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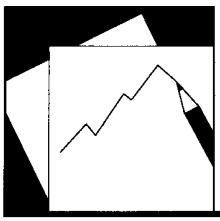

IMF Working Paper

Do IMF-Supported Programs Catalyze Donor Assistance to Low-Income Countries?

Yasemin Bal Gündüz and Masyita Crystallin

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Do IMF Programs Catalyze Donor Assistance to Low-Income Countries?[1]

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Abstract

This study explores whether IMF-supported programs in low-income countries (LICs) catalyze Official Development Assistance (ODA). Based on a comprehensive set of ODA measures and using Propensity Score Matching approach to address selection bias, we show that programs addressing policy or exogenous shocks have a significant catalytic impact on both the size and the modality of ODA. Moreover, the impact is greatest when LICs are faced with substantial macroeconomic imbalances or large shocks. Nevertheless, when countries attracting similar donor assistance before shocks are matched results for bilateral ODA turn insignificant, suggesting that the catalytic impact is attributed primarily to multilateral ODA.

JEL Classification Numbers: F33, F35, F53, F63, O19

Keywords: IMF-Supported programs; official development assistance (ODA); catalytic impact of IMF-supported programs; low-income countries; propensity score matching

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ABBREVIATIONS AND ACRONYMS

CFFs	Compensatory Financing Facilities
DAC	Development Assistance Committee
EC	European Commission
ECF	Extended Credit Facility
EFFs	Extended Fund Facilities
ENDA	Emergency Natural Disaster Assistance
EPCA	Emergency Post-Conflict Assistance
ESAF	Enhanced Structural Adjustment Facility
ESF	Exogenous Shocks Facility
FDI	Foreign Direct Investment
HIPC	Heavily Indebted Poor Countries
IDA	International Development Association
IMF	International Monetary Fund
LICs	Low-Income Countries
MDRI	Multilateral Debt Relief Initiative
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OOF	Other Official financing
PITF	Political Instability Task Force
PRGF	Poverty Reduction and Growth Facility
PS	Propensity Score
PSM	Propensity Score Matching
RAP	Rights Accumulation Program
RCFs	Rapid Credit Facilities
RFI	Rapid Financing Instrument
SAF	Structural Adjustment Facility
SBAs	Stand-By Arrangements
SCF	Standby Credit Facility
SMP	Staff-Monitored Program
UCT	Upper Credit Tranche

I. INTRODUCTION

While the catalytic effect of IMF-supported programs on donor flows is potentially an important channel for the economic impact of the IMF engagement in low-income countries (LICs) it received scant attention in the literature. Empirical research on catalytic financing effects has focused overwhelmingly on private capital flows to emerging market economies and findings on the IMF catalytic impact are at best mixed. Nevertheless, this strand of literature appears to have reached an agreement that the catalytic effect is not uniform across different types of IMF-supported programs or across recipient countries.

When assessing the catalytic impact of IMF-supported programs in LICs, stark differences in the financing landscape in comparison to emerging market economies need to be taken into account. LICs tend to depend on donor financing owing to their limited access to international capital flows and low domestic savings. Therefore, in the LIC context the relevant test of the catalytic impact of IMF-supported programs is whether such programs lead to significantly higher donor assistance. Catalysis could occur through two channels: (i) IMF conditionality, aiming at restoring macroeconomic stability and advancing economic reform in program countries to increase resilience to shocks; and (ii) the IMF financing, easing the burden of adjustment to shocks, thereby, supporting economic stabilization and near-term growth. On both fronts IMF engagement may provide some assurances to donors that resources allocated to program countries could be utilized more effectively to support better macroeconomic outcomes.

The major conceptual and methodological challenge in estimating the catalytic impact of IMF-supported programs is selection bias because initial economic conditions will differ systematically for a program versus a non-program country. Countries that approach the Fund tend to already face economic difficulties or expect to experience problems in the near future. If both donors and the IMF respond to economic circumstances of countries, obviously a positive association between programs and donor assistance will be observed. However, causality could only be examined by comparing donor assistance to program and non-program countries experiencing similar prior economic conditions.

The key step to address selection bias is to estimate determinants of IMF-supported programs (participation or selection model). The literature has reached a consensus on the need to improve selection models in order to properly assess program effects and suggested looking into subsets of programs, distinguishing the traditional current account crisis, capital account crisis, and LICs (survey articles by Steinwand and Stone, 2008, and Bird, 2007). Recognizing the wide spectrum of IMF programs tailored to specific needs of the membership, factors affecting participation may vary across different subsets of IMF programs. Therefore, focusing on more homogenous subsets of programs to estimate the participation model, and thereby address selection bias more effectively, is a promising avenue in assessments of program effects.

Interestingly, even programs specifically designed for the LIC membership differ significantly in terms of the nature of balance of payments needs that they address. Some programs deal with immediate needs arising from policy and exogenous shocks while others address more protracted balance of payments needs associated with lack of diversification in

economic structures and scarce domestic savings that could be addressed over time through structural transformation. The economic conditions prior to these two types of programs are likely to be quite distinct; suggesting that further disaggregation within LIC programs could improve the performance of the selection model.

More recently a handful of papers have looked into subsets of Fund programs. Bal Gündüz (2009) examines the participation in a subset of IMF-supported programs with LICs addressing policy and exogenous shocks. She reports significant effects from various economic variables (reserve coverage, current account balance to GDP, real GDP growth, macroeconomic stability, and terms of trade shocks) and global conditions (real growth in oil and non-oil commodity prices and world trade). She highlights two factors that are likely to account for higher explanatory power and better model specification, capturing the impact of economic conditions on participation: (i) studying a more homogenous subset of Fund financing addressing immediate balance of payments needs for LICs; and (ii) accounting for observable "supply-side" constraints that would preclude a member's access to Fund financing.

Building on the empirical strategy of examining participation and impact using more homogenous subsets of IMF-supported programs (Bal Gündüz, 2009 Bal Gündüz and others, 2013, and Mumssen and others, 2013) this study investigates the existence of the catalytic impact of the IMF engagement with LICs addressing policy or exogenous shocks. This paper makes several contributions to the empirical literature on the catalytic impact of IMF-supported programs. First, it is the only study to explore the catalytic impact of a unique set of financing arrangements with LICs addressing the policy and exogenous shocks. Second, it implements the propensity score matching (PSM) technique to address selection bias. So far only a handful of papers have used PSM to examine the economic impact of IMF-supported programs but not in the context of the catalytic financing impact.[2] Third, we examine the catalytic impact through not only the amount but also the modality of Official Development Assistance (ODA). Furthermore, we test a comprehensive set of ODA measures, including gross and net disbursements (both including and excluding debt relief), net commitments, and untied disbursements. Fourth, we explore heterogeneity of the catalytic impact by donors, inspired by findings in the literature that bilateral aid may be more responsive to political and strategic considerations of donors. Fifth, we explicitly account for the implementation of programs in estimating the catalytic impact. Although the literature recognizes that the impact of programs would depend on how successfully they are implemented previous empirical work has rarely accounted for the implementation record.[3]

Our results highlight that IMF-supported programs with LICs lead to significantly higher ODA and affect donors' preferences in terms of the modality of aid. Countries with IMF-supported programs tend to have an increase in gross disbursements (excluding debt relief) amounting to 1.9 percent of GDP. Interestingly, the size of the estimated catalytic impact

[2] See Bal Gündüz and others (2013) for a comprehensive survey of findings in the literature on the economic impact of IMF-supported programs.

