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The Impact of IMF-Supported Programs on FDI in Low-income Countries

Ali J. Al-Sadiq

IMF Working Papers describe research in progress by the author(s) and are published to elicit comments and to encourage debate. The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Finance Department

**The Impact of IMF-Supported Programs on FDI
in Low-income Countries**

Prepared by Ali J. Al-Sadiq¹

Authorized for distribution by Olaf Unteroberdoerster

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Abstract

It is common for IMF-supported adjustment programs with low-income member countries (LICs) to project that they will facilitate FDI inflows. The main objective of this paper is to empirically examine this hypothesis. Using an unbalanced panel dataset for 73 low-income countries over the period 1980–2012, and two different econometric methods that address the selection-bias problem, the empirical results robustly show that participating in IMF-supported program is associated with a significant increase in FDI inflows.

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Author's E-Mail Address: aalsadiq@imf.org

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1. INTRODUCTION

Most Macroeconomic frameworks under International Monetary Fund (IMF)-supported programs project a recovery or increase of Foreign Direct Investment (FDI) inflows. The underlying assumption is that IMF-supported programs help restore macroeconomic stability and address structural constraints to growth, thereby rebuilding confidence and encouraging foreign investors to take on long-term investment projects.

Whether the presence of IMF-supported programs has a positive signaling effect that in turn facilitates FDI flows is an empirical question that has received little attention in the literature. While most empirical studies have, using a variety of methodologies, examined the effects of IMF-supported programs on participating countries' macroeconomic performance,² the relationship between IMF-supported programs and FDI has received relatively little attention. In addition, with exception to Bal Gündüz and Crystallin (2014), most empirical studies that examined the catalytic role of IMF-supported programs have largely focused on emerging markets, particularly on the impact of such programs in helping countries regain access to international financial markets. Only a few studies, such as Bird and Rowlands (2002), Jensen (2004), and Biglasier and DeRouen (2010), have examined the influence of IMF-supported programs on FDI location, and there are hardly any studies focused exclusively on low-income countries (LICs).

Against this backdrop, the main objective of this paper is to empirically assess the impact of IMF-supported programs on FDI inflows. It contributes to the literature in several ways. First, we focus solely on LICs by using unbalanced panel data for 73 LICs over the period 1980–2012, and considering *all* IMF concessional financial and non-financial programs available for LICs. Second, given that a country's participation in an IMF-supported program is not a random decision, we address the self-selection problem of being under an IMF-supported program through using two different econometric approaches: i) in the first approach, we use a two-step estimation method based on a treatment effect model. ii) In the second approach, we use a non-parametric estimation method based on a propensity score matching (PSM) technique.

This study finds a positive relationship between IMF-supported programs and FDI flows to LICs. The empirical findings indicate that countries that participated in IMF-supported programs were able to attract more FDI than countries that did not. The estimated average treatment effects suggest that a country with an IMF-supported program was able to attract one to four times more FDI as a percentage of GDP than a country without a program. This result is very robust under different specifications and sample periods.

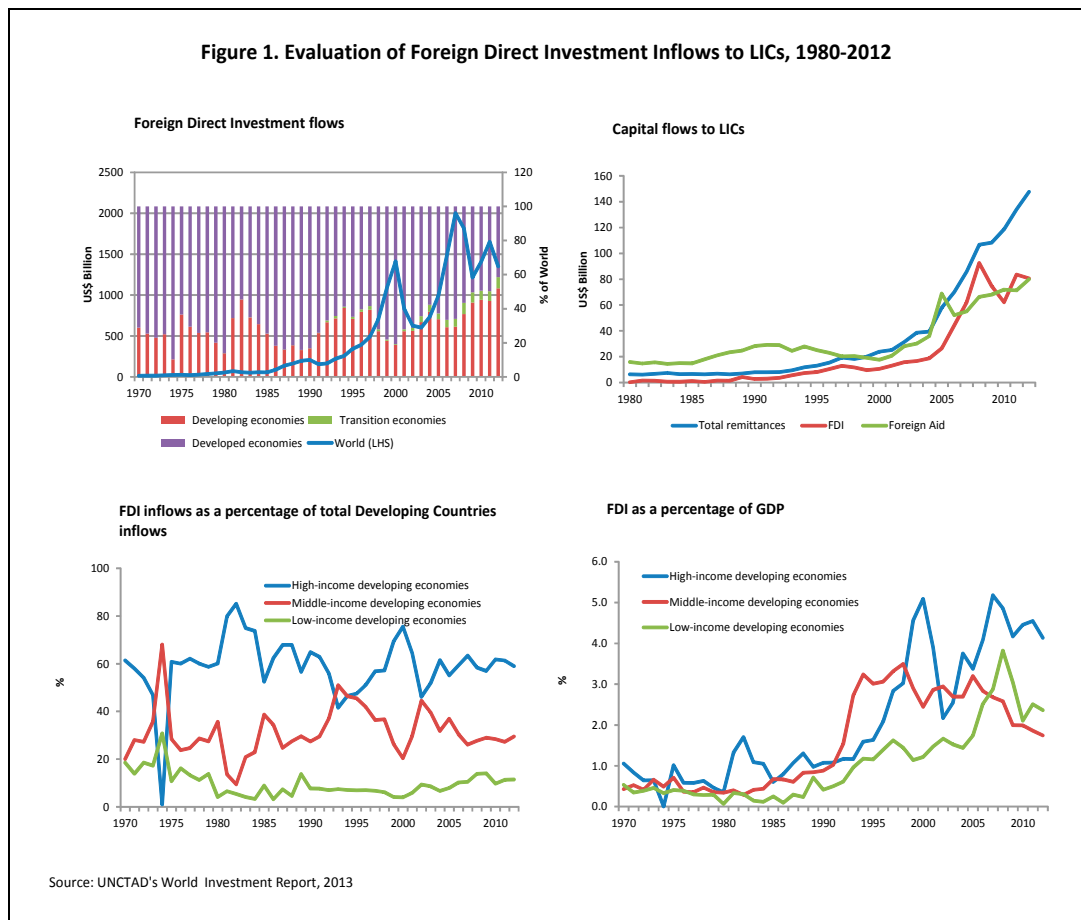
The remainder of the paper is organized as follows. Section 2 briefly discusses the determinants of FDI location. Section 3 discusses the role of IMF-supported programs.

² See for example: Khan (1990), Killick (1995), UI Haque and Khan (1998), Hutchison and Noy (2003), Vreeland (2003), Joyce (2003), Barro and Lee (2005), Bulir and Moon (2003), Dreher (2006), IMF (2006), Steniwand and Stone (2007), Honda (2008), Clements et al., (2011), and Bal Gündüz *et al.*, (2013).

Section 4 surveys the empirical literature. Section 5 presents our empirical model, the estimation methods, and data sources. Section 6 presents the empirical results. Section 7 concludes.

2. TRENDS AND DETERMINANTS OF FDI LOCATION

FDI has become a dominant financial capital flow for many countries, including for LICs. While developed countries have been the largest recipients of FDI inflows, developing countries have experienced a sharp increase in FDI inflows since the 1990s. Approximately 52 percent of world FDI flows went to developing countries in 2012. Although the distribution of FDI flows has been relatively uneven, more FDI flows are moving into LICs than ever before. Since 1970, FDI flows to LICs have increased fivefold and recently have surpassed other financial flows (Figure 1).



The motivation of investors to shift parts or all of their investment activities abroad can be explained by Dunning's (1977, 1981, and 1988) "eclectic paradigm". According to this paradigm, for a firm to engage in FDI, it must first have some competitive advantages in its home country that are specific to it. The *ownership* or 'O' advantages of the firm must also be transferable to foreign locations. Then, conditional on the existence of the 'O'

advantages, there must also be certain features or characteristics of the host country that will allow the firm to reap the full benefits of its ‘O’ advantages in the host country. This second set of advantages is referred to as *location* or ‘L’ advantages of countries. Finally, conditional on the existence of the ‘O’ advantages, the firm must also possess *internalization* or ‘I’ advantages which allow it to maintain its competitive position by reducing transactions costs.

While the ownership and internalization advantages depend on the firms’ characteristics, the location-specific advantages largely depend on host countries’ economic, social and political factors. Thus, incentives for a firm to invest abroad rather than at home may include the host country’s market size and its potential, macroeconomic stability, degree of trade openness, the availability of cheap inputs, sound institutions, corruption levels, political stability, and the quality of infrastructure. Although some of these factors are fixed or change only over very long periods, a country may alter some of these factors to attract more FDI. The question is, then, how do IMF-supported programs, through improving a country’s fundamentals, influence FDI flows?

