as dependent variable the log of ($a + x$), and estimates the value of the constant a.

$$1 \geq \frac{\partial LFDI}{\partial FDI} = \frac{\left(sign(FDI)\right)^2}{1+\left|FDI\right|} = \frac{1}{1+\left|FDI\right|} \geq 0 \qquad (3)$$

4. Empirical Findings

First glance at the data

Following Reinhart and Reinhart (2001), we will center our empirical analysis on the impact on FDI flows on what they label the twin cycles: the business (or output) cycle and the interest rate cycle. Their presumption that both cycles tend to move together is no doubt influenced by their focus on the US economy, where recent years have witnessed a countercyclical monetary policy.

However, a similar countercyclicality of interest rates is exhibited also in Europe and Japan, the other two big FDI source regions. Indeed, as Figures 4-6 show, comovements in both cycles are more pronounced in the latter than they are in the US.[15] The figures chart the real interest rate against the output gap, once both variables have been conditioned on a time trend. The coefficient for the US is equal to that of Japan (and one third that of Europe), and less closely correlated than in the other two sources.

Using total U.S.-originated FDI flows, Calvo et al. (2001) and Reinhart and Reinhart (2001), show that, on average, FDI flows to developing economies tend to be higher when the US are in expansion, or when the monetary stance is tight. As we use a different source of data (bilateral FDI rather than total FDI flows), it is useful, as a first step, to check whether this basic result is also borne out by our dataset.

To do that, we start by using data from all 19 source countries included in our sample and compute the average North-South FDI flow by splitting the sample according to whether their real interest rate is above or below the country-specific mean, and to whether the source economy is in an expansion or a recession. As noted, we use two

[14] One problem with the transformation (both ours and Eichengreen and Irwin's), is that by adding 1, the computed elasticity becomes dependent on the unit. We measure all our variables in dollar (not million) and hence adding 1 is equivalent to adding one dollar to FDI flows.
[15] For Europe, we aggregate the GDPs of the European source countries and use the German real interest rate as a proxy.

methods to define recessions and expansions. First, we define expansion as having a positive output gap and recessions as having a negative output gap (i.e., we use our OUTGAPS measure). Next, we define expansion as growth below or above the long-run trend. We then repeat the same exercise for FDI originating in the USA, Europe, and Japan (i.e., we use our EXPS measure). Table 2 reports the results.

As can be seen, the evidence seems to confirm previous results for the US that FDI flows tend to be countercyclical with respect to the interest rate (i.e., FDI flows are always higher during periods in which interest rates in the host country are low). The evidence on the relationship between FDI flows and output cycle is more mixed. When we use EXPS, we find that FDI is either procyclical (i.e., significantly higher during expansions) or not significantly different in recessions and expansions. When we use the output gap instead, we find similar results for all countries, for the U.S. and for Japan (although differences in recessions and expansions are no longer significant), but we find that European-originated FDI flows tend to be very high in recessions with low interest rates. Thus, this first take on the data appears to suggest that FDI flows are likely to fall (or do not change significantly) with a recession in industrial countries.

Econometric Results

A more careful look at the evidence reveals a different (and country-specific) pattern. In Table 3 we present results using our baseline regression (column 1) with the output gap as the key cycle measure. We find that the coefficient for the gap variable is negative and significant. As already suggested by Table 2, we further find a strong negative correlation between FDI flows and source country real rates (columns 2 and 3). We also look at what happens if, instead of using output gap, we use the change in GDP growth (EXPS). We find that the coefficient is negative (while Table 2 seemed to indicate a positive correlation between EXPS and FDI flows) but never significant (columns 4 and 5). The other results are unchanged.

However, the aggregate results of Tables 3 mask important differences across sources. Table 4 replicates the regressions interacting source-specific variables with dummies corresponding to the main three sources of FDI: the U.S., industrial Europe and Japan. In other words, we let the US and Japan have source-specific coefficients and force all European countries to have the same coefficient. Simple inspection of column (1) indicates that output countercyclicality is at its highest for the U.S. Europe also has a negative and highly significant coefficient, but the point estimate is about one third that of the US. Japan actually displays a procyclical (but not statistically significant) pattern. Similarly, the influence of interest rate shifts is strongly significant for the U.S. and Europe, and larger for the former. The differences in cyclical responses are significant in all cases.

The previous results highlight how the cyclical behavior of FDI flows diverges across source areas. In light of the above, to have a more accurate depiction of this cyclical nature, we aggregate Western European countries into a single source to focus on flows originating in three big source regions of comparable economic size: the USA, Japan, and Western Europe (BIG3).

Aggregating Western Europe together leads to more accurate results. When taking individual countries that are highly diverse in size, small countries such as Iceland receive the same weight as large countries such as Germany. From a policy perspective, these two countries should be counted differently, something that we achieve by treating Western Europe as a single source of FDI.[16] Furthermore, aggregating Western Europe into a unique source is a realistic simplification because European cycles tend to be highly correlated. In fact, the first principal component explains 51 percent of the variance of the business cycle of all 14 European countries in the sample. If we focus on the largest 5 countries, as much as 83 percent of the variance is explained by this component. In turn, using the BIG3 sources allows us to separate the effect of the business cycle on FDI out of the three macro-regions while controlling for the role of the source country's real interest rate cycle.[17] This aggregation reduces our sample to 93 pairs and 1,781 observations.