[3] A notable exception is Mercer-Blackman and Unigovskaya (2000).

does not vary much for program countries experiencing substantial prior macroeconomic imbalances or large exogenous shocks. Moreover, the catalytic impact on commitments appears to be larger than the impact on disbursements, likely suggesting some room to improve both the utilization of aid by recipients and the predictability of aid disbursements. Finally, IMF-supported programs are associated with significantly higher ODA from multilateral donors while the estimated impact is, albeit positive, weaker for bilateral donors.

In terms of aid modality, countries with IMF-supported programs tend to receive a higher proportion of aid in general budget support from International Development Association (IDA) and European Commission (EC). Furthermore, the proportion of untied aid (excluding technical cooperation and humanitarian aid) in total aid is higher for countries with IMF-supported programs.

The paper is structured as follows: Section II reviews the literature on catalytic effects of IMF-supported programs. Section III presents some stylized facts on the evolution of ODA. Section IV introduces the methodology followed by empirical results in section V. Finally, conclusions are summarized in section VI.

II. LITERATURE REVIEW

The literature on the catalytic financing effect of IMF-supported programs focuses on the effect on private capital flows in emerging market economies.[4] Although this body of research could not support a uniform and significantly positive catalytic impact, they did report some non-monotonic positive impact depending on the initial economic conditions of recipient countries and type of private flows. Steinwand and Stone (2008), in their review article, point out that one clear finding of the literature is that the catalytic effects of IMF lending are not uniform across countries. Studies that investigate the possibility of non-monotonic effects find positive catalytic effects only for countries in a middle range of economic indicators for wealth or financial stability. Specifically, Mody and Saravia (2006) report that IMF program participation lowers the bond spread for countries with medium levels of foreign reserves, while countries with higher level of reserves experience negative catalytic effects (higher bond spread) and at the lower end have neither positive nor negative catalytic effect. They also observe that the sign of the catalytic impact of IMF financing may change when selection bias is explicitly accounted for.

Bird and Rowlands (2007) is the only paper examining the catalytic impact of IMF-supported programs on donor assistance to LICs. Their results indicate a strong positive association and also suggest that this effect may have more to do with conditionality than with the provision of IMF resources. However, this paper differs from our study in two important ways: (i) it does not correct for selection bias; and (ii) BR includes all programs with LICs regardless of the nature of balance of payments needs: Stand-By Arrangements (SBA) addressing immediate balance of payments needs, and programs supported by Extended Fund Facility

[4] Bird and Rowlands (2002 and 2009a); Morris and Shin (2006); Mody and Saravia (2006); and Cottarelli and Giannini (2002).

(EFF), and Poverty Reduction and Growth Facility (PRGF) addressing longer-term balance of payments needs.

Previous research on aid has found that determinants of bilateral and multilateral aid are different. Alesina and Dollar (2000) find that political and strategic considerations are more significant factors explaining bilateral aid than economic variables. Clist (2011) reports that aid allocation is influenced by donors' commercial and strategic ties with recipients and by the needs of the recipients. Similarly, Berthélemy (2006) found that most bilateral donors target their assistance to their most significant trading partners while they also respond to recipients' needs and merit. Based on these findings, we will also explore whether IMF-supported programs affect assistance from bilateral and multilateral donors differently.

Focusing only on the amount of ODA in assessing the catalytic impact of IMF-supported programs may give an incomplete picture. Other aspects of donor selectivity, i.e., how responsive aid allocation is to the needs and the policy environment of recipients, have also received attention in the literature. Clist, Isopi, and Morrissey (2012) argue that donors exercise selectivity over the aid modality. Specifically, multilateral donors (the EC and WB) cede more control to recipients over aid by granting more budget support to those recipients with better policies. Motivated by these findings we also explore the impact of IMF-supported programs on the aid modality of major multilateral donors.

III. Defining the Catalytic Impact on ODA

Cottarelli and Giannini (2002) define the catalytic impact of IMF-supported programs on private flows as follows: "… the IMF's involvement in a country has a catalytic effect to the extent that the announcement of an economic program backed up by a limited amount of IMF resources increases the propensity of private investors to lend to the country concerned, thereby reducing the adjustment burden falling on the debtor country with respect to the no-catalysis scenario." In the case of private flows an IMF-supported program is mostly an exogenous factor that would feed into investment/lending decisions of private investors.

The catalytic impact of programs on ODA from multilateral and bilateral donors, on the other hand, has more of a simultaneous and collaborative meaning. In a way an IMF-supported program likely acts as a coordination device among donors also motivated by the needs of the recipient countries among other more peculiar factors. The simultaneity aspect is also ingrained in the IMF's policy on financing assurances. All IMF financing arrangements requires that IMF-supported programs can only be approved (and reviews can only be completed) when the program is fully financed. This means that donors and creditors have furnished assurances that they will provide the necessary financial support to meet the program financing requirements on terms consistent with the member's return to external viability.[5] Given the predominant role of official flows in LICs programs are approved only when such assurances are in place from multilateral and bilateral donors. If this device works

[5] Specifically there should be no unfilled financing gaps over the 12 months immediately following the approval of the arrangement (and the completion of each review), and that there is a clear expectation that the program will be fully financed through the remainder of the arrangement period.

well in garnering significant additional ODA, it could ease and smooth the required policy adjustment and alleviate the associated output costs. The question, therefore, is how effective the IMF-supported programs in LICs as coordinating devices for donors support compared to the non-program countries experiencing similar economic difficulties.