3. THE ROLE OF IMF-SUPPORTED PROGRAMS

An IMF-supported program can facilitate FDI flows into LICs through three channels; a sound macroeconomic framework underpinned by program conditionality, market efficiency improvement brought by structural reforms under the program, and improvements to institutional capacity, governance, and transparency.

The first channel through which IMF-supported programs help countries improve their locational advantages, a stable and sustainable macroeconomic position underpinned by program conditionality, is a necessary condition for improving the investment climate. To secure financial assistance from the IMF, a member country agrees to implement a set of macroeconomic policies (program conditionality) that aim at restoring macroeconomic stability, strengthening fiscal and external position, and boosting economic growth.³ Given that IMF-supported programs are monitored through compliance with program conditionality, successfully completing reviews sends a “signal” to investors that the country strongly demonstrates its commitment to implementing the program conditions (Bird and Rowlands, 2002 and Bird, 2002). Thus, the IMF’s involvement in the reforms enhances the credibility of the country’s effort to reforms.

The second potential channel through which IMF-supported programs facilitate FDI into LICs works through non-quantitative structural conditions that typically aim to improve market efficiency and promote private-sector led growth, such as trade reforms, price liberalization, and privatization. For example, several IMF-supported programs have included some form of conditionality on price liberalization, reforms of banking and financial sectors, and on privatization of state-owned enterprises (SOEs) (Box 1). In the context of the latter, Brune, Garret and Kogut (2004) find that countries under

³ For comprehensive discussion on the IMF’s conditionality, please see IMF (2002, 2009, 2011, and 2014).

IMF-supported programs privatized more SOEs than countries not under such programs. Thus, since privatization programs would create opportunities for FDI, countries with an open capital account would observe surge in FDI inflows.⁴

Box 1. IMF Conditionality on Privatization and Liberalization¹

While the World Bank takes the lead in privatization, some IMF-supported programs have included some forms of structural conditionality promoting privatization and liberalization reforms critical for resolving the fiscal and external imbalances (Davis *et al.*, 2000). These structural reforms aim for institutional and legislative policy reforms, which improve the efficiency, quality and cost effectiveness of the public sector, enhance competitiveness, and foster private sector development. The reforms typically cover three different areas: liberalizing and privatizing the banking and financial sectors; transferring state-owned enterprises in key sectors of the economy such as ports, airports, utilities, communications, and energy to the private sector; and reducing government regulations of key markets.

Example of Financial Reforms:

- **Afghanistan's 2006 PRGF program incorporated a measure aimed at accelerating the restructuring of the state-owned banks:** adopt long-term restructuring plans for Bank Millie and Bank Pashtany.

Example of Privatization

- **The Mali's privatization program under the 2004 PRGF encompasses the following measures:**
 1. Adoption by the government of a privatization strategy for the Telecommunications Company (SOTELMA) and a timetable for its implementation.
 2. Adoption by the government of a strategy and timetable for the privatization of BIM SA.
 3. Adoption by the government of an operational master plan for the privatization of the CMDT.

Example of Liberalization

- **Sierra Leone's liberalization reforms under the ECF arrangement encompasses the following measure:** Adopt an automatic adjustment mechanism for retail petroleum prices to ensure full pass through of international prices.

¹/ Drawn from Countries' Memorandum of Economic and Financial Policies (MEFPs).

Finally, IMF-supported programs may encourage more FDI inflows through improving countries' institutional capacity, policy design, governance, and transparency. The IMF provides technical assistance to help member countries develop more effective institutions and legal frameworks to formulate and implement effective policies. In addition, IMF-supported programs promote governance, transparency, and provide measures and

⁴ For example, the remarkable increase in FDI inflows into Europe and Central Asia in 2007 was largely attributed to the privatization programs associated with major structural reforms as was the case for the large volume of FDI in Latin American in 1990s (the World Bank, 2008). Further, Marlevede and Schoors (2005) find that privatization of the SOEs has direct positive impacts on FDI inflows.

conditionality for Anti-Money Laundering and Combating Financial Terrorism (AML/CFT).⁵ Although TA is available for all members, IEO (2005) finds that most TA activities were mainly driven by the specific needs of IMF-supported programs and they have been broadly useful in improving the technical capabilities of the recipient agencies of the country.

4. EMPIRICAL LITERATURE

While there is a large body of literature on whether IMF-lending improves countries' ability to access international financial markets,⁶ there are only three studies on the effect of IMF-supported programs on FDI flows and the findings are contradictory. Bird and Rowlands (2002), using data for 117 low- and middle-income countries over the period 1977–1999, investigated whether a country participating in an IMF-supported program would be able to attract more FDI inflows. They considered three different lending facilities, *Stand-By Arrangement* (SBA), *Extended Fund Facility* (EFF), and the three-year adjustment programs supported by the *Enhanced Structural Adjustment Facility* (ESAF).⁷ They could not find significant support for this hypothesis. The study, however, does not control for the selection bias problem and so their results may not be consistent. Jensen (2004), using data for 68 countries over the period 1970–1998, examined the impact of SBA and EFF facilities, and reached the same conclusion as Bird and Rowlands. However, after controlling for the self-selection bias, his empirical results suggest that IMF-supported programs lead to lower FDI. Countries with IMF-supported programs attracted 25 percent less FDI than countries without such programs. On the other hand, Biglasier and DeRouen (2010) examined whether countries under different kinds of IMF-lending facilities—SABs, EFFs and ESAFs/PRGFs—receive more U.S. FDI than countries not under such arrangements. They used data for 126 developing countries over the period 1980–2003. Their empirical evidence indicates that countries with IMF-supported programs attracted more U.S. FDI than those without such programs. Furthermore, their results show that not all IMF-supported programs have the same impact. They find that concessional lending via the PRGF does not have a positive effect, while other facilities such as SAB have positive effects.

⁵ Recent empirical work underscores the importance of institutional quality and good governance as important factors in driving FDI inflows (See Al-Sadig, 2009).

⁶ See for example Hajivassiliou (1987); Killick, Malik and Manuel (1992); Rodrick (1996); Marchesi and Thomas (1999); Marchesi (2001); Benelli (2003); Mody and Saravia (2003); Bordo *et al.* (2004); Bird and Rowlands (1997, 2002, 2007); Kim (2006); Eichengreen *et al.*, (2005), Eichengreen *et al.*, (2006), Arabaci and Ecer (2014); Cottarelli and Gianini (2002); and Edwards (2005).

⁷ The Enhanced Structural Adjustment Facility (ESAF) was established in 1987, which brought stricter conditionality to the IMF's concessional financing and offered higher access under three-year arrangements. In 1999, The ESAF facility was renamed as *the Poverty Reduction and Growth Facility* (PRGF), with a focus on reducing poverty and strengthening growth on the basis of country-owned poverty reduction strategy. In 2009, the IMF overhauled its concessional lending facilities to make them more flexible and meet increasing demand for financial assistance from those countries in need and so the PRGF Trust has transformed into the *Poverty Reduction and Growth Trust* (PRGT).

This paper contributes to the literature on the impact of IMF-supported programs on FDI inflows in several ways. First, we focus exclusively on LICs, using an unbalanced panel data for 73 LICs over the period 1980–2012. Second, we consider *all* IMF concessional financial and non-financial facilities available to PRGT-eligible countries; *Extended Credit Facility* (ECF) and its two predecessors (PRGF, ESAF, *Structural Adjustment Facility* (SAF), *Exogenous Shocks Facility* (ESF), *Standby Credit Facility* (SCF), and *Policy Supported Instrument* (PSI) arrangements.⁸ Third, we use two different econometric methods developed to mitigate the selection bias. Under the first method, we use a two-step estimation technique based on a regression-based treatment effect model, and under the second method, we employ a non-parametric estimation based on propensity score matching (PSM).

5. EMPIRICAL FRAMEWORK

5.1 The Model

Since the primary objective of this study is to empirically examine the effects of IMF-supported programs on FDI inflows, we need to consistently disentangle the influences of these programs on our dependent variable. We assume that FDI location is determined by the following linear equation:

$$y_{i,t} = x'_{i,t-1} \beta + \delta D_{i,t-\tau}^{\text{IMF}} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where i is the host country and t is the time. The dependent variable (y) is FDI inflows as a percentage of the host country's GDP, x is a vector of exogenous variables. D^{IMF} is a dummy variable equal to one if country i is participating in an IMF-supported program in a certain year for at least five months and zero otherwise.⁹ β and δ are unknown parameters to be estimated, η is time invariant country-specific, and ε is the random disturbance term.