Table 5, which reports the regressions for each of the sources, reveals a much clearer picture, confirming what the previous tests hinted at. For the US and Europe, FDI flows are significantly countercyclical with respect to both the output and the interest rate cycle, whereas for Japan FDI flows are procyclical (but not statistically significant) with

[16] Although the US and Europe have a GDP about 2.5 times larger than Japan's, this difference is substantially less pronounced than that between, e.g., the U.S. and Iceland.
[17] We approximate the European interest rate with the German interest rate.

respect to output (a result closer in nature to the income effect described in the introductory section).[18]

Robustness

One potential problem with our results is related to our definition of recession and, in particular, how it captures the changes in marginal productivity that underpins the substitutability hypothesis that is consistent with the previous findings. To test the robustness of our results, we replicate the regressions using two alternative cycle measures: the dummy EXPS, described in section 2, and the official dating of recessions and expansions done by the NBER for the US and the OECD for Europe and Japan.

Since the OECD provides dates for the business cycles in Belgium, France, Germany, Italy, Spain, and the UK, we compute an aggregate European business cycle by computing a weighted average of these six individual countries' business cycles.[19] In most cases, official dating coincides with the dating obtained using EXPS. There are however, some years (especially for Japan) where the two indicators differ. Table 6 compares the cycles obtained in these two ways.

Tables 7 and 8 show that, although alternative measures tend to yield somewhat weaker results (due to a loss of precision) in the correlation between output gap and FDI, the basic message is still the same: FDI tends to be countercyclical for the first two source areas (the sign of the business cycle measure is negative although it fails to be significant). In addition, the signs associated with the interest rate cycle confirm our previous findings.

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[18] A rapid computation shows that the effect of cyclical movements are by no means negligible. Using the statistics reported in Table 1, we can infer that a one standard deviation increase in the real interest rate is approximately associated with average declines of 41 percent, 18 percent and 9 percent in North-South FDI flows originated in the US, Europe and Japan, respectively. The numbers are obtained multiplying the standard deviation times the interest rate coefficient in equations (3), (6) and (9).

[19] More precisely, we use the following procedure. For each country-year, we assign a value 1 when a country is in expansion and a value zero when the country is in recession. Then we compute country weights by dividing total average GDP for the 6 countries by individual country GDP (the procedure yields the following weights: Belgium 0.035, France 0.221, Germany 0.296, Italy 0.179, Spain 0.085, UK 0.184). Finally, we consider Europe to be in expansion when the aggregate index takes a value bigger than 0.5 and Europe to be in recession when the aggregate index takes a value below 0.5. It should be pointed out that the results are robust to different thresholds because, possibly due to the high cyclical comovement of European economies, there is only one case in which the index is in the 0.3-0.7 range (we have a 0.416 for 1991).

One could argue that the negative link between source output and FDI might be reflecting a negative correlation between source and host business cycles. Formally, assume that FDI from source *s* to host *h* is described by the following relationship: $FDI_{s,h}$ = $f(GAP_s, Y_h)$, with $Y_h = g(GAP_s, x)$, $g_1 > 0$, $f_2 > 0$ (x is an exogenous third factor uncorrelated with output gap in country *s*).[20] Then the relationship between FDI and output gap in source country is given by the following derivative:

$$\frac{dFDI_{s,h}}{dGAP_s} = f_1 + f_2 g_1$$

Since our estimates of the coefficient attached to the output gap in the source country only capture f_1 they may not reflect the full effect of the output gap. As $f_2 g_1$ is captured by the coefficient of GDP at the host (which is always positive as predicted by the sign of f_2 g_1) our estimate of $\frac{dFDI_{s,h}}{dGAP_s}$ may be biased downward and indicate a negative relationship even when the true relationship between the two variables is positive. We address this issue by rerunning the regressions of Table 5 and replacing the host GDP by its trend (unaffected by the cyclical behavior of the source country). Table 9 reports the results. Comparison with Table 5 clearly shows that the results are not altered by the change in specification.

Omitted variables bias is another potential problem underlying our results. While by using pair fixed effects we control for all pair-specific time-invariant factors, it is possible that time-variant factors may affect our results. In particular, FDI flows may be affected by movements in the real exchange rate or induced by the privatization process in the host country. Tables 10 and 11 show that the results of Table 5 are basically

[20] The link between output gap in source country and GDP in host countries may come, for example, through trade or through commodity prices (Dornbusch, 1985). In addition, in many emerging economies output cycles may be associated with the behavior of international capital, with sudden stops inducing output contractions (Calvo, 2002).

unchanged when one controls for bilateral real exchange rate and privatizations by the host.[21]

Substitutability of Investment

The results reported so far appear to support the view that the substitution effect described in the introductory section dominates the income effect coming from unexpected earnings or losses during expansions and recessions. Intuitively, the argument would indicate that, as investment prospects deteriorate in the contractionary phase of the local cycle, investors tend to favor relatively more profitable options abroad. Thus, if domestic and foreign investment opportunities compete with each other for the same pool of financial resources, we should expect that they move in opposite directions during the cycle, with a rise in the latter being accompanied by a decline in the former.

We look at this in the data by including the log of domestic investment (*LINV*) at the source as an additional control in the split sample regressions (Table 12). The results confirm that, indeed, in the U.S. and Europe where FDI is clearly countercyclical, investment at home and abroad are negatively correlated. By contrast, in procyclical Japan, domestic investment and FDI move together.[22]

Some analysts have recently put forward the idea that FDI may substitute for portfolio investment as a source of financing in developing countries. As the argument goes, firms in risky economies with limited access to segmented international capital markets may find themselves forced to finance their operation by selling a controlling stock to developed countries' foreign investors that can finance the acquisition at lower rates at home. Thus, the more imperfect the market (the riskier the host country), the higher the incidence of FDI vis-à-vis portfolio investment.[23] In other words, the positive trend in FDI to developing economies may not be independent from the recent wave of financial crises and the decline in capital flows to emerging markets.