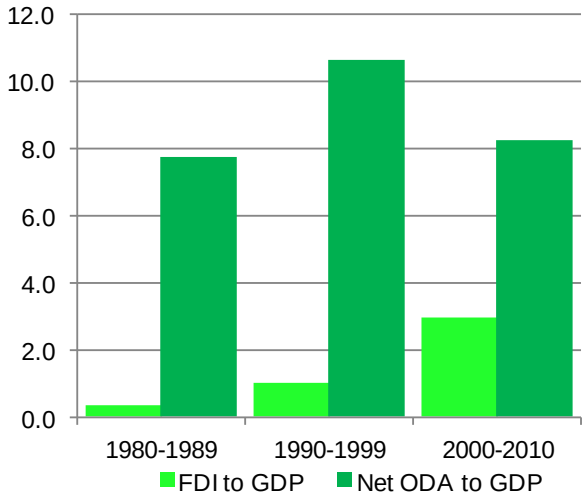
IV. METHODOLOGY

A. Data

Over the last three decades despite significant increases especially in Foreign Direct Investment (FDI) flows to LICs the ODA remains the most prominent source of financing by a large margin (Figure 1). Therefore, we prefer to focus on estimating the catalytic impact of programs on ODA flows. Furthermore, FDI flows reached meaningful levels only in the last decade, providing an extremely small sample to study that is not suited well to the PSM approach.

We use databases of the Organization for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) disaggregated by donors and recipients over time.[6] DAC definition of ODA includes official and concessional flows to developing countries granted with the objective of promoting the economic development and welfare of recipient countries.[7] Although the coverage of donors is not comprehensive, the DAC database covers the majority of ODA flows.

Figure 1. ODA and Foreign Direct Investment (FDI), medians over 1980–2010



[6] DAC is a specialized committee of aid donors that includes 29 member countries, plus the European Union as a full member.

[7] The minimum concessionality requirement is 25 percent, calculated using a discount factor of 10 percent.

We use four broad measures of ODA: gross disbursements, net disbursements, net commitments, and untied disbursements. In DAC statistics, repayments of loan principal (and any recoveries on grants or proceeds from equity sales) are subtracted from gross ODA to arrive at net ODA. Untied disbursements are derived by deducting humanitarian aid, technical cooperation grants, and food aid from gross disbursements.

Following Claessens, Cassimon, and Campenhout (2009) and Roodman (2012) we deduct debt forgiven and rescheduled from gross disbursements. Our motivation for removing debt relief is twofold: First, debt relief transactions do not represent actual current money transfers. Second, more importantly, the eventual debt relief is the outcome of a multi-year process and to a large extent predetermined with respect to the type of programs we examine.[8] As such debt relief part of ODA cannot be attributed to the catalytic impact of these programs and may distort the results.

Any loan cancellation, ODA or other official financing (OOF) loans, increases gross ODA through "debt forgiveness grants."[9] Moreover, when donors and recipients reschedule debt, the capitalization of interest arrears is treated as a new aid flow, and is included in "ODA loans extended," under "rescheduled debt." Using these series our adjusted gross disbursement variable is derived as follows:

Gross disbursement= (total ODA grants– debt forgiveness grants) + (total gross loans extended – rescheduled debt).

The DAC definition of net ODA automatically removes grants for ODA loan forgiveness by deducting the offsetting entry for amortization recorded in loan repayments. However, the OECD definition of net disbursements overstates the amount of actual money transfers as the debt relief granted on OOF loans are recorded as debt forgiveness grants but the offsetting entries of OOF loan repayments are recorded under the original category not as ODA loan repayments. We remove these offsetting entries from our definition of net disbursements to refine our measure of net disbursements.

[8] Although IMF-supported programs are required for debt relief, therefore, by definition catalyze donor support the subset of programs we examine tend not to overlap with those pre-requisite programs. In order to reach the decision and the completion points under the Heavily Indebted Poor Countries (HIPC) initiative and receive Multilateral Debt Relief Initiative (MDRI) a minimum six-month track record of policy performance under an IMF-supported program is required preceding both points. Programs that count toward qualification include those supported by ECF, SCF, or Extended Arrangements, on a case-by-case basis as determined by the Board, SBA, Rights Accumulation Program (RAP), Rapid Financing Instrument (RFI), Rapid Credit Facility (RCF), and Staff-Monitored Program (SMP) (when the Executive Board agrees that its policies meet the policy standard of an Upper Credit Tranche (UCT) arrangement). We do not typically have these programs in our subset of financing events addressing shocks. Only RCFs, and first years of some ECFs, if they address policy or exogenous shocks, are included. Furthermore, CFFs and augmentations of access under ECFs, included in our set, do not overlap with pre-requisite programs.

[9] In general, official loans that do not meet the concessionality requirement or allocated for non-developmental objectives such as military aid are classified as OOF. Loans with maturity of less than one year are also not counted as ODA.

Finally, for gross commitments disaggregated data for debt relief on commitment basis is not available at OECD/DAC database; therefore, we use the original OECD definition including debt relief.

To assess the impact of IMF-supported programs on aid modality we use ODA commitments for general budget support by IDA and EU. We use Clist, Isopi, and Morrissey (2012) dataset covering 1997–2009 for EU and 1995–2007 for IDA.

B. Propensity Score Matching

The empirical analysis in this paper implements the PSM approach to control for selection bias, a relatively new and innovative class of statistical methods for impact evaluation using non-experimental or observational data.[10] Participation in an IMF-supported program addressing policy or exogenous shocks is taken as the treatment status. The PSM involves a statistical comparison of program versus non-program countries in two steps: First, the probability of participating in IMF-supported programs is estimated conditional on observable economic conditions and country characteristics (selection model). At the second step, these probabilities, or *propensity scores*, are used to match program countries to non-program countries, and thereby, construct a statistical control group.[11]

The matching based on the probability of participation in IMF-supported programs assures similarity of initial macroeconomic conditions and country characteristics in the comparison, or control, group. The control group provides in effect a proxy for the counterfactual, that is, for the catalytic effect if program countries had not had a program. The catalytic effect of the IMF-supported programs is then calculated as the mean difference of relevant ODA measures (scaled by GDP) across these two groups.

The limitations of assumptions underlying the PSM should be noted. This approach is useful when only observed pre-treatment characteristics are believed to affect program participation. Two necessary assumptions for identification of the program effects are (i) conditional independence; and (ii) presence of a common support. Conditional independence, also called confoundedness, implies that the program participation is based entirely on observed pre-shock characteristics of LICs. If unobserved characteristics determine program participation, conditional independence will be violated, and PSM would not be an appropriate method. Using a rich set of pre-program data to estimate the probability of participation in IMF-supported programs addressing policy and exogenous shocks helps

[10] The interest in PSM accelerated after Heckman and others (1998) assessed the validity of using propensity matching to characterize selection bias using experimental data, and Dehejia and Wahba (1999) used PSM to approximate the experimental results from the National Supported Work Demonstration. In the context of evaluating the impact of IMF-supported programs, only Atoyan and Conway (2006), IMF (2012b), and Bal Gündüz and others (2013) implemented the PSM.