However, any attempt to estimate this model using conventional estimation methods such as Ordinary Least Squares (OLS) would yield biased and inconsistent estimates of the effect of participating in IMF-supported programs on FDI inflows. In other words, the presence of the dummy variable in the above equation creates two fundamental statistical problems. The first one is that we cannot observe $y_i|D_i = 1$ and $y_i|D_i = 0$ for the country i at the same time. That is, we only observe what happens to country i after participating in an IMF-supported program, but not what would have happened in the absence of such participation. The challenge is to construct a suitable counterfactual of country i 's treatment status. Thus, we

⁸ For more details on these facilities, see IMF (2004, 2009).

⁹ An alternative coding for the dummy variable is the value of one if a new IMF-supported program is approved and zero otherwise. While this setting may be preferred in determining the probability of participating in an IMF-supported program, it would not allow us to identify whether programs are on track or not, leading to a potential bias of the estimates of the impact of successful programs on FDI inflows.

need to construct what happens were country i to participate (not participate) when it actually did not (did).

The second potential problem is the endogeneity of the dummy variable. A necessary condition for the estimated coefficient of the effect of participating in an IMF-supported program (i.e. δ) to be unbiased and consistent is that the dummy variable (D_i^{IMF}) and the error terms ($\eta_i + \varepsilon_{i,t}$) are uncorrelated. However, a country's decision to seek financial assistance from the IMF is endogenous and therefore should be modeled directly. Since a country selects to participate into such a program, the bias of the estimated effect of IMF-supported programs on FDI inflows due to the endogeneity problem is called a "selection bias".

To overcome these two issues, we use two different econometric methods to correct the selection bias and be able to estimate the impact of IMF-supported programs on FDI location consistently. The first one is a regression-based treatment effect model developed by Maddala (1983) and the second one is a non-parametric approach based on PSM.

5.1.1 The Treatment Effect Model

Since participation in an IMF-supported program is not a random decision, the treatment effect model allows us to generate selection-corrected estimates of the impact of IMF program participation on FDI inflows. This is done in a two-step procedure. In the first step, we estimate the probability of participating in an IMF-supported program (i.e., the selection equation). Then using the results of this regression, we can consistently estimate Equation (1) (i.e., the outcome equation).¹⁰ That is,

$$D_{i,t}^{IMF*} = z'_{i,t} \gamma + \mu_{i,t} \quad (\text{selection equation}) \quad (2)$$

Where $D_{i,t}^{IMF*}$ is a latent endogenous variable which its observable counterpart $D_{i,t}^{IMF}$ is generated as follows:

$$D_{i,t} = \begin{cases} 1 & \text{if } D_{i,t}^{IMF*} > 0 \\ 0 & \text{otherwise} \end{cases}$$

z is a vector of exogenous variables and μ is the error term. To obtain consistent estimates of the parameters, the treatment effect model assumes that the two equations' error terms (ε and μ) must be correlated. If these error terms are uncorrelated, the outcome equation can be estimated consistently by OLS.¹¹

The remaining part is to specify the potential determinants of our outcome FDI equation and the factors leading a member country to participate in IMF-supported programs (i.e., the

¹⁰ The discussion on the treatment effect model is drawn from Wooldridge (2002, pp. 551–582).

¹¹ The model can be estimated by Maximum Likelihood estimator (MLE) and Heckman's two-step estimator.

selection equation). The choice of the control variables for the outcome question is motivated by the related existing empirical studies and the availability of data.¹² In particular, we assume that FDI inflows are determined by: 1) the host country's market size and its potential growth proxied by GDP per capita and real GDP growth, respectively; 2) the host country's level of financial development measured by broad money as a percentage of GDP; 3) the host country's degree of trade openness measured by the sum of total exports and import as a percentage of GDP; 4) the host country's macroeconomic stability measured by inflation rates; 5) agglomeration proxied by the host country's existing FDI stock as a percentage of GDP; 6) since political risk creates uncertainty, foreign investors avoid investing in host countries with high political risk, thus, we control for political risk; 7) countries with sound institutions, low corruption levels, and democratic institutions are found to attract more FDI and so we control for these factors.

With respect to the determinants of IMF program participation (the selection equation), we also rely on the existing literature.¹³ We assume that the member's decision to participate in an IMF-supported program depends on: 1) *country-specific macroeconomic factors*: the level of development, real GDP growth rates, the level of foreign reserves, inflation rates, current account balance, terms of trade, and external debt services;¹⁴ 2) *institutional factors*: a number of years a country has been under past IMF-supported programs and democratic institutions; 3) *global factors*: since LICs' exports are largely dependent on world demand, an increase in real world GDP growth would improve countries' current account deficits, which in turn reduces the need to borrow from the IMF (Cerutti, 2007).

5.1.2 Propensity Score Matching

Given that the results of the regression-based treatment effect model outlined above are very sensitive to the selection equation's specifications, the literature proposes an alternative approach that yields consistent estimates despite the presence of the selection bias problem (Verbeek, 2012, p. 266). This approach estimates the average treatment effect of IMF program participation based on a non-parametric technique using PSM. The basic idea of PSM is that we compare FDI inflows into a group of countries that participated in IMF-supported programs to another group of countries, which did not participate in such programs.

Let Y_{1i} be the value of outcome variable when the country i participates in an IMF-supported program and Y_{0i} be the value of the outcome variable when the country i is not participating in such a program.¹⁵ Each country is either exposed to the treatment (participates in a

¹² See Al-Sadig (2009).

¹³ The model used to estimate the determinants of IMF participations is usually based on a reduced form of a supply-demand model. In addition, we should note that since several variables in the selection equation do not appear in the outcome equation, our model is over-identified.

¹⁴ See Bal Gündüz (2009).

¹⁵ The outline of the PSM is largely drawn from Imbens (2004), Wooldridge (2002, pp. 603–608), and Stata (2013).

program) ($D_i = 1$) or not exposed ($D_i = 0$). Thus, countries that participate in IMF-supported programs are called the “treatment group” and the countries that do not participate in such programs are called “the control group”. Further, there are a set of observed covariates, X . Thus, for each country, we observe the triple (D_i, Y_i, X_i) , where Y_i is the realized outcome:

$$Y_i = \begin{cases} Y_{0i} & \text{if } D_i = 0 \\ Y_{1i} & \text{if } D_i = 1 \end{cases}$$

Since it is impossible to observe the outcome of the same country in both treatment conditions at the same time, the effect of a treatment on country i , δ_i , is the difference between potential outcomes with and without a treatment.

$$\delta_i = Y_{1i} - Y_{0i}$$

Thus, to evaluate the effect of IMF-supported programs on FDI inflows, we may compute the **average treatment effects** (ATE):

$$\text{ATE} = E(\delta_i) = E[Y_{1i} - Y_{0i}]$$

Further, we may be interested in computing the **average treatment effect on the treated** (ATT) as follows:

$$\text{ATT} = E[Y_{1i}|D_i = 1] - E[Y_{0i}|D_i = 1]$$

The probability of the treatment as a function of X is known as the *propensity score*. Instead of attempting to create a match for each participant with exactly the same value of X , we can instead match on the probability of participation.

$$P(s) = P(D_i = 1|X = x)$$

In order to be able to identify the treatment effects, we need two key assumptions.

1) *Conditional independence* (unconfoundedness), which implies there exists a set X of observable covariates such that, after controlling for these covariates, the potential outcomes are independent of treatment status:

$$(Y_{1i}, Y_{0i}) \perp\!\!\!\perp D_i | X$$

2) *The common support* (the overlap), which implies that for each value of X , there is a positive probability of being both treated and untreated:

$$1 > P(D = 1|X) > 0$$

This assumption implies that the probability of receiving treatment (participating in an IMF-supported program) for each country in our sample is similar to the probability of not receiving treatment. This assumption of common support ensures that there is sufficient

overlap in the characteristics of treated and untreated (control) countries to find adequate matches.

5.2 The Data

The empirical analysis is based on unbalanced panel data for 73 LICs over the period 1980–2012.¹⁶ Data on FDI inflows, FDI stock, foreign aid, external debt services, and total external debt come from UNCTAD’s *World Investment Report* (2013). Data on the growth rates of real GDP, GDP per capita, the inflation rates, terms of trade, foreign reserves in months of imports, current account balances, and world real GDP growth come from the IMF’s *World Economic Outlook database* (2013). Data on the sum of exports and imports to GDP and broad money supply (M2) come from the World Bank’s *World Development Indicators* (2013). Data on corruption levels, institutional quality, and political risk come from *International Country Risk Guide*, Political Risk Groups (2013). Democracy index is measured as the sum of political and civil right indices and data come from *Freedom House*’s database (2013). Data on IMF-supported programs come from IMF’s database on arrangements. The dummy variable equals one if a member country is under one of IMF-supported programs (SAF, ECF, SCF, ESF, and PSI) in a certain year for at least five months and zero otherwise. All independent variables are lagged one year to reduce the simultaneity problem. A full description of the data and their sources are in the Appendix. Appendix Table 1 reports the descriptive statistics and Appendix Tables 2A and 2B report the correlation matrices.