Does the substitutability unveiled for investment at the source extend to portfolio investment for the case of developing economies? If so, both international sources of

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[21] In some cases the t statistics are lower but this is due to changes in sample size rather than to the fact that we are controlling for additional variables.
[22] This result is by no means unexpected, given the well-known procyclicality of investment.
[23] See, for example, Hausmann and Fernández Arias (2001).

financing should move in opposite directions: as portfolio capital pulls out during a crisis, FDI takes the lead. To test whether the recent surge in FDI in many emerging economies was the reflection of a sudden stop in portfolio capital flows to the same countries, we add the log of portfolio investment originated at the source to our basic specification. As columns 4-6 in Table 12 show, the evidence on this front is at best mixed. While for the European area portfolio investment displays the expected negative sign, the link is positive for both the US and Japan. However, the coefficient is never statistically significant.

5. Conclusions

In this paper, we examined how the business and interest rate cycles in developed countries affects their FDI in developing countries. By exploiting a detailed database and using alternative cycle measures, we found that the cyclical nature of FDI differs according to the source: while for the US and Europe FDI flows are countercyclical, the opposite is true for Japan.

The results offer two important implications. The first one, related with the nature of FDI flows, is that, contrary to what it is usually claimed, FDI flows to developing countries may benefit from recessions in industrial countries and the monetary easing that typically accompanies them, particularly in those economies such as the Latin American ones where European and American FDI prevails.

The second implication has to do with the very nature of FDI. Our findings highlight the substitutability between investment at home and abroad for industrial economies. In contrast, we do not find evidence of complementarities of FDI and portfolio investment as alternative financing sources for developing countries, contradicting the view that the recent surge in FDI to emerging economies was in part the result of the reversal of portfolio flows in the second half of the 1990s.

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Appendix

Countries included in the sample

Developed countries (North): Austria, Belgium, Switzerland, Germany, Denmark, Finland, France, Greece, United Kingdom, Iceland, Italy, Japan, Netherlands, Norway, Portugal, Sweden, United States

Developing countries (South): Algeria, Argentina, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Czech Republic, Egypt, Arab Rep. Hong Kong, Hungary, India, Indonesia, Iran, Israel, Korea, Kuwait, Malaysia, Mexico, Morocco, Panama, Philippines, Poland, Romania, Russian Federation, Saudi Arabia, Singapore, Slovak Republic, Slovenia, South Africa, Thailand, Turkey, Ukraine, United Arab Emirates, Venezuela

Table 1. Summary statistics

	Mean	St Dev	Min	Max	N. Obs
ALL					
FDI (million USD)	75.1	340.1	-1263	5646	7688
Real Interest rate	3.83	2.93	-10.8	16.13	295
Output Gap (%)	-0.01	3.37	-12.17	12.27	295
USA					
FDI (million USD)	314.3	690.9	-322.0	5646	639
Real Interest rate	3.46	1.83	0.07	6.1	19
Output Gap (%)	-0.31	2.23	-5.5	2.88	19
Europe					
FDI (million USD)	348.2	703.0	-290.9	5088.4	635
Real Interest rate	3.38	1.40	1.28	7.15	19
Output Gap (%)	-0.18	1.55	-1.66	3.06	19
Japan					
FDI (million USD)	246.9	475.6	0	3834	507
Real Interest rate	2.51	1.76	-1.25	4.51	19
Output Gap (%)	0.66	4.96	-12.17	7.55	19

The averages are computed dropping all zero pairs

Table 2. Average North-South FDIs (million USD)

	All Countries			USA			EUROPE			JAPAN		
	USING OUTPUT GAP											
	LOW RATE	HIGH RATE	**TOT**	LOW RATE	HIGH RATE	**TOT**	LOW RATE	HIGH RATE	**TOT**	LOW RATE	HIGH RATE	**TOT**
RECESSIONS	116	21	**77***	462	62	**321***	560	69	**455***	369		**369**
EXPANSIONS	107	51	**73***	403	224	**306***	106	126	**122**	243	178	**184**
TOTAL	**112**	**38***	**75**	**440**	**156***	**314**	**520***	**106***	**348**	**351**	**178**	**247**
	USING CHANGES IN GROWTH RATE											
	LOW RATE	HIGH RATE	**TOT**	LOW RATE	HIGH RATE	**TOT**	LOW RATE	HIGH RATE	**TOT**	LOW RATE	HIGH RATE	**TOT**
RECESSIONS	99	26	**64***	335	49	**251***	439	121	**262***	337	143	**257***
EXPANSIONS	126	49	**86***	511	184	**344***	551	90	**399***	433	202	**234***
TOTAL	**112***	**38***	**75**	**440***	**156***	**314**	**520**	**106**	**348**	**351**	**178***	**247**

The averages are computed dropping all zero pairs * means that the difference across rows or columns is statistically significant.