[11] This study uses the nearest neighbor matching approach, which constructs a control group of countries by choosing those four non-program countries with probability of requesting a program as close as possible to that of the specific program country in question.

support the conditional independence assumption. In other words, a well-specified and comprehensive selection model explaining the participation in IMF-supported programs is the key to properly assess the catalytic impact of IMF programs. Moreover, we test the impact of programs based on both first differences and levels of ODA. The former transformation is the preferred to remove the unobserved heterogeneity arising from country-specific factors that are not controlled for in the participation equation, which should further buttress conditional independence. The second condition, i.e., presence of a common support, ensures that treatment observations have comparison observations "nearby" in the propensity score distribution. Again, a well specified participation equation differentiating the initial macro-economic conditions well and providing probability estimates well dispersed in the range of zero and one would help uphold this assumption.

IMF program countries are called the treatment group whereas the remainder of the sample constitutes the control group. In terms of policy research on estimating the catalytic impact of IMF-supported programs, the average treatment effect of IMF engagement on the treated group (ATT) would be of interest and given by:

$$ATT = E[\Delta \mathrm{ODA}_{\mathrm{i1}} | IMF_i = 1] - E[\Delta \mathrm{ODA}_{i0} | IMF_i = 1] \qquad [1]$$

where IMF is the dummy variable identifying LICs with IMF engagement in any given year. $\Delta \mathrm{ODA}_{i0} | IMF_i = 1$ is the change in ODA (scaled by lagged GDP) that would have been observed if a LIC with IMF engagement had not experienced such an engagement, and $\Delta \mathrm{ODA}_{\mathrm{i1}} | IMF_i = 1$ is the change in ODA (scaled by lagged GDP) observed on the same country. The counterfactual outcome under no program is not observable for a program country. In order to derive the ATT based on observables equation [1] can be rearranged as follows:

$$E[\Delta \mathrm{ODA}_{\mathrm{i1}} | IMF_i = 1] - E[\Delta \mathrm{ODA}_{i0} | IMF_i = 0] = ATT + E[\Delta \mathrm{ODA}_{i0} | IMF_i = 1] - E[\Delta \mathrm{ODA}_{i0} | IMF_i = 0] \qquad [2]$$

The difference between the term on the left-hand side and the ATT is selection bias, i.e., the difference in average donor assistance to program countries under the condition of no program versus average donor assistance to nonprogram countries. Given that the initial macroeconomic conditions of program countries are substantially different than those of nonprogram countries, it is not plausible to assume that donor assistance would have been the same in the absence of IMF-supported programs, therefore, a sizeable selection bias would be present.

The key assumption to eliminate selection bias from equation (2) through matching methods is conditional independence which requires that, conditional on some control variables X, the catalytic impact be independent of the IMF engagement dummy, i.e. $E[\Delta \mathrm{ODA}_{i0} | IMF_i = 1, X_i] - E[\Delta \mathrm{ODA}_{i0} | IMF_i = 0, X_i]$ would be zero. Under this assumption, equation (2) can be rewritten as

$$ATT = E[\Delta \mathrm{ODA}_{\mathrm{i1}} | IMF_i = 1, X_i] - E[\Delta \mathrm{ODA}_{i0} | IMF_i = 0, X_i] \qquad [3]$$

Rosenbaum and Rubin (1983) propose that one can match the treated units and control units on their propensity scores, which can be estimated by simple probit or logit models. A further assumption needed to apply PSM is the common support assumption ($p(Xi) < 1$), which requires the existence of some comparable control units for each treated unit. When PSM is used, the ATT now can be estimated as

$$ATT = E[\Delta \text{ODA}_{i1} | IMF_i = 1, p(X_i)] - E[\Delta \text{ODA}_{i0} | \text{IMF}_i = 0, p(X_i)] \qquad [4]$$

The strategy then consists in computing the differences in ODA(Y_i) for observations with similar propensity scores (the probability of participating in IMF-supported programs addressing policy or exogenous shocks). Various methods have been proposed in the literature to match observations. In this study, we present results using the nearest neighbor technique. The nearest neighbor matching estimator sorts all records by the estimated propensity score, and then searches forward and backward for the closest control units.

Selection model for IMF-supported programs addressing policy and exogenous shocks

The selection model adopted in this study draws on Bal Gündüz (2009). This is the only study looking into determinants of LIC participation in IMF arrangements addressing immediate balance of payments needs in response to domestic policy and/or external shocks. Examining this more homogenous subset of IMF arrangements significantly improves the specification of the selection model, which is the key to counter selection bias to properly assess the impact of IMF-supported programs.[12]

The dependent variable is a panel dummy variable, taking the value of 1 if a new IMF shock financing is approved, and 0 otherwise, indicating a normal episode. The set of arrangements include those addressing an immediate balance of payments need arising from policy and/or exogenous shocks. SBA, Structural Adjustment Facility (SAF)/ Enhanced Structural Adjustment Facility (ESAF)/PRGF/ Extended Credit Facility (ECF) augmentations, Exogenous Shocks Facility (ESF), Standby Credit Facility (SCF), Rapid Credit Facility (RCF) and Compensatory Financing Facility (CFF) are included in this set.[13] The following refinements are made to this basic set: (i) precautionary SBA/SCF and SBA/PRGF/ECF augmentations addressing natural disasters are excluded,[14] and (ii) some SAF/ ESAF

[12] Before Bal Gündüz (2009), only Bird and Rowlands (2009b) looked into determinants of Fund arrangements with LICs, albeit without much success in improving the model specification. Only three variables turned significant: the presence of previous Fund arrangements, high inflation, and the rescheduling of debt in the current year.

[13] Bal Gündüz and others (2013) provides an extensive discussion on the evolution of the IMF's concessional facilities since 1986. For the IMF's current toolkit of facilities with LICs please refer to "*Handbook of IMF Facilities for Low-Income Countries*" (2014).

[14] The exclusion was based on the lack of immediate balance of payments need for precautionary SBAs and different nature of the shock for SBAs/PRGF augmentations addressing natural disasters. Specifically, it is quite unlikely that one could predict Fund financing addressing natural disasters, conditional on a similar set of explanatory variables as in policy and other exogenous shocks. In that regard, please see Bal Gündüz (2009) presenting a robustness check which shows that the participation equation estimated for programs addressing natural disasters are substantially different than programs addressing other immediate financing needs.