6. EMPIRICAL RESULTS

As a starting point, we estimate the selection equation alone by pooled panel probit regressions to determine the probability of participating in an IMF-supported program. The results presented in Appendix Table 3 are broadly in line with the empirical literature and remain robust under a number of alternative specifications.¹⁷ LIC member countries with low levels of economic development, large current account deficits, large fiscal deficits, high public debt-to-GDP ratios, high external debt services-to-exports ratios, high inflation rates, and low foreign reserves are likely to seek financial assistance from the IMF. Moreover, countries participated in one of the IMF-supported programs in the past would likely to request another program. On the other hand, real GDP growth, changes in terms of trade, world real GDP growth, and foreign aid inflows do not have the expected signs.¹⁸ Although further examinations of why these variables do not have the expected signs in determining

¹⁶ The sample includes all current PRGT-eligible member countries and those that “graduated” from the PRGT-eligibility, for which the data available over this period (see the list of the countries in the appendix).

¹⁷ As a robustness check, we re-estimate the model by random effects probit model and correlated random effects probit. The results reported in Appendix Table 4 do not change very much.

¹⁸ We should note that although the signs of the estimated coefficients of the selection equations are meaningful and their significances are important, interpreting them is complicated given the observed D^{IMF} variable takes only two values and the estimation process uses the probability of $D^{\text{IMF}} = 1$.

the probability of participating in IMF-supported programs are beyond the scope of this study, we propose several potential justifications for such results. First, *engagement motivations*; the underlying factors that determine the probability of participating in an IMF-supported program vary systematically in a way that is not captured by the current single-equation empirical model. For example, some countries do not need the IMF's financial resources, given that they have alternatives of financing, but require only the conditionality or the IMF policies to solve their macroeconomic imbalances. Second, *group heterogeneity*; the results may suggest that LIC members are not homogenous in terms of their vulnerability to exogenous shocks (Bal Gündüz, 2009). Third, *nonlinearity impact*; the relationship between the probability of participating in an IMF-supported program and these factors are nonlinear and so the current linear empirical model may significantly misrepresent the true relationship.

6.1 The Results of the Treatment Effect Model

Table 1 presents the baseline results. As stated above the regression-based treatment effect model is sensitive to misspecifications, and so we estimate the FDI outcome equation using the six different specifications of the selection model reported in the Appendix Table 3. Also, since the data coverage on corruption, institutional quality, and political risk is much less extensive and if used the sample size drops from 73 to 43 host countries, we exclude these variables from our baseline regressions.¹⁹ As is apparent from the results, the estimated coefficient of IMF participation variable is positive and robustly significant at the 1 percent level. The estimated average treatment effect suggests that a member country under an IMF-supported program attracts four times more FDI as a percentage of GDP than a country not under such a program.

With the exception of the financial development, inflation rates, and the democratic institution variables, the estimated coefficients on the control variables have the expected signs and are statistically significant. These results remain robust under a number of alternative specifications to the selection equation and a number of alternative control variables in the regression equation. The host country's market size measured by per capita GDP is positive and highly significant at the 1 percent level. The growth rate of GDP, which is a proxy for market potential, is also positively and statistically significant at the 10 percent level, which implies that foreign investors are forward-looking. This finding is consistent with the hypothesis that market-seeking FDI is attracted to a country with large market size and its economy is growing over time. Also, the effect of the degree of openness is also positive and statistically significant at the 1 percent level. Moreover, agglomeration effects exhibit a high degree of statistical significance and have positive impacts on FDI inflows, implying that past FDI in the host country attracts new FDI inflows.

As mentioned above, the treatment effect model would yield consistent estimates only when the error terms of the two questions are significantly correlated. As can be seen from the corresponding *p*-values of the Wald tests reported at the bottom of Table 1, the correlation

¹⁹ This also can be seen as a robustness check as small-state countries were excluded from the sample.

between the two error terms are statistically significant suggesting that the treatment effects model is appropriate.

Table 1: IMF-Supported Programs and FDI inflows: Maximum Likelihood Estimations

<i>Dependent variable: FDI as a percentage of GDP: 1980-2012</i>						
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
IMF participation	4.9* (2.99)	4.2* (2.25)	4.3* (4.97)	4.7* (3.82)	4.2* (5.12)	4.2* (5.22)
Real GDP growth rate	0.07*** (1.68)	0.09** (1.96)	0.05** (2.00)	0.03 (0.94)	0.05** (1.96)	0.05*** (1.87)
Log (GDP per capita)	0.89** (2.38)	0.72*** (1.75)	1.0* (3.99)	0.66** (1.97)	0.97* (4.05)	0.97* (4.07)
Financial Development	-0.01* (-2.86)	-0.02* (-2.71)	-0.02* (-3.07)	-0.02** (-2.19)	-0.02* (-3.07)	-0.02* (-3.09)
Openness	0.03* (5.39)	0.03* (5.05)	0.03* (5.88)	0.04* (5.72)	0.03* (5.84)	0.03* (5.87)
Inflation rate	0.0001 (1.50)	0.0001 (1.18)	0.0001 (1.46)	0.0001 (0.95)	0.0001 (1.42)	0.0001 (1.41)
FDI stock /GDP	0.09* (11.7)	0.09* (11.7)	0.09* (11.2)	0.09* (9.65)	0.09* (11.3)	0.09* (11.2)
Democratic Institutions	-0.89 (0.93)	-0.47 (0.46)	0.44 (0.85)	0.74 (1.20)	0.45 (0.86)	0.46 (0.88)
No. of Observations	1763	1751	1555	1092	1550	1550
No. of Countries	73	73	71	71	71	71
Wald test 4/ <i>P-value</i>	28.6 0.000	19.7 0.000	39.6 0.000	39.6 0.000	41.2 0.000	42.7 0.000

Notes:

1/ All independent variables are lagged by one year. Models differ in the selection equation specifications

2/ All regressions include a constant term. Robust z-values in the parentheses.

3/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

4/ The null hypothesis is that error terms in both equations are uncorrelated.

Appendix Table 5 reports the regression results after controlling for corruption, institutional quality, and political risk. The estimated coefficient of IMF participation variable is still significantly positive. Furthermore, we re-estimate the baseline model by Heckman's two-step estimator as a robustness check and the results presented in Appendix Table 6 do not change.

Thus far, we have not differentiated between different types of IMF-supported programs implicitly assuming that these programs exert the same effects. However, they may vary substantially in their set of macroeconomic adjustment policies and the scope of structural reforms. Thus, using a single dummy variable to capture the impact of different programs may be misleading. Since a longer-term arrangement such as the ECF facility is designed to

address a protracted balance of payments need and structural issues, we would expect that it has a larger singling effect than short-term arrangements. To distinguish between the impact of different IMF-lending facilities, we constructed a new dummy variable that includes only the ECF and its predecessor the ESAF/PRGF arrangements. We re-run the model using this variable instead of all IMF-supported programs. As can be seen from the results reported in Appendix Table 7, as expected, the impact of the IMF-ECF programs have a stronger impact.

We also conduct several robustness checks to further examine these results. First, we exclude countries with the largest FDI inflows from our sample to test whether the results are sensitive to those countries. We considered two thresholds, 10 percent and 5 percent of GDP, respectively. The results are reported under columns 1 and 2 of Appendix Table 8. It is evident that the results are not sensitive to the exclusion of the largest recipients from the sample. Second, given that FDI flows to LICs have increased sharply as a result of capital account liberalization in 1990s, we run a regressions for post-1990s. We considered three different periods; 1990-2012, 1995-2012, and 2000-2012. As can be seen from the results reported under columns 3, 4, and 5 of Appendix Table 8, our results are not sensitive to different sample periods.

Finally, by way of comparison, we also estimate the FDI outcome question directly by pooled OLS (POLS), Fixed Effects model (FE) and system Generalized Method of Moments (GMM), thus abstracting from the self-selection issue. The results of these regressions are reported in Appendix Table 9. Still, IMF-supported programs are found to exert positive effects in encouraging FDI inflows into countries participating in such programs.²⁰

6.2 The Results of Propensity Score Matching

We undertake a further check in order to conclude on the effects IMF-supported programs of FDI by estimating the average treatment effect by PSM. The PSM procedure can be done through three steps: *first*, we estimate propensity scores for each country in the sample for the probability of participating in IMF-supported programs (i.e., the selection equation) given a set of observed covariates using a pooled panel probit regression model, predictors being observed pre-programs covariates. *Second*, we choose a matching algorithm that will use the estimated propensity scores to match countries under IMF-supported programs with similar countries not under such programs. *Third*, we estimate the average treatment effect of the intervention with the matched sample and calculate the standard errors.