Table 3. Full Sample

	(1)	(2)	(3)	(4)	(5)
gaps	-0.150		-0.125		
	(4.44)***		(3.67)***		
exps				-0.049	-0.035
				(0.84)	(0.60)
lgdph	0.441	0.366	0.341	0.466	0.355
	(1.18)	(0.98)	(0.91)	(1.24)	(0.95)
rate	8.335	3.443	4.644	7.410	3.553
	(3.05)***	(1.23)	(1.65)*	(2.71)***	(1.27)
trends	0.966	0.723	0.775	0.932	0.730
	(6.67)***	(4.88)***	(5.22)***	(6.42)***	(4.91)***
year		-0.264	-0.242		-0.262
		(6.00)***	(5.46)***		(5.97)***
Constant	207.824	82.642	114.683	182.860	85.790
	(2.88)***	(1.12)	(1.55)	(2.54)**	(1.16)
Observations	7688	7688	7688	7688	7688
Number of pair	451	451	451	451	451
R-squared	0.11	0.11	0.12	0.11	0.11

Absolute value of t statistics in parentheses
*significant at 10%; ** significant at 5%; *** significant at 1%

Table 4. Full Sample by Source

	(1)	(2)	(3)
gap (US)	-0.664		-0.507
	(3.96)***		(2.94)***
gap (EU)	-0.218		-0.198
	(5.69)***		(5.15)***
gap (JP)	0.077		0.039
	(0.84)		(0.36)
Lgdph	0.500	0.494	0.432
	(1.34)	(1.32)	(1.16)
Trend (US)	4.019	3.830	4.373
	(1.35)	(1.10)	(1.23)
Trend (EU)	13.034	5.865	8.657
	(4.11)***	(1.69)*	(2.47)**
Trend (JP)	13.550	7.676	9.628
	(4.72)***	(2.33)**	(2.89)***
Common Trend	1.171	0.830	0.958
	(7.20)***	(4.70)***	(5.37)***
rate (US)		-1.168	-0.992
		(4.30)***	(3.55)***
rate (EU)		-0.227	-0.193
		(4.69)***	(3.96)***
rate (JP)		0.233	0.172
		(0.63)	(0.39)
Constant	308.302	141.428	208.814
	(3.79)***	(1.60)	(2.33)**
Observations	7688	7688	7688
Number of pair	451	451	451
R-squared	0.12	0.12	0.12

Absolute value of t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Split Sample by Source

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	US			Europe			Japan		
Gap	-0.566		-0.430	-1.022		-0.837	0.030		0.033
	(2.55)**		(1.89)*	(4.12)***		(2.41)**	(0.50)		(0.47)
Lgdph	3.533	3.936	3.676	-1.530	-1.664	-1.562	-1.736	-1.667	-1.754
	(2.14)**	(2.40)**	(2.24)**	(1.14)	(1.23)	(1.16)	(1.74)*	(1.67)*	(1.73)*
rate	0.735	0.432	0.526	0.567	0.524	0.548	0.456	0.447	0.452
	(5.70)***	(2.98)***	(3.44)***	(5.46)***	(4.90)***	(5.11)***	(5.11)***	(4.50)***	(4.52)***
trend		-1.039	-0.883		-0.996	-0.309		0.045	-0.027
		(3.05)***	(2.53)**		(3.42)***	(0.76)		(0.18)	(0.09)
constant	-86.500	-89.736	-84.899	44.715	52.031	46.808	51.246	49.506	51.807
	(2.16)**	(2.26)**	(2.13)**	(1.37)	(1.58)	(1.43)	(2.11)**	(2.01)**	(2.06)**
Observations	639	639	639	635	635	635	507	507	507
Number of pair	37	37	37	37	37	37	29	29	29
R-squared	0.16	0.16	0.17	0.11	0.10	0.11	0.10	0.10	0.10

Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Dating of Expansions and Recessions

	EXPS					
Official	USA		Japan		Europe	
Dating	Expansion	Recession	Expansion	Recession	Expansion	Recession
Expansion	13	2 (1993 1995)				
Recession	0	4				
Expansion			6	3 (1993-95)		
Recession			2 (1985 1991)	8		
Expansion					12	1 (1983)
Recession					0	6

Table 7. Split Sample by Source – Alternative Cycle Proxies (EXPS)

	(1)	(2)	(3)	(4)	(5)	(6)
	US		Europe		Japan	
Exps_ld	-1.525	-0.716	-0.597	-1.196	-0.186	-0.251
	(1.54)	(0.69)	(0.74)	(1.46)	(0.36)	(0.46)
Lgdph	3.634	3.825	-1.697	-1.867	-1.708	-1.672
	(2.20)**	(2.32)**	(1.24)	(1.37)	(1.72)*	(1.67)*
Trend	0.692	0.464	0.635	0.551	0.434	0.454
	(5.42)***	(3.05)***	(5.92)***	(5.08)***	(5.36)***	(4.52)***
rate		-0.968		-1.083		0.088
		(2.72)***		(3.64)***		(0.33)
Constant	-87.368	-87.065	48.711	57.845	50.855	49.569
	(2.17)**	(2.18)**	(1.46)	(1.75)*	(2.09)**	(2.01)**
Observations	639	639	635	635	507	507
Number of pair	37	37	37	37	29	29
R-squared	0.15	0.16	0.08	0.10	0.10	0.10

Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Split Sample by Source – Alternative Cycle Proxies (Official Dating)

	(1)	(2)	(3)	(4)	(5)	(6)
	US		Europe		Japan	
off_exp	-0.423	0.015	-0.034	-1.186	-0.173	-0.184
	(0.35)	(0.01)	(0.04)	(1.36)	(0.35)	(0.37)
Lgdph	3.811	3.938	-1.604	-1.872	-1.673	-1.646
	(2.30)**	(2.39)**	(1.17)	(1.38)	(1.69)*	(1.64)
Trend	0.671	0.431	0.618	0.530	0.434	0.447
	(5.04)***	(2.80)***	(5.86)***	(4.95)***	(5.36)***	(4.49)***
rrate		-1.039		-1.148		0.054
		(3.03)***		(3.68)***		(0.22)
Constant	-92.232	-89.784	46.222	58.438	49.972	49.038
	(2.29)**	(2.24)**	(1.38)	(1.76)*	(2.06)**	(1.99)**
Observations	639	639	635	635	507	507
Number of pair	37	37	37	37	29	29
R-squared	0.15	0.16	0.08	0.10	0.10	0.10

Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9. Split Sample by Source (host country trend instead of GDP)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	US			Europe			Japan		
Gap	-0.607		-0.484	-0.954		-0.787	0.063		0.049
	(2.73)***		(2.12)**	(3.81)***		(2.25)**	(1.03)		(0.70)
Trend GDP host	4.046	2.220	2.620	-4.941	-5.503	-4.905	-4.661	-4.466	-4.714
	(1.27)	(0.68)	(0.81)	(1.84)*	(2.05)**	(1.82)*	(2.65)***	(2.58)**	(2.67)***
Trend	0.672	0.517	0.582	0.809	0.799	0.787	0.683	0.694	0.712
	(2.97)***	(2.27)**	(2.54)**	(4.23)***	(4.11)***	(4.06)***	(4.78)***	(4.46)***	(4.52)***
Rate		-0.982	-0.800		-0.916	-0.279		0.218	0.124
		(2.82)***	(2.24)**		(3.13)***	(0.69)		(0.88)	(0.44)
Constant	-98.713	-48.253	-59.628	127.071	144.376	127.367	122.762	117.245	123.523
	(1.28)	(0.61)	(0.76)	(1.96)*	(2.23)**	(1.96)*	(2.85)***	(2.78)***	(2.87)***
Observations	639	639	639	635	635	635	507	507	507
Number of pair	37	37	37	37	37	37	29	29	29
R-squared	0.16	0.16	0.16	0.11	0.10	0.11	0.11	0.11	0.11

Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 10. Split Sample by Source (Controlling for real exchange rate)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	US			Europe			Japan		
Gap	-0.622		-0.438	-0.436		-0.140	0.078		0.075
	(2.39)**		(1.71)*	(1.74)*		(0.36)	(1.15)		(0.99)
Lgdph	4.345	5.256	4.454	0.873	1.031	1.003	-0.788	-0.482	-0.769
	(1.83)*	(2.27)**	(1.89)*	(0.46)	(0.55)	(0.53)	(0.60)	(0.37)	(0.57)
RER	0.547	0.339	0.174	-1.211	-1.070	-1.051	-0.330	-0.165	-0.332
	(0.36)	(0.22)	(0.12)	(0.98)	(0.87)	(0.85)	(0.42)	(0.22)	(0.42)
Trend	0.699	0.331	0.466	0.438	0.385	0.392	0.475	0.452	0.478
	(3.85)***	(1.80)*	(2.32)**	(2.83)***	(2.42)**	(2.44)**	(3.92)***	(3.56)***	(3.69)***
Rate		-1.189	-1.022		-0.607	-0.495		0.167	0.021
		(3.16)***	(2.63)***		(1.86)*	(1.09)		(0.59)	(0.07)
Constant	-106.914	-121.274	-103.316	-11.521	-12.920	-12.708	27.620	19.638	27.061
	(1.84)*	(2.13)**	(1.79)*	(0.25)	(0.28)	(0.28)	(0.86)	(0.61)	(0.82)
Observations	548	548	548	515	515	515	428	428	428
Number of pair	36	36	36	36	36	36	28	28	28
R-squared	0.15	0.16	0.16	0.07	0.08	0.08	0.12	0.11	0.12

Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 11. Split Sample by Source (Controlling for privatization)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	US			Europe			Japan		
gaps_lc	-1.497		-1.511	-1.768		-2.345	-0.016		-0.343
	(2.93)***		(2.47)**	(3.08)***		(2.84)***	(0.07)		(1.11)
lgdph	4.853	6.109	4.828	-2.239	-1.984	-1.742	-0.981	-1.641	-1.442
	(1.29)	(1.60)	(1.27)	(0.72)	(0.62)	(0.55)	(0.46)	(0.77)	(0.67)
priv	0.033	0.123	0.034	-0.093	0.012	-0.128	0.176	0.162	0.184
	(0.22)	(0.82)	(0.22)	(0.79)	(0.10)	(1.04)	(2.24)**	(2.13)**	(2.35)**
trend	0.183	-0.021	0.179	0.197	0.457	0.347	0.372	0.061	-0.932
	(0.47)	(0.05)	(0.44)	(0.53)	(1.13)	(0.87)	(0.64)	(0.19)	(0.97)
irate		-1.239	0.039		-0.953	0.863		-0.724	-1.197
		(1.56)	(0.04)		(1.51)	(0.97)		(1.31)	(1.72)*
Constant	-111.616	-138.535	-111.014	71.009	62.567	54.057	30.913	53.588	62.959
	(1.22)	(1.49)	(1.20)	(0.93)	(0.79)	(0.69)	(0.60)	(0.99)	(1.15)
Observations	230	230	230	225	225	225	194	194	194
Number of pair	29	29	29	29	29	29	23	23	23
R-squared	0.06	0.03	0.06	0.12	0.09	0.12	0.10	0.11	0.12

Absolute value of t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 12. Domestic Investment, Portfolio Investment and FDI