/PRGF/ECF arrangements are added if they address immediate balance of payments needs arising from policy shocks. In order to systematically determine the latter cases, this study relied heavily on program interruptions preceding SAF/ESAF/PRGF/ECF arrangements. For first time SAF/ESAF/PRGF arrangements, narratives from IMF staff reports are used to identify programs that envisaged a drastic shift in macroeconomic policies to address an immediate financing gap. Normal episodes are identified as the initial year of two successive years with no IMF financing for shocks when the member is eligible to access IMF resources.[15] Several refinements are made to normal episodes to identify cases where supply constraints are binding.[16]

The effects of various economic variables on the probability of a LIC requesting IMF financing in response to shocks are assessed by estimating a binary response model for panel data. The general specification for panel probit models is given by

$$\begin{aligned} &y_{it} = 1 \quad \text{if Fund financing is requested} \\ &y_{it} = 0 \quad \text{normal episodes} \\ &P(y_{it} = 1 \mid x_{it}, c_i) = \Phi(x_{it}'\beta + c_i) \quad i = 1,\ldots,n \text{ and } t = 1,\ldots,T \end{aligned} \tag{1}$$

where, y is the observed outcome, Φ is the cumulative normal density function (c.d.f.), x_{it} is the 1*xk* vector of explanatory variables, and β is *kx1* vector of coefficients associated with x_{it}. Different estimators are constructed depending on their assumptions for the panel heterogeneity, i.e., how they treat c_i.[17] The estimations are carried out step-by-step under different estimators and a correlated random effects probit model is preferred based on the

[15] Years with no programs that are immediately followed by IMF financing programs are excluded from the set of normal episodes as depending on the timing of programs negotiations may have taken place in these years. Therefore, economic circumstances in these years may resemble to those of program years. Allowing a safe "distance" away from program episodes helps better distinguish economic circumstances of program versus normal episodes which should improve the model specification.

[16] Members with overdue obligations to the Fund are ineligible to use Fund resources, therefore, observations with arrears to the Fund are excluded from normal episodes. Observations with Fund financing for natural disasters through Emergency Natural Disaster Assistance (ENDA) or PRGF augmentations, program interruptions or break-up of negotiations for a program, SMP, Emergency Post-Conflict Assistance (EPCA), and three years leading up to EPCAs are also excluded. Finally, episodes during which members incurred arrears to other bilateral and multilateral creditors and did not have adjustment programs that would garner the Fund support and rescheduling by their major creditors are excluded from normal episodes.

[17] Pooled probit models assume independence of observations over both *t* and *i*. A random effects (RE) probit model treats the individual specific effect, c_i, as an unobserved random variable with $c_i \mid x_{it} \sim IN(\mu_c, \sigma_c^2)$ if an overall intercept is excluded, and imposes independence of c_i and x_{it}. A fixed effects (FE) probit model treats c_i as parameters to be estimated along with β, and does not make any assumptions about the distribution of c_i given x_{it}. This can be problematic in short panels as both β and c_i are inconsistently estimated owing to an incidental parameters problem. Finally, a correlated random effects model relaxes independence between covariates and individual-specific effect using the Chamberlain (1982) and Mundlak (1978) device under conditional normality. In this specification, the time average is often used to save on degrees of freedom.

econometric tests for the significance of both the individual specific effect and the sample average for covariates.

Bal Gündüz (2009) finds that a number of economic variables are significantly associated with increased probability of IMF financing, including reserve coverage, the ratio of current account balance to GDP, real GDP growth, macroeconomic stability indicator and terms of trade shocks (Table 1).[18] Moreover, adverse global shocks to the change in real oil and non-oil commodity prices, and the cyclical component of world trade increase the participation in IMF arrangements. Therefore, the demand for IMF resources by LICs is likely to be cyclical in response to global conditions with its intensity depending on the magnitude and persistence of adverse external shocks.[19]

The ultimate objective is to distinguish the short-term impact of IMF-supported programs when a country has an immediate external financing need. The treatment variable is identified mostly symmetrically to the one used in the selection equation. A panel dummy variable taking the value of 1 for the approval of IMF-supported programs with LICs addressing immediate balance of payments needs, and 0 for non-program episodes, is constructed as the treatment variable.[20] Refinements to the program and non-program episodes are made similar to those for the dependent variable in the selection equation. Within the set of program countries, a higher propensity score will identify the IMF-supported programs addressing a clear financing need. Severe state failure events are excluded from both program and non-program sets as the macroeconomic outcomes in these episodes will be frail, independent of the impact of IMF-supported programs.[21] Furthermore,

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[18] In order to assess the macroeconomic policy stance based on a comprehensive set of complementary indicators, this study used a variant of the composite indicator introduced by Jaramillo and Sancak (2009). The version of this index that includes the black market premium was first used in Bal Gündüz (2009). The formula for the indicator is given by:

$$mitot_{it} = \frac{\ln(\frac{cpi_{it}}{cpi_{it-1}})}{\sigma_{\Delta\ln(cpi)}} + \frac{\ln(\frac{xr_{it}}{xr_{it-1}})}{\sigma_{\Delta\ln(xr)}} - \frac{\frac{res_{it}-res_{it-1}}{mgs_{t-1}}}{\sigma_{\Delta res/mgs_{t-1}}} - \frac{\frac{gbal_{it}}{gdp_{it}}}{\sigma_{gbal/gdp}} + \frac{\ln(1+blackpr_{it})}{\sigma_{\Delta\ln(xr)}}$$

where mitot is the macroeconomic stability index for country i at time t, cpi is the consumer price index, xr is the exchange rate of national currency to U.S. dollar (an increase indicates a nominal depreciation), res is the stock of international reserves, mgs is the imports of goods and services, gbal is the government balance, gdp is the nominal GDP, blackpr is the black market premium, and σ is the standard deviation of each variable. Weights are inverses of the standard deviation of each component for all countries over the full sample after removing the outliers. Higher levels of mitot indicate increased macroeconomic instability.

[19] See Bal Gündüz (2009) for other variables that could be significantly associated with the participation in IMF-supported programs but do not turn out to be significant, including variables capturing investors/donors' willingness to meet financing needs, i.e., access to alternative financing, prior to financing events.

[20] Some asymmetries compared to the dependent variable in the participation equation are introduced for nonprogram episodes to increase the common support for the PSM. The treatment variable includes nonprogram years followed immediately by an IMF-supported program and nonprogram episodes without IMF membership. The dependent variable in the participation equation excludes these observations from the sample.

[21] The severe state failure events are identified from Political Instability Task Force (PITF) dataset. Four types of political crises are included in this dataset: revolutionary wars, ethnic wars, adverse regime changes, and

(continued…)

as state failures could lead to a disruption of all donor involvement including these episodes could potentially bias results on the catalytic impact of programs. Finally, in order to take account of program implementation, years of program interruptions are excluded from the sample.