We specify the determinants of the country's participating in IMF-supported programs as in Equation (2) and we estimate it by pooled panel probit regressions.²¹ To match treated and

²⁰ To evaluate further the durability of the impact of IMF-supported programs on FDI inflows we lagged IMF participation variable by two periods. The empirical results (not reported here) remain qualitatively similar.

²¹ In unreported regressions, the pooled panel logit model was used. The results do not change.

untreated countries, we use three different matching algorithms; the *Nearest Neighbor*, *Radius*, and *Kernel* matching.²²

The results reported in Table 2 confirm our findings above although the estimated effects appear to be smaller. The PSM results suggest that a member country under an IMF-supported program attracts two times more FDI as a percentage of GDP than a country not under such a program and this result is significant at the one percent level.²³

Table 2: IMF-Supported Programs and FDI Inflows: Non-Parametric Estimations

	<i>Estimator: Propensity Score Matching</i>				
	Nearest Neighbor Matching (1)	Nearest Neighbor Matching (3)	Nearest Neighbor Matching (5)	Kernel Matching	Radius Matching
IMF Participation	2.3* (3.11)	2.2* (3.70)	1.9* (2.67)	2.7* (2.75)	1.6* (3.06)
No. of Observations	1954	1954	1954	1954	1954
No. of Countries	73	73	73	73	73

Notes:

1/ Robust t-stat in parentheses.

2/*, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

6.3 Robustness Check

While matching methods greatly reduce risk of misspecifications, as noted above, they can produce biased estimates of the average treatment effects in the presence of unobserved heterogeneity (hidden bias) between the treatment and control groups. That is, matching estimators are unbiased as long as the *conditional independence* assumption holds. However, if matching fails to account for some relevant variables, the results would be biased. In other words, the probability that a country i would participate in an IMF-supported program is only a function of the set x of observable covariates that describes the country. If two countries with the same value of x have different probabilities of participating in IMF-supported programs, then there is hidden bias.

One way to test whether our results presented in Table 2 are robust to a possible presence of an unobserved confounder is to conduct a sensitivity analysis using the Rosenbaum bounds methods (Rosenbaum, 2002), and determine if the average treatment effects of an IMF-

²² Matches of observations within the common support sample were used in all estimates.

²³ To test whether these results presented in Table 2 are sensitive to unobserved time-invariant country-specific factors, we looked at the impact of IMF-supported programs on changes in our outcome variable, instead of the levels (i.e., changes in FDI inflows as a percentage of GDP). The results presented in Appendix Table 10 suggest that the impact of IMF-supported programs on changes in FDI inflows as a percentage of GDP is still positive although the such “change in FDI inflows” are more difficult to interpret while the estimates are also not statistically significant.

supported program on FDI flows may change due to unobserved factors and so creating hidden bias.

Let π_i be the probability for participating in an IMF-supported program for country i . The odds that this country will participate in an IMF-supported program is $\pi_i/(1 - \pi_i)$. With the same being true for country j , the participation odds ratio is:

$$\Gamma = \frac{\pi_i / (1 - \pi_i)}{\pi_j / (1 - \pi_j)}$$

For a given set x_i and x_j of observable covariates such that $x_i = x_j$, then if the sensitivity parameter that measures the degree of deviations from a random assignment of participation (Γ) equals one, this implies that the odds ratio of participation is the same and our result is free of hidden bias. The larger it is the more likely our conclusion will change due to the magnitude of the hidden bias. Thus, the sensitivity analysis involves examining whether our results presented in Table 2 hold for different range of Γ .

The results of Rosenbaum's sensitivity analysis presented in Table 3 show that the estimated impact of IMF-supported programs on FDI inflows is not sensitive to selection bias due to unobserved factors. The *p-critical value* from the Wilcoxon signed rank test maintains the 5 percent significance up to a value of $\Gamma = 5$ suggesting that even with a small unobserved difference in a covariate would not change our conclusion.

Table 3: Robsenbaum's Sensitivity Analysis

Γ	<i>P-Value</i>	Hodges Lehmann		95% Confidence	
		Max	Min	CI+	CI-
1.4	0	-0.82	0.65	-1.22	1.07
1.8	0	-1.40	1.26	-1.85	1.70
2.2	0	-1.89	1.75	-2.43	2.20
2.6	0	-2.36	2.15	-2.97	2.64
3.0	0	-2.80	2.51	-3.46	3.06
3.4	0	-3.20	2.83	-3.91	3.45
3.8	0	-3.57	3.15	-4.37	3.81
4.2	0	-3.91	3.44	-4.83	4.16
4.6	0	-4.25	3.71	-5.26	4.50
5.0	0	-4.59	3.98	-5.75	4.83

Notes:

1/ Robsenbaum Bounds are calculated using the command *rbounds* in Stata

2/ *P*-value is the upper bond (sig+) of the Wilcoxon's signed rank test.

7. CONCLUSIONS

The main purpose of this study has been to empirically examine the effects of IMF-supported programs on FDI inflows in LICs. While there are a considerable number of empirical studies on the influence of IMF-supported programs on international private capital flows, a few studies examined whether IMF-supported programs create a significant incentive for FDI to invest in countries participating in such programs.

From a theoretical perspective, we identify three channels through which the IMF-supported programs facilitate FDI flows to LICs; program's conditionality aimed to restore macroeconomic stability and create conditions for sustainable and inclusive economic growth, market efficiency brought by programs' structural reforms, and through technical assistance aimed to improve a country's institutional capacity. To test this hypothesis, we use unbalanced panel data for 73 LICs over the period 1980–2012, and estimate the average treatment effects by two different econometric approaches to address the self-selection problem. In the first approach, we use a two-step regression based method that estimates the outcome and selection equations simultaneously. In the second approach, we rely on a non-parametric approach in which the average treatment effect is estimated by propensity score matching. The empirical findings imply that countries participate in IMF-supported programs were able to attract more FDI inflows than countries not under such programs.

That said, there is scope for future research. In particular, given that IMF programs vary in their strength of macroeconomic adjustment one may want to distinguish between them, as the use of a simple binary variable in this study cannot capture those differences. Also, one can differentiate between successfully completed programs vs. unsuccessful ones.

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APPENDIX

Appendix Table 1: Summary statistics**Sample: 73 Low-Income Host Countries 1980-2012**

Variables	Obs	Mean	Std. Dev	Min	Max
FDI /GDP	2024	3.83	6.42	-14.68	90.46
IMF	2052	0.37	0.48	0.00	1.00
IMF =1	758				
IMF = 0	1294				
Real GDP growth	2052	3.96	6.05	-50.25	71.19
log (GDP per capita)	2052	6.49	0.96	4.28	10.09
Inflation rate	2048	58.78	705.55	-72.73	23773
Financial development	1893	33.90	22.42	4.53	151.55
Openness	2052	76.10	43.67	4.19	403.92
FDI stock /GDP	1979	27.42	34.06	0.03	248.56
Reserves	2052	4.26	3.55	0.00	23.05
Log (terms of trade)	2052	4.70	0.40	3.30	7.15
Current Account Balance / GDP	2052	-7.74	11.08	-154.03	35.48
External Debt /GDP	1957	3.09	3.25	0.00	30.18
Debt Services/ total Exports	1726	15.12	13.81	0.25	156.86
total period of IMF participations	2052	4.65	5.47	0.00	25.00
Fiscal balance /GDP	1417	-2.68	6.79	-46.2	125.4
Quota /GDP	2052	194.4	322.7	0.0	2770.5
log (foreign Aid)	1962	5.30	1.41	-3.22	9.34
World Real GDP Growth	2052	2.78	1.37	-2.11	4.59
Democratic institutions	2052	0.43	0.28	0.00	1.00
Law and Order	1271	2.71	1.07	0.00	5.00
Corruption	1271	2.29	0.98	0.00	5.00
Political risk	1263	52.87	11.57	9.00	76.00