	(1)	(2)	(3)	(4)	(5)	(6)
	US	Europe	Japan	US	Europe	Japan
linv	-27.990	-5.153	0.822			
	(3.54)***	(2.36)**	(0.78)			
lgdph	3.340	-1.295	-1.778	3.881	-1.694	-1.654
	(2.03)**	(0.95)	(1.78)*	(2.35)**	(1.24)	(1.66)*
trend	2.219	0.961	0.374	0.024	0.600	0.369
	(4.84)***	(5.36)***	(3.30)***	(0.02)	(1.39)	(1.75)*
Lport				1.895	-0.354	0.298
				(0.34)	(0.18)	(0.42)
Irate				-1.038	-0.975	-0.037
				(3.05)***	(3.11)***	(0.12)
Constant	291.731	107.076	41.980	-108.641	56.787	46.354
	(2.52)**	(2.55)**	(1.59)	(1.59)	(1.35)	(1.80)*
Observations	639	635	507	639	635	507
Number of pair	37	37	29	37	37	29
R-squared	0.17	0.09	0.10	0.16	0.10	0.10

Absolute value of t statistics in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%

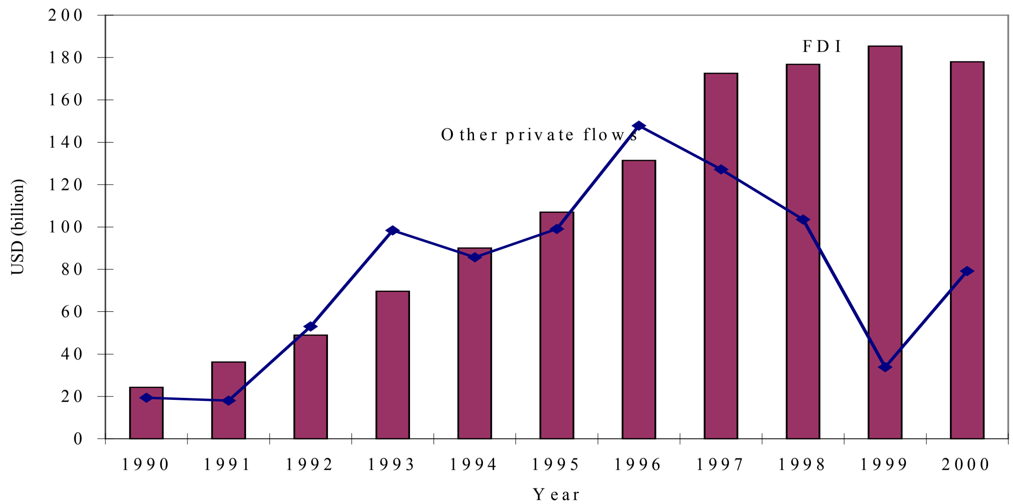


Figure 1. Private Capital Flows to Developing Countries

Source: World Bank's Global development Finance

Figure 2. Composition of Private Capital Flows to Latin America

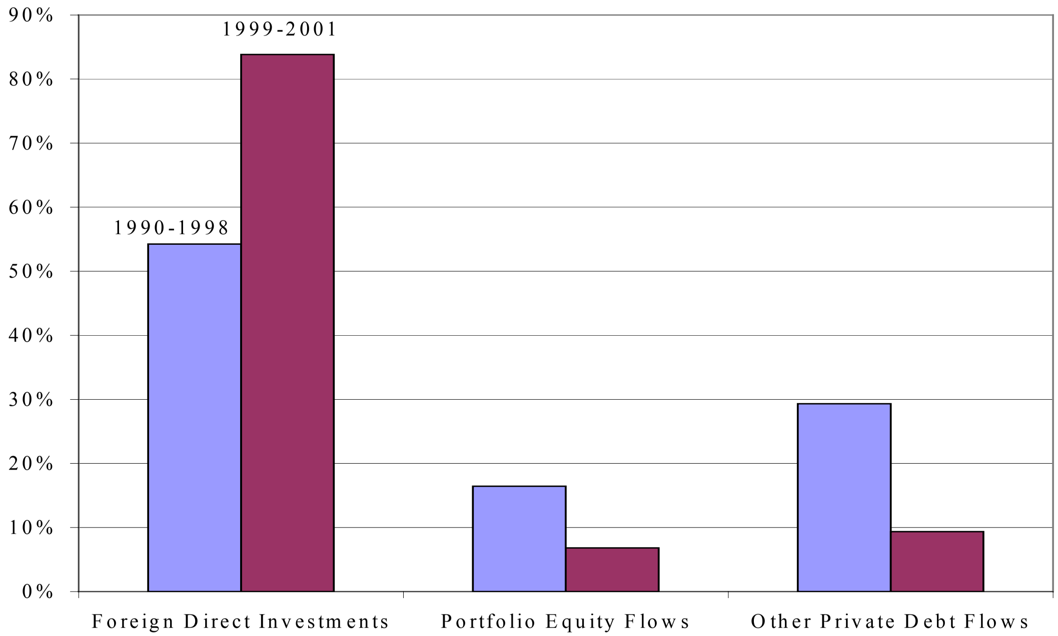


Figure 3. The LFDI Function

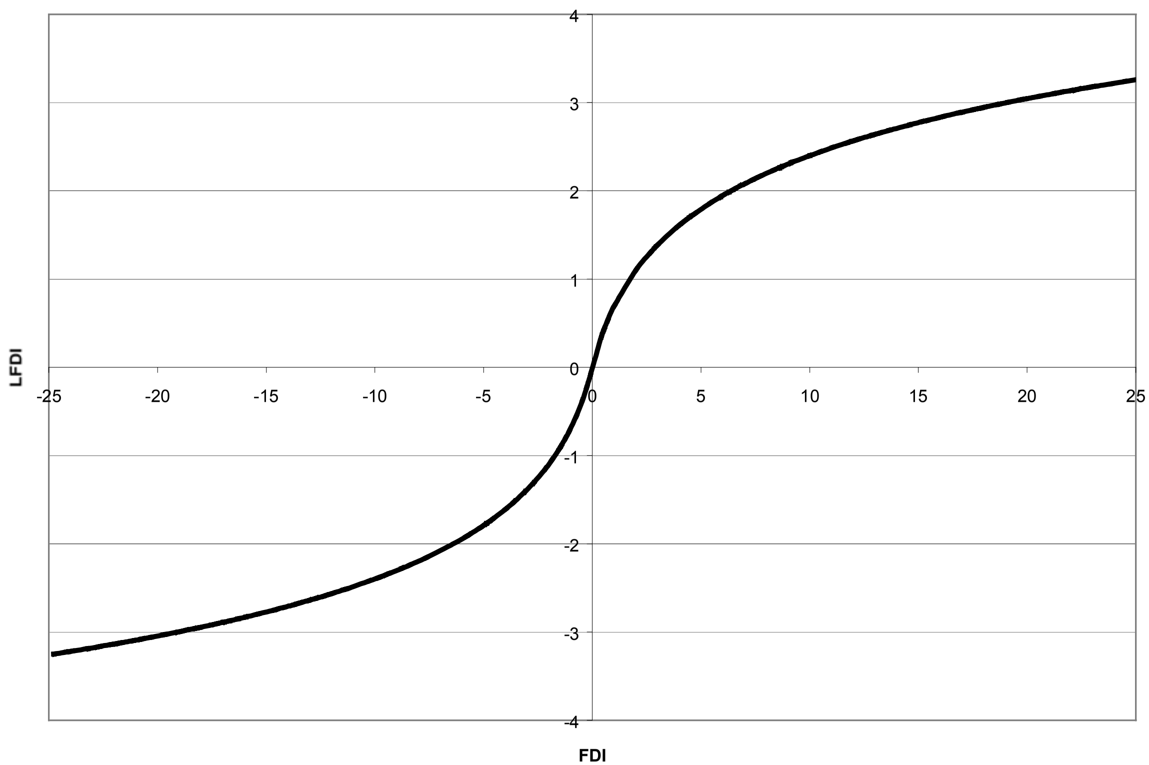


Figure 4. Correlation between Real interest Rate and Output GAP (USA)

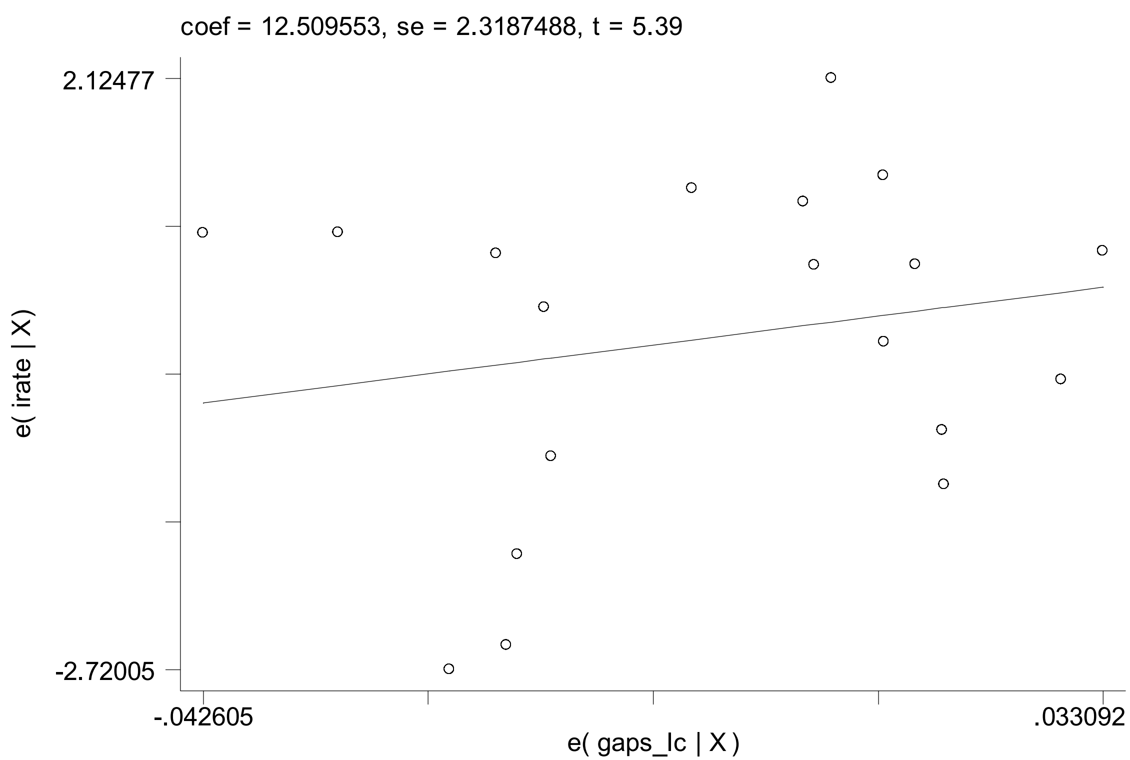


Figure 5. Correlation between Real Interest Rate and Output GAP (EUROPE)