Table 1. Demand for IMF Financing in Response to Policy and/or External Shocks

Current account balance to GDP (*t*-1)	-0.076 ***
	(-4.61)
Reserve coverage in months of imports (CFA) (*t*-1)	-0.478 ***
	(-6.08)
Reserve coverage in months of imports (non-CFA) (*t*-1)	-0.769 ***
	(-8.71)
Macroeconomic stability indicator (*t*-1)	0.068 ***
	(2.89)
Real GDP growth (*t*-1)	-0.113 ***
	(-4.24)
Change in terms of trade (*t*-1)	-0.022 ***
	(-2.8)
Change in real oil prices in previous two years	0.009 ***
	(2.85)
Real world trade, cyclical component	-0.099 **
	(-2.53)
Change in real non-oil commodity prices	-0.020
	(-1.58)
Real growth of goods exports (*t*-1)	-0.009 *
	(-1.79)
Paris Club dummy	0.774 ***
	(3.24)
Constant	0.551
	(1.23)
Country-specific averages	
Total debt service to exports	0.044 ***
	(2.63)
FDI to GDP	-0.105 *
	(-1.76)
Pseudo R2	0.58
LR test : $\beta_z = \ldots = \beta_k = 0$ χ^2(Prob)	376 (0.00)
LR test : $\rho = 0$ χ^2(Prob)	11 (0.00)
Number of observations	532
Sample probability	0.44
Number of countries	55

Source: Bal Gunduz (2009).

Note: Demand for IMF financing in response to policy and/or exogenous shocks excluding natural disasters is estimated by a correlated random effects probit model. Significant at 10 percent:*; 5 percent:**; and 1 percent:***, t-statistics in paranthesis. Country-specific averages are calculated as the sample average of variables for each country. FDI = foreign direct investment; LR = likelihood ratio test.

[1] The CFA franc zone consists of 14 countries in sub-Saharan Africa, each affiliated with one of two monetary unions maintaining the same currency, the CFA Franc.

genocides and politicides. From this dataset the variable SFTPMMAX, which presents the maximum magnitude of all events in a year, exceeding 3.9 is taken as a severe state failure event.

V. RESULTS

Using the PSM we examine the catalytic impact of IMF-supported programs both on the size and the modality of ODA flows to LICs during 1980–2010.[22] Our outcome variables include four measures of ODA: gross and net disbursements, net commitments, and untied disbursements. For the first three measures, we further explore heterogeneity in the catalytic impact on ODA flows from bilateral versus multilateral donors. We take first differences of all outcome variables scaled by lagged GDP to eliminate persistent country-specific differences in aid allocation and focus on increases in aid that could be attributed to the catalytic impact of IMF-supported programs.[23] Furthermore, we present results on disbursements both excluding and including debt relief to examine the effect of this adjustment on the estimated catalytic impact.

Countries with higher propensity scores are more likely to request an IMF-supported program to address large exogenous shocks or substantial prior macroeconomic imbalances arising from policy slippages. Therefore, for each outcome variable we further examine the heterogeneity of the catalytic impact with respect to initial economic difficulties of recipients by testing the impact separately for three sub-groups of propensity scores: low (less than 0.3), medium to high (between 0.3 and 0.7) and very high (higher than 0.7). Table 2 shows the distribution of propensity scores across the treatment (programs) and the control groups (nonprograms). As noted earlier for nonprogram episodes we introduced some asymmetries compared to the dependent variable in the participation equation to increase the common support for the PSM by including nonprogram years followed immediately by an IMF-supported program or episodes without IMF membership. As a result of this strategy we significantly increased the size of the control group for high propensity scores.[24]

Simulation studies for the PSM report that the control to treated ratio is an important parameter affecting the level of difficulty for the matching estimators: When this ratio is smaller than 1:1 the mean square error (MSE) of the estimate of mean outcome in the nontreated population conditional on the propensity score becomes larger indicating worsening performance of the matching estimator (e.g., Frolich, 2004). Conversely the higher the ratio the more efficient the estimation becomes. In our study, the control to treated ratio is safely above one for both the full sample and the sub-groups by propensity scores.

[22] Our definition of LICs is defined as those countries that were eligible to receive the IMF's subsidized resources as of January 1st, 2010. Please see the annex for the list of countries included in the sample.

[23] We preferred to use a common denominator to put the emphasis on the change in ODA.

[24] Owing to the small sample for the sub-group with medium to high propensity scores, the PSM may not perform well, therefore, our results related to this sub-group should be interpreted cautiously.

Table 2. Sample Description: Distribution of Propensity scores across the Treatment and the Control Groups

	PS<0.3	0.3<PS<0.7	PS>0.7	Total
IMF-supported programs	29	47	112	188
Nonprograms	203	71	124	398
Total	232	118	236	586
Control-treated ratio	7.0	1.5	1.1	2.1

Source: Authors' calculations. IMF-supported programs include those addressing immediate balance of payments needs addressing policy or exogenous schocks. PS stands for propensity scores.

Gross and Net Disbursements

Benchmark results on disbursements suggest that countries with IMF-supported programs receive significantly higher ODA (Table 3 top panel):

- Contemporaneous increases in both gross and net disbursements (excluding debt relief) are significantly higher by about 2.0 and 2.4 percent of GDP respectively for countries with IMF-supported programs. Interestingly, the impact is, while positive, not significant for countries with low propensity scores, nevertheless, it is substantially higher and becomes significant for medium to high and very high propensity scores. We observe the same pattern for untied ODA disbursements. This finding seems to suggest that donors respond to economic difficulties of recipients and within the group of countries experiencing similar levels of economic hardship, i.e., substantial macroeconomic imbalances or large shocks, they tend to favor those with IMF-supported programs.

- Both multilateral and bilateral donors significantly raise their gross and net disbursements to countries with IMF-supported programs. While increases are highly significant across the board for multilateral flows, except for the net disbursements to the low propensity group, the significance of bilateral flows is driven by medium to high propensity scores. Net disbursements excluding debt relief are most likely to affect near-term economic outcomes as they represent net current cash transfers to recipients. It is noteworthy that changes in net bilateral disbursements are only slightly lower than those of net multilateral disbursements, except for low propensity scores.

The bottom panel of Table 3 presents results for the same ODA measures but including debt relief. As argued earlier, we prefer the ODA measures excluding debt relief to eliminate the noise arising from the debt relief process that is predetermined for the type of programs we examine. Interestingly, even with the unadjusted measures results are still broadly in line with our benchmark results. However, a noteworthy difference is that the increase in gross ODA disbursements from bilateral donors becomes insignificant. Furthermore, the

significance of the catalytic impact for gross ODA from multilaterals is driven only by the very high propensity scores.