Source: Author's calculation

Appendix Table 2A: Correlation Matrix

Variables	IMF	Real GDP growth	Log (GDP per capita)	CAB /GDP	External debt/GDP	Real world GDP growth	Debt Services /exports	Inflation rate	Log (terms of trades)	Foreign Reserves	Period of IMF programs	log (foreign Aid)	Democratic Institutions
IMF	1.00												
Real GDP growth	0.11	1.00											
Log (GDP per capita)	-0.19	0.09	1.00										
CAB /GDP	-0.03	0.07	-0.05	1.00									
External debt/GDP	-0.08	-0.04	0.08	0.03	1.00								
Real world GDP growth	0.02	0.09	-0.07	0.05	0.03	1.00							
Debt Services /exports	0.04	-0.14	-0.34	-0.20	-0.05	0.04	1.00						
Inflation rate	-0.06	-0.09	-0.05	-0.02	0.00	0.02	0.14	1.00					
Log (terms of trades)	-0.01	-0.02	-0.11	0.11	-0.01	0.02	-0.06	-0.03	1.00				
Foreign Reserves	0.10	0.13	0.08	0.21	-0.15	-0.04	-0.11	-0.05	0.01	1.00			
Period of IMF programs	0.54	0.13	-0.08	0.00	-0.21	-0.06	-0.08	-0.04	-0.04	0.22	1.00		
log (foreign Aid)	0.35	0.12	-0.35	0.20	-0.01	-0.04	0.04	0.00	0.11	0.03	0.42	1.00	
Democratic Institutions	0.07	0.03	0.50	-0.13	0.01	-0.02	-0.16	-0.04	-0.08	0.05	0.17	-0.22	1.00

Source: Author's calculation

Appendix Table 2B: Correlation Matrix

Variables	FDI/GDP	Real GDP growth	Log (GDP per capita)	Openness	Inflation rate	Democratic Institutions	FDI Stock/GDP	Financial Development	Law & Order	Corruption	Political risk	IMF participation
FDI/GDP	1.00											
Real GDP growth	0.09	1.00										
Log (GDP per capita)	0.16	0.10	1.00									
Openness	0.41	0.10	0.28	1.00								
Inflation rate	-0.04	-0.10	-0.06	-0.03	1.00							
Democratic Institutions	0.12	0.06	0.35	0.16	-0.05	1.00						
FDI Stock/GDP	0.59	0.11	0.05	0.42	-0.02	0.06	1.00					
Financial Development	0.08	-0.06	0.52	0.31	-0.02	0.35	0.04	1.00				
Law & Order	0.10	0.20	0.02	0.05	-0.11	0.13	0.02	0.00	1.00			
Corruption	-0.03	-0.02	-0.02	-0.04	0.00	0.12	0.02	-0.06	0.32	1.00		
Political risk	0.16	0.22	0.33	0.23	-0.15	0.46	0.07	0.24	0.62	0.31	1.00	
IMF participation	0.07	0.13	-0.15	-0.11	-0.08	0.11	-0.04	-0.15	0.14	0.06	0.21	1.00

Source: Author's calculation

Appendix Table 3: The Determinants of Participations in IMF-Supported Programs

Independent Variables	<i>Dependent Variable: IMF participations:1980-2012 1/</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Current Account Balance / GDP	-0.001 (-0.266)	-0.001 (-0.388)	-0.005 (-1.464)	-0.01** (-2.040)	-0.01** (-2.448)	-0.003 (-1.540)
Real GDP growth	0.02* (3.190)	0.02* (3.469)	0.03* (4.611)	0.010 (1.369)	0.03* (3.620)	0.03* (4.483)
log (real GDP per capita)	-0.50* (-11.53)	-0.50* (-11.19)	-0.45* (-9.372)	-0.53* (-9.029)	-0.40* (-7.940)	-0.45* (-9.270)
Reserves in months of imports	-0.009 (-0.984)	-0.007 (-0.722)	-0.008 (-0.796)	-0.02*** (-1.733)	-0.007 (-0.724)	-0.012 (-0.72)
Inflation rate	-0.002* (-2.832)	-0.002* (-2.768)	-0.002* (-2.829)	-0.002** (-2.161)	-0.002* (-2.834)	-0.002** (-2.188)
Changes in Terms of Trades	0.045 (0.558)	0.059 (0.709)	0.048 (0.561)	0.167 (1.483)	0.047 (0.543)	0.102 (1.124)
Periods under IMF programs	0.11* (15.42)	0.12* (15.58)	0.11* (15.26)	0.11* (13.51)	0.11* (15.25)	0.13* (15.72)
Democratic Institutions	0.71* (5.421)	0.67* (4.929)	0.61* (4.370)	0.66* (3.876)	0.60* (4.317)	0.37** (2.533)
External Debt / GDP		0.03* (3.175)				
External Debt Services / Exports			0.02** (2.511)	0.016 (1.419)	0.02** (2.495)	0.004 (0.508)
Fiscal balance / GDP				0.04* (4.101)		
World real GDP growth					0.035 (1.469)	0.05*** (1.890)
Foreign aid /GDP					0.03* (6.236)	
No. of Observations	1976	1953	1884	1275	1867	1884
No. of Countries	73	73	73	73	73	73
Pseudo R2	0.22	0.22	0.22	0.26	0.22	0.24

Notes:

1/ The dependent variable is a dummy variable equal one if the country is under IMF-programs at least five months and zero otherwise.

2/ All independent variables are lagged by one year. Models are estimated by pooled Probit regressions.

3/ All regressions include a constant term. Robust z-values in the parentheses.

4/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix Table 4: The Determinants of Participations in IMF-Supported Programs: Alternative Estimations

Independent Variables	<i>Dependent Variable: IMF participations:1980-2012 1/</i>					
	<i>Random Effects Probit</i>			<i>Correlated Random Effects Probit</i>		
	(1)	(2)	(3)	(1)	(2)	(3)
Current Account Balance / GDP	-0.001 (-0.49)	-0.001 (-0.45)	-0.01 (-1.75)	-0.001 (-0.44)	-0.001 (-0.43)	-0.01 (-1.92)
Real GDP Growth	0.02* (3.57)	0.02* (3.65)	0.03* (3.61)	0.02* (3.59)	0.02* (3.70)	0.02* (3.63)
Log (real GDP per capita)	-0.65* (-8.80)	-0.63* (-8.30)	-0.65* (-6.57)	-0.54* (-9.57)	-0.53* (-9.24)	-0.46* (-6.68)
Reserves in months of imports	0.03*** (1.79)	0.03*** (1.73)	0.04* (2.61)	0.01 (1.30)	0.01 (1.23)	0.03** (2.08)
Inflation rate	-0.003* (-2.64)	-0.003* (-2.6)	-0.002*** (-1.76)	-0.002* (-2.57)	-0.002* (-2.52)	-0.002** (-2.25)
Changes in Terms of Trades	0.04 (0.34)	0.04 (0.35)	-0.05 (-0.42)	0.03 (0.34)	0.03 (0.39)	-0.08 (-0.86)
Periods under IMF programs	0.07* (7.83)	0.07* (7.71)	0.02** (2.16)	0.08* (10.7)	0.08* (11.01)	0.04* (4.83)
Democratic Institutions	1.2* (5.68)	1.2* (5.40)	1.1* (4.60)	0.90* (5.60)	0.90* (5.31)	0.97* (5.07)
External Debt / GDP		0.01 (1.02)			0.01 (1.62)	
External Debt Services / Exports			0.01*** (1.70)			0.02** (2.26)
World real GDP growth			0.05** (2.03)			0.05** (2.02)
Foreign Aid / GDP			0.7* (8.42)			0.4* (9.00)
No. of Observations	1976	1953	1867	1976	1953	1867
No. of Countries	73	73	73	73	73	73
Rho hat (p-value)	0.00	0.00	0.00	0.00	0.00	0.00
Wald test (p-value)	0.00	0.00	0.00	0.00	0.00	0.00

Notes:

1/ All independent variables are lagged by one year.

2/ All regressions include a constant term.