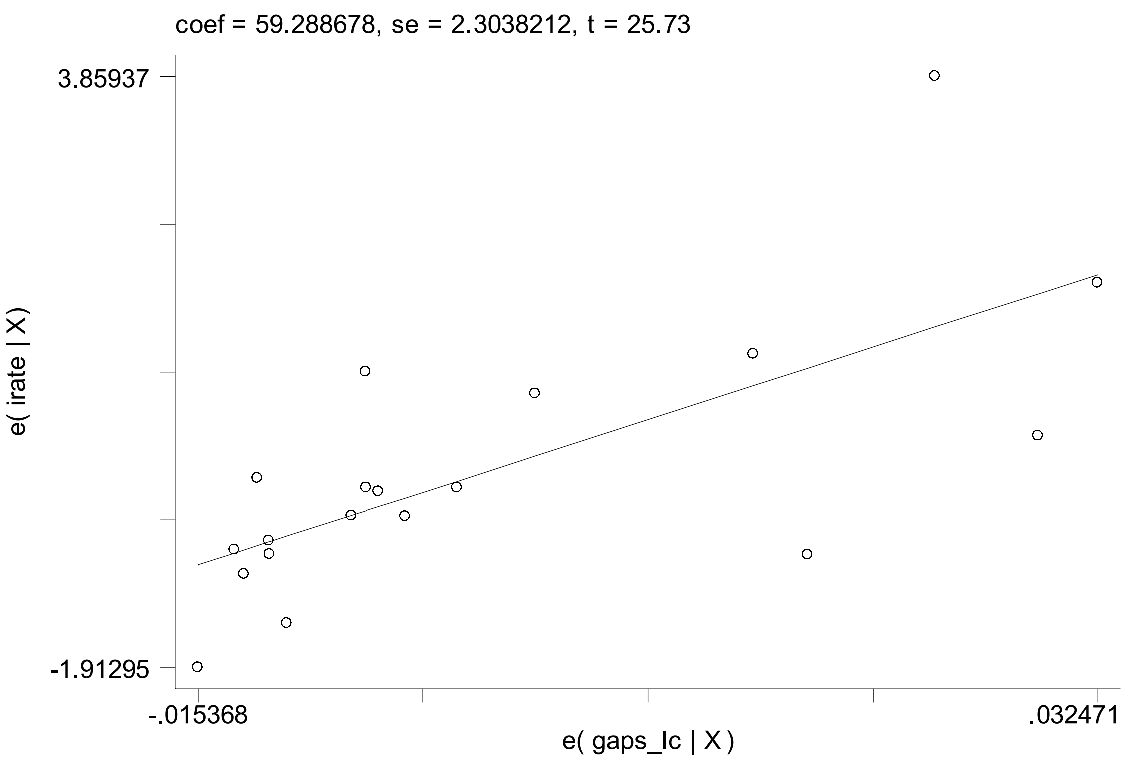
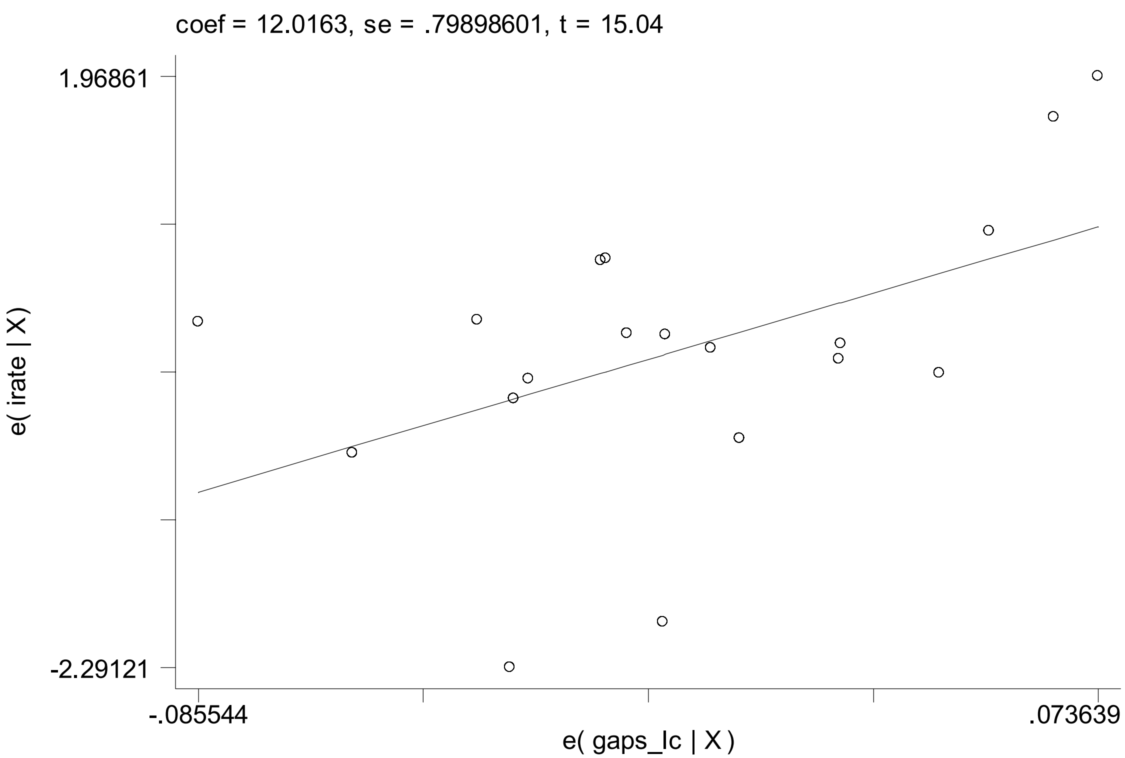


Figure 6. Correlation between Real Interest Rate and Output GAP (JAPAN)



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