Table 3. The Catalytic Impact of IMF-supported Programs on Change in Disbursements of Official Development Assistance (ODA)

Variables (first-differenced)	All LICs	PS<0.3	0.3<PS<0.7	PS>0.7
Excluding Debt Relief				
Gross disbursement	1.992***	0.964	2.087***	2.165**
	(0.572)	(0.898)	(0.629)	(0.906)
	584	232	118	234
Net disbursement	2.405***	1.978	2.635***	2.359*
	(0.871)	(2.118)	(0.998)	(1.301)
	584	232	118	234
Untied ODA disbursement	1.688***	0.776	1.840***	1.812**
	(0.498)	(0.758)	(0.549)	(0.790)
	584	232	118	234
Bilateral gross disbursement	0.854**	0.419	1.099**	0.875
	(0.420)	(0.335)	(0.529)	(0.656)
	567	226	114	227
Multilateral gross disbursement	1.394***	1.604***	0.964***	1.492***
	(0.308)	(0.394)	(0.373)	(0.477)
	567	226	114	227
Bilateral net disbursement	1.231*	0.931	1.323*	1.280
	(0.639)	(0.660)	(0.780)	(1.000)
	567	226	114	227
Multilateral net disbursement	1.463***	2.176	1.320**	1.317**
	(0.500)	(2.086)	(0.654)	(0.595)
	567	226	114	227
Including Debt Relief				
Gross disbursement	2.347**	-0.173	1.747**	3.211**
	(0.967)	(2.449)	(0.734)	(1.474)
	584	232	118	234
Net disbursement	1.975***	0.525	1.998***	2.288**
	(0.689)	(1.039)	(0.507)	(1.117)
	584	232	118	234
Untied ODA disbursement	2.044**	-0.361	1.500**	1.812**
	(0.898)	(2.373)	(0.666)	(0.790)
	584	232	118	234
Bilateral gross disbursement	1.198	-0.457	1.148**	1.643
	(0.770)	(0.906)	(0.534)	(1.242)
	567	226	114	227
Multilateral gross disbursement	1.459***	1.212	0.543	1.871***
	(0.452)	(1.908)	(0.548)	(0.542)
	567	226	114	227
Bilateral net disbursement	1.460*	0.196	0.613	2.137**
	(0.767)	(2.501)	(0.642)	(1.087)
	557	224	113	220
Multilateral net disbursement	1.017**	1.411	1.283**	0.788*
	(0.414)	(2.036)	(0.559)	(0.410)
	557	224	113	220

Source: Authors' calculations. Using the propensity score matching (PSM) the average treatment effect for the treated is reported. PS stands for the propensity score. Each variable is first differenced and scaled by lagged GDP: $(X_t - X_{t-1}) / GDP_{t-1}$. Standard errors are in parentheses, followed by number of observations. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

ODA in first differences is conceptually a better measure to assess the catalytic impact of IMF-supported programs as it removes country-specific and persistent differences in aid allocation, a phenomenon well documented in the literature for bilateral donors. Table 4 presents results for ODA measures in levels to examine whether our results for benchmark first-differenced measures would hold. Results are broadly similar except that the catalytic impact of programs on bilateral flows becomes insignificant for both gross and net disbursements across both the full sample and the sub-groups by propensity scores. On the other hand, aggregate disbursements including all donors remain significant thanks to multilateral flows. This finding is consistent with the literature highlighting that political and strategic factors are more influential on the allocation of bilateral aid. Nevertheless, within the group of countries experiencing similar economic problems bilateral donors appear to favor those with the IMF-supported programs and raise their base aid, which is determined mainly by their political and strategic considerations, more for this group.

Table 4. The Catalytic Impact of IMF-supported Programs on Disbursements of Official Development Assistance (ODA)

Variables (level in % of GDP)	All LICs	PS<0.3	0.3<PS<0.7	PS>0.7
Excluding Debt Relief				
Gross disbursement	2.224**	3.970**	3.530*	1.165
	(0.992)	(1.778)	(2.035)	(1.370)
	584	232	118	234
Net disbursement	2.240**	3.509*	3.953*	1.130
	(1.056)	(1.919)	(2.205)	(1.444)
	584	232	118	234
Untied ODA disbursement	2.217***	3.340**	3.481**	1.341
	(0.707)	(1.394)	(1.493)	(0.956)
	584	232	118	234
Bilateral gross disbursement	0.804	1.806	1.585	0.186
	(0.634)	(1.259)	(1.344)	(0.853)
	584	232	118	234
Multilateral gross disbursement	1.420***	2.163***	1.945**	0.979
	(0.477)	(0.677)	(0.870)	(0.697)
	584	232	118	234
Bilateral net disbursement	0.960	1.385	2.035	0.367
	(0.681)	(1.351)	(1.527)	(0.888)
	584	232	118	234
Multilateral net disbursement	1.280**	2.124*	1.918**	0.762
	(0.534)	(1.091)	(0.911)	(0.764)
	584	232	118	234

Source: Authors' calculations. Using the propensity score matching (PSM) the average treatment effect for the treated is reported. PS stands for the propensity score. Standard errors are in parentheses, followed by number of observations. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Commitments

Table 5 reports results for ODA commitments including debt relief.[25] The short-term IMF engagement leads to significantly higher commitments from multilaterals while its impact on bilateral commitments is insignificant. A comparison of these results with those for gross disbursements (including debt relief) reveals that the catalytic impact of programs on commitments is somewhat higher than the impact on gross disbursements. For multilateral flows all except countries with middle to high propensity scores commitments are higher than gross disbursements, possibly suggesting room to raise the utilization of aid either through increasing the technical implementation capacity of recipients or predictability of aid by multilateral donors. Interestingly, for bilateral donors the catalytic impact on gross disbursements is higher than the impact on commitments for both the full sample and the sub-groups by propensity scores.

Table 5. The Catalytic Impact of IMF-supported Programs on Change in Commitments of Official Development Assistance (ODA)

Variables (first-differenced)	All LICs	PS<0.3	0.3<PS<0.7	PS>0.7
Including debt relief				
Commitment	2.632**	1.869	0.925	3.495**
	(1.074)	(1.218)	(1.360)	(1.674)
	567	226	114	227
Bilateral commitment	0.815	-0.469	0.178	1.371
	(0.719)	(0.915)	(0.814)	(1.129)
	567	226	114	227
Multilateral commitment	1.817***	2.337***	0.747	2.124**
	(0.566)	(0.738)	(0.944)	(0.840)
	567	226	114	227

Source: Authors' calculations. Using the propensity score matching (PSM) the average treatment effect for the treated is reported. PS stands for the propensity score. Each variable is first differenced and scaled by lagged GDP: $(X_t - X_{t-1})/ GDP_{t-1}$. Standard errors are in parentheses, followed by number of observations. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Aid Modality

In addition to the quantity based-ODA measures above, we also assess the catalytic impact of IMF-supported programs on aid modality. Specifically, we look into whether programs are associated with an increase in the proportion of general budget support from IDA and EC.[26] Table 6 presents results.

Our findings suggest that IMF-supported programs have a significant catalytic impact through aid modality. For all LICs in our sample, Fund Programs tend to induce significantly higher proportion of aid allocated as general budget support from the IDA and the EC.

[25] It is not possible to calculate ODA commitments excluding debt relief as disaggregated data on debt relief on commitment basis is not available in the OECD/DAC database.

[26] Data availability is limited, from 1997 to 2009 for the EC and from 1995 to 2007 for the IDA.

Owing to the relatively small sample size the PSM may not perform well, therefore, our results related to the aid modality should be interpreted with caution. For that reason we also do not report results by sub-groups of propensity scores.