3/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix Table 5: IMF-Supported Programs and FDI inflows: Maximum Likelihood Estimations

<i>Dependent variable: FDI as a percentage of GDP: 1980-2012</i>						
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
IMF Participation	5.2* (4.870)	5.2* (4.838)	5.1* (4.668)	4.5* (3.130)	5.1* (4.884)	5.1* (4.842)
Real GDP growth rate	0.07*** 1.793	0.07*** 1.7924	0.07 1.5854	0.03 0.4204	0.07 1.4593	0.07 1.422
Log(GDP per capita)	1.1* (3.252)	1.1* (3.258)	1.0* (3.035)	0.32 (0.772)	1.0* (3.105)	1.0* (3.091)
Financial development	-0.02* (3.286)	-0.02* (3.253)	-0.03* (3.126)	-0.03* (3.057)	-0.03* (3.262)	-0.03* (3.267)
Openness	0.02* (3.819)	0.03* (3.791)	0.03* (3.930)	0.03* (4.486)	0.03* (4.053)	0.03* (4.080)
Inflation rate	0.0001*** (1.934)	0.0001*** (1.925)	0.0002** (2.097)	0.0002 (0.363)	0.0002** (2.145)	0.0002** (2.118)
FDI stock / GDP	0.09* (8.060)	0.09* (8.061)	0.09* (7.092)	0.10* (6.213)	0.09* (7.139)	0.09* (7.139)
Democratic Institutions	-0.50 (0.774)	-0.50 (0.770)	-0.11 (0.175)	0.31 (0.363)	-0.14 (0.211)	-0.12 (0.189)
Political Risk	-0.009 (0.499)	-0.009 (0.506)	-0.009 (0.558)	-0.009 (0.142)	-0.009 (0.504)	-0.009 (0.516)
Corruption	-0.14 (1.171)	-0.14 (1.162)	-0.13 (1.098)	-0.32** (2.001)	-0.12 (1.003)	-0.12 (0.990)
Law and Order	0.02 (0.150)	0.02 (0.151)	0.13 (0.799)	0.06 (0.297)	0.12 (0.732)	0.12 (0.713)
No. of Observations	1003	1003	946	682	945	945
No. of Countries	43	43	43	43	43	43
Wald test 4/ <i>p-value</i>	41.8 0.00	41 0.00	40.1 0.00	20.3 0.00	44.1 0.00	43.6 0.00

Note:

1/ All independent variables are lagged by one year. Models differ in the selection equation specifications.

2/ All regressions include a constant term. Robust z-values in the parentheses.

3/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

4/ The null hypothesis is that error terms in both equations are uncorrelated.

Appendix Table 6: IMF-Supported Programs and FDI inflows: Heckman's Two Step Estimations

<i>Dependent variable: FDI as a percentage of GDP: 1980-2012</i>						
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
IMF Participation	3.6* (5.477)	3.3* (5.122)	3.6* (6.114)	3.7* (6.317)	4.2* (5.404)	3.8* (6.487)
Real GDP growth rate	0.08* (3.756)	0.09* (4.541)	0.06* (2.588)	0.06* (2.558)	0.04 (1.437)	0.06** (2.445)
Log (GDP per capita)	0.60* (2.657)	0.50* (2.140)	0.83* (3.726)	0.84* (3.780)	0.52*** (1.797)	0.86* (3.874)
Financial development	-0.02* (2.639)	-0.02* (2.373)	-0.02* (2.706)	-0.02* (2.706)	-0.02* (1.952)	-0.02* (2.727)
Openness	0.03* (10.08)	0.03* (9.554)	0.03* (8.657)	0.03* (8.710)	0.03* (8.189)	0.03* (8.739)
Inflation rate	0.0001 (0.425)	0.0001 (0.413)	0.0001 (0.330)	0.0001 (0.338)	0.0001 (0.175)	0.0001 (0.354)
FDI stock /GDP	0.09 (18.95)	0.09 (19.25)	0.09 (18.31)	0.09 (18.40)	0.09 (15.35)	0.09 (18.36)
Democratic Institutions	-0.3 (0.589)	-0.1 (0.142)	0.6 (1.038)	0.5 (0.957)	0.8 (1.058)	0.5 (0.901)
Inverse Mills ratio 4/	-1.8* (4.280)	-1.6* (3.891)	-1.9* (5.165)	-2.0* (5.400)	-2.6* (5.323)	-2.1* (5.602)
No. of Observations	1763	1751	1555	1550	1092	1550
No. of Countries	73	73	71	71	71	71

Note:

- 1/ All independent variables are lagged by one year. Models differ in the selection equation specifications.
- 2/ All regressions include a constant term. Robust z-values in the parentheses.
- 3/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively
- 4/ The null hypothesis is that error terms in both equations are uncorrelated.

Appendix Table 7: ECF-Supported Programs and FDI inflows: Maximum Likelihood Estimations

<i>Dependent variable: FDI as a percentage of GDP: 1980-2012</i>						
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
IMF-ECF Participation	5.4* (3.472)	4.4* (1.901)	4.4* (5.055)	5.3* (4.481)	4.3* (5.147)	4.3* (5.313)
Real GDP growth rate	0.06 (1.180)	0.08 (1.482)	0.03 (0.929)	0.02 (0.567)	0.03 (1.048)	0.03 (1.037)
Log GDP per capita	0.91* (2.687)	0.69 (1.460)	0.94* (3.943)	0.74** (2.264)	0.92* (3.958)	0.93* (4.024)
Financial development	-0.01* (2.969)	-0.02* (2.786)	-0.02* (2.992)	-0.02** (2.164)	-0.02* (2.992)	-0.02* (3.007)
Openness	0.03* (5.475)	0.03* (5.124)	0.03* (5.973)	0.04* (6.001)	0.03* (5.953)	0.03* (5.976)
Inflation rate	0.0001 (1.477)	0.0001 (0.897)	0.0001 (1.051)	0.0001 (0.950)	0.0001 (1.021)	0.0001 (1.046)
FDI Stock /GDP	0.09* (11.783)	0.09* (11.642)	0.09* (11.291)	0.09* (9.580)	0.09* (11.347)	0.09* (11.328)
Democratic Institutions	-1.1 (1.193)	-0.6 (0.472)	0.3 (0.576)	0.6 (0.999)	0.3 (0.587)	0.3 (0.580)
No. of Observations	1763	1751	1555	1092	1550	1550
No. of Countries	73	73	71	71	71	71
Wald test 4/ <i>p-value</i>	35.7 0.00	17.6 0.00	41.2 0.00	45.9 0.00	41.8 0.00	43.7 0.00

Notes:

1/ All independent variables are lagged by one year. Models differ in the selection equation specifications.

2/ All regressions include a constant term. Robust *z*-values in the parentheses.

3/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

4/ The null hypothesis is that error terms in both equations are uncorrelated.

Appendix Table 8: IMF-Supported Programs and FDI inflows: Maximum Likelihood Estimations: Alternative Sampling

Independent Variables	<i>Dependent variable: FDI as a percentage of GDP</i>				
	FDI /GDP < 10	FDI /GDP < 5	1990-2012	1995-2012	2000-2012
IMF Participation	2.2* (10.82)	1.3* (8.65)	5.5** (2.28)	6.1** (2.51)	4.8* (3.83)
Real GDP growth rate	0.02 (1.55)	0.002 (0.16)	0.06 (1.32)	0.05 (0.76)	0.008 (0.18)
Log (GDP per capita)	0.59* (5.12)	0.19** (2.05)	0.84 (1.53)	0.73 (1.29)	0.65*** (1.88)
Financial Development	0.002 (0.89)	0.003 (1.36)	-0.01** (-2.21)	-0.015** (-2.23)	-0.01** (-2.21)
Openness	0.01* (6.07)	0.01* (4.08)	0.03* (4.72)	0.04* (4.49)	0.03* (3.89)
Inflation rate	0.0 (0.41)	-0.00*** (-1.92)	0.000 (0.90)	-0.0 (-0.23)	0.01 (1.56)
FDI stock /GDP	0.04* (13.75)	0.02* (7.72)	0.09* (10.67)	0.09* (10.45)	0.09* (10.22)
Democratic Institutions	0.78* (2.68)	0.66* (3.02)	-1.3 (-1.05)	-1.5 (-1.11)	-0.96 (-1.05)
No. of Observations	1592	1310	1383	1131	893
No. of Countries	73	72	73	73	73
Wald test 4/	57.1	33.3	15.5	15.3	16.8
<i>p</i> -value	0.00	0.00	0.00	0.00	0.00

Note:

1/ All independent variables are lagged by one year. Models differ in the selection equation specifications.

2/ All regressions include a constant term. Robust *z*-values in the parentheses.

3/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively

4/ The null hypothesis is that error terms in both equations are uncorrelated.

Appendix Table 9: IMF-Supported Programs and FDI inflows: Alternative Estimations

<i>Dependent variable: FDI as a percentage of GDP: 1980-2012</i>						
Independent Variables	POLS	POLS	FE	FE	GMM	GMM
lagged Dependent Variable					0.13 (0.716)	0.31** (2.151)
IMF Participation	1.8* (5.262)	1.5* (3.433)	1.5** (2.190)	1.3*** (1.691)	0.95** (2.138)	0.60 (1.528)
Real GDP growth rate	0.12** (2.396)	0.14*** (1.736)	0.10** (2.317)	0.12** (2.026)	0.12** (2.372)	0.25 (1.630)
Log (GDP per capita)	0.68* (2.604)	0.79** (2.478)	0.27 (0.311)	0.99 (0.827)	-1.95 (1.334)	-1.76 (1.523)
Financial development	0.00 (0.553)	-0.02*** (1.697)	0.02 (0.723)	0.02 (0.579)	-0.01 (0.251)	0.08 (1.266)
Openness	0.04* (4.591)	0.04* (3.143)	0.03* (3.351)	0.03** (2.361)	0.04 (1.554)	0.003 (0.152)
Inflation rate	0.0001 (0.366)	0.0001 (0.764)	-0.0001* (2.608)	-0.0001 (1.406)	0.0001 (0.301)	-0.0001*** (1.704)
FDI stock / GDP	0.05* (4.047)	0.05* (3.144)	0.05*** (1.709)	0.03 (0.547)	0.00 (0.211)	0.01 (0.926)
Democratic Institutions	0.56 (0.980)	0.80 (1.129)	2.4* (2.717)	1.38 (1.053)	0.95 (0.341)	2.21 (1.312)
Political Risk		-0.002 (0.110)		0.002 (0.050)		-0.09 (0.921)
Corruption		-0.40** (2.198)		-0.67 (1.372)		-0.31 (0.903)
Law and Order		0.3 (1.429)		0.74** (2.128)		1.2*** (1.777)
No. of Observations	1864	1035	1864	1035	1859	1035
No. of Countries	73	43	73	43	73	43
Adjusted R-Squared	0.34	0.34	0.12	0.10	--	--

Notes:

1/ POLS: Pooled Ordinary Least Squares, FE: Fixed Effects, GMM: Generalized Method of Moments.

2/ All independent variables are lagged by one year.

3/ All regressions include a constant term. Robust *t*- and *z*-values in the parentheses.

4/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix Table 10: The Impact of IMF-Supported Programs on FDI Inflows: Non-Parametric Estimations

	<i>Estimator: Propensity Score Matching</i>				
	Nearest Neighbor Matching (1)	Nearest Neighbor Matching (3)	Nearest Neighbor Matching (5)	Kernel Matching	Radius Matching
Changes in FDI as a percentage of GDP	0.59 (1.39)	0.28 (0.75)	0.47 (1.44)	0.28 (1.00)	0.38 (1.59)
No. of Observations	1954	1954	1954	1954	1954
No. of Countries	73	73	73	73	73

Notes:

1/ Robust t-stat in parentheses.

2/ *, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix Table 11: List of PRGT-eligibility Countries

	Date of First Eligibility	Date of Graduation		Date of First Eligibility	Date of Graduation
1	Afghanistan	March 26, 1986	46	Macedonia, FYR	February 23, 1994
2	Albania	April 7, 1992	47	Madagascar	March 26, 1986
3	Angola	April 7, 1992	48	Malawi	March 26, 1986
4	Armenia 1/	December 15, 1993	49	Maldives	March 26, 1986
5	Azerbaijan	May 30, 1995	50	Mali	March 26, 1986
6	Bangladesh	March 26, 1986	51	Marshall Islands	April 8, 2013
7	Benin	March 26, 1986	52	Mauritania	March 26, 1986
8	Bhutan	March 26, 1986	53	Micronesia	April 8, 2013
9	Bolivia	March 26, 1986	54	Moldova	March 23, 1999
10	Bosnia and	August 19, 1996	55	Mongolia	April 7, 1992
11	Burkina Faso	March 26, 1986	56	Mozambique	March 26, 1986
12	Burundi	March 26, 1986	57	Myanmar	March 26, 1986
13	Cambodia	March 26, 1986	58	Nepal	March 26, 1986
14	Cameroon	February 23, 1994	59	Nicaragua	April 7, 1992
15	Cape Verde	March 26, 1986	60	Niger	March 26, 1986
16	Central African	March 26, 1986	61	Nigeria	April 7, 1992
17	Chad	March 26, 1986	62	Pakistan	March 26, 1986
18	China	March 26, 1986	63	Papua New	June 11, 2003
19	Comoros	March 26, 1986	64	Philippines	April 7, 1992
20	Congo, Democratic	March 26, 1986	65	Rwanda	March 26, 1986
21	Congo, Republic	May 30, 1995	66	Samoa	March 26, 1986
22	Côte d'Ivoire	April 7, 1992	67	Sao Tomé and	March 26, 1986
23	Djibouti	March 26, 1986	68	Senegal	March 26, 1986
24	Dominica	March 26, 1986	69	Sierra Leone	March 26, 1986
25	Dominican	April 7, 1992	70	Solomon Islands	March 26, 1986
26	Egypt	April 7, 1992	71	Somalia	March 26, 1986
27	Equatorial Guinea	March 26, 1986	72	South Sudan	August 9, 2012
28	Eritrea	January 5, 1995	73	Sri Lanka	March 26, 1986
29	Ethiopia	March 26, 1986	74	St. Kitts and Nevis	March 26, 1986
30	Gambia, The	March 26, 1986	75	St. Lucia	March 26, 1986
31	Georgia 1/	December 15, 1993	76	St. Vincent &	March 26, 1986
32	Ghana	March 26, 1986	77	Sudan	March 26, 1986
33	Grenada	March 26, 1986	78	Tajikistan	December 15, 1993
34	Guinea	March 26, 1986	79	Tanzania	March 26, 1986
35	Guinea-Bissau	March 26, 1986	80	Timor Leste	June 11, 2003
36	Guyana	March 26, 1986	81	Togo	March 26, 1986
37	Haiti	March 26, 1986	82	Tonga	March 2, 1987
38	Honduras	April 7, 1992	83	Tuvalu	April 8, 2013
39	India	March 26, 1986	84	Uganda	March 26, 1986
40	Kenya	March 26, 1986	85	Uzbekistan	June 11, 2003
41	Kiribati	March 2, 1987	86	Vanuatu	March 26, 1986
42	Kyrgyz Republic	December 15, 1993	87	Vietnam	March 26, 1986
43	Lao, P.D.R.	March 26, 1986	88	Yemen, Republic	March 26, 1986
44	Lesotho	March 26, 1986	89	Zambia	March 26, 1986
45	Liberia	March 26, 1986	90	Zimbabwe 2/	April 7, 1992

Source: Finance Department, the IMF

1 / On April 8, 2013 the Executive Board decided to remove Armenia and Georgia from the list of PRGT eligible countries effective July 8, 2013 or at the time of when their arrangements under PRGT expire, whichever is later.

Armenia's ECF expired on June 27, 2013 and Georgia's SCF expired on April 4, 2014 (see SM/13/75, 3/18/2013).

2 / On September 24, 2001, Zimbabwe was removed from the PRGT-eligible list due to its overdue obligations to the PRG Trust (Decision No. 12582-(01/99)).

Definitions of Variables and Their Sources

Data used in this paper are extracted from six different sources.

1. UNCTAD's *World Investment Report, 2013*.

FDI Inflows: Foreign Direct Investment inflows as a percentage of GDP.

FDI stock: end-period total FDI stock in the host countries as a percentage of GDP.

Foreign Aid: total Official financial flows. It consist of the sum of official development assistance net (ODA) and other official flows net (OOF).

External Debt/GDP: External long-term debt as a percentage of GDP.

Debt Service to Exports: External long-term debt service as a percentage of total exports of goods and services.

2. **The World Bank's** *World Development Indicators, 2013*

Financial Development: Money and quasi money (M2) as a percentage of GDP.

Openness: The sum of exports and imports of goods and services measured as a share of GDP.

3. **The Political Risk Groups,** *International Country Risk Guide,*

Corruption: the International Country Risk Guide (ICRG) corruption index:
Countries are scored from (0 = high) to (6 = low).

Law & Order: is an index, ranging countries from (0 = very low) to (6 = very high), measuring the strength of Law and Order.

Political Risk: is an index, ranging countries from (0 = very low) to (100 = very high), measuring the country's political stability

4. **International Monetary Fund's** *World Economic Outlook database, 2013*

Real GDP Growth: Annual real GDP growth rate.

CAB/GDP: Current Account Balance as a percentage of GDP.

World real GDP growth: Annual real GDP growth rate.

Inflation rate: consumer price index (annual %).

Foreign Reserves: total international reserves in months of total imports

Level of Development: Annual GDP per capita.

Fiscal balance/GDP: Overall fiscal balance as a percentage of GDP

Terms of Trade: Terms of goods and services Trade index.

5. **International Monetary Fund's** *Finance Department database*

IMF participation: a dummy variable equals one if a member country is under an IMF-supported programs at least five months of the year and zero otherwise.

Period of IMF-programs: total number of years a member country has been under IMF- supported programs.

6. Freedom House's database, 2013

Democratic institutions: our own compilation based on data for political rights and civil liberties. Countries are ranked from 1 (most free) to 7 (least free) in both indices. Our index is defined as $[14 - (\text{political rights} + \text{civil rights}) / 12]$ and so it ranges from 0 (least free) to 1 (most free).