Table 6. The Catalytic Impact of IMF-supported Programs through Aid Modality

Variables (first differenced)	ALL LICS
Proportion general budget support from IDA	18.58***
	(5.318)
	146
Proportion general budget support from EC	18.59***
	(3.776)
Observations	212

Source: Authors' calculations. Using the propensity score matching (PSM) the average treatment effect for the treated is reported. PS stands for the propensity score. Each variable is first differenced. Standard errors are in parentheses, followed by number of observations. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Robustness Checks

Rosenbaum sensitivity analysis to hidden bias

The key assumption behind the PSM is conditional independence which means that program participation depends only on the observed characteristics of LICs. However, hidden bias may arise from important omitted covariates. The strong specification for the participation equation, encompassing a number of highly significant variables, should tend to alleviate the hidden bias. Moreover, this study looks into the impact of programs on changes in outcomes as well as their levels, which should help remove the unobserved heterogeneity arising from time-invariant country-specific factors not controlled in the participation equation.

In addition to these safeguards, we conducted Rosenbaum's sensitivity analysis to test sensitivity of our findings to hidden bias. This analysis manipulates the estimated odds of having a program versus not having a program to see how much it can deviate from 1, the expected odds ratio for a randomized experiment, while results still remaining robust. Table 7 presents results for the Rosenbaum sensitivity analysis to hidden bias. The parameter Γ is a measure of how much hidden bias can be present before results of the study begin to change. A variable is highly sensitive to hidden bias if the conclusions change for Γ just barely larger than 1, and it is insensitive if the conclusions change only for quite large values of Γ.[27]

[27] Robins (2002) expressed skepticism about the usefulness of sensitivity analysis as he proved that Rosenbaum's Γ fit the criteria of a paradoxical measure: its magnitude increases as the analyst decreases the amount of hidden bias by measuring some of the unmeasured covariates. As such, this measure could be useful only if experts could provide a plausible and logically coherent range of Γ.

Sensitivity analysis shows that our results across different measures of ODA are robust to hidden bias except for the results for the bilateral ODA, with Γ ranging from 1.7 to 3.11. While results for sub-groups with medium to high and very high propensity scores are robust, except for the bilateral disbursements, the results are very sensitive to hidden bias for the group with low propensity scores.

Table 7. Rosenbaum Sensitivity Analysis (Γ parameters)

Variables	All LICs	PS<0.3	0.3<PS<0.7	PS>0.7
Excluding Debt Relief				
Gross Disbursement	1.74	1.00	1.79	1.77
Net Disbursement	1.66	1.46	1.76	1.73
Bilateral Gross Disbursement	1.24	1.3	1.44	1.22
Multilateral Gross Disbursement	2.18	1.00	1.86	2.53
Bilateral Net Disbursement	1.24	1.00	1.44	1.27
Multilateral Net Disbursement	1.94	1.00	1.78	2.23
Flexible Disbursement	1.95	1.00	2.82	1.97
Including Debt Relief				
Gross Disbursement	1.76	1.00	1.83	1.79
Net Disbursement	1.73	1.00	1.82	1.7
Bilateral Gross Disbursement	1.28	1.38	1.5	1.24
Multilateral Gross Disbursement	2.5	1.03	1.87	2.6
Bilateral Net Disbursement	1.58	1.00	1.43	1.3
Multilateral Net Disbursement	2.39	1.00	2.58	2.83
Flexible Disbursement	1.98	1.02	2.09	1.94
Commitment	2.07	1.49	2.03	2.42
Bilateral Commitment	1.77	1.24	1.86	2.04
Multilateral Commitment	2.56	1.03	2.11	3.11

Source: Authors' calculations. The parameter Γ is a measure of how much hidden bias can be present, i.e. how much the estimated odds of having a program versus not having a program can deviate from 1 before results of the study begin to change. A variable is highly sensitive to hidden bias if the conclusions change for Γ just barely larger than 1, and it is insensitive if the conclusions change only for quite large values of Γ.

Sensitivity of results to immediate versus protracted balance of payments problems

In this section, we examine whether our results change if programs supported under ECF, addressing protracted balance of payments needs, are also included in our IMF program dummy used in the second stage for the PSM analysis.[28] Table 8 presents the results.

As expected observations with programs under ECFs predominantly add to the group with low propensity scores, thereby, results for the full sample gets weaker for all ODA measures but it becomes insignificant only for net disbursements (both aggregate and by donors) and gross disbursements for bilateral ODA. The results for multilateral gross disbursements are the most robust to the inclusion of ECFs. For net disbursements the catalytic impact is significant only for the group with medium to high propensity scores.

Weakening in results for the high to medium and very high propensity scores is noteworthy

[28] The ECF provides financial assistance to LICs with protracted balance of payments problems. Assistance under an ECF arrangement is provided usually for three years.

and could be an area for further research. It should be noted that we take all three years with ECF programs, not only the approval year of a program which may induce more donor aid than the interim years. Moreover, propensity scores are still estimated from the participation equation for programs addressing immediate balance of payments needs to flag the economic needs of countries, however, determinants of ECF programs are likely to differ substantially from those that matter for the subset of programs we focus on. Therefore, this sensitivity analysis should not be interpreted as weaker catalytic impact for ECF programs.

Table 8. Robustness Checks: IMF-Supported Programs including Extended Credit Facility

Variables (first-differenced)	All LICs	PS<0.3	0.3<PS<0.7	PS>0.7
Excluding Debt Relief				
Gross disbursement	0.724***	0.358	0.886*	1.185
	(0.280)	(0.333)	(0.525)	(0.808)
	1,149	627	209	313
Net disbursement	0.121	-0.575	1.069	0.773
	(0.572)	(0.818)	(0.729)	(1.269)
	1,149	627	209	313
Untied ODA disbursement	0.658***	0.352	0.806*	1.034
	(0.243)	(0.283)	(0.437)	(0.709)
	1,149	627	209	313
Bilateral gross disbursement	0.223	0.141	0.266	0.406
	(0.182)	(0.145)	(0.366)	(0.600)
	1,121	617	203	301
Multilateral gross disbursement	0.627***	0.495***	0.636*	0.878**
	(0.144)	(0.156)	(0.351)	(0.378)
	1,121	617	203	301
Bilateral net disbursement	0.384	0.351	0.233	0.593
	(0.305)	(0.299)	(0.501)	(0.964)
	1,121	617	203	301
Multilateral net disbursement	-0.153	-0.671	0.873*	0.271
	(0.505)	(0.818)	(0.487)	(0.665)
	1,121	617	203	301

Source: Authors' calculations. Using the propensity score matching (PSM) the average treatment effect for the treated is reported. PS stands for the propensity score. Each variable is first differenced and scaled by lagged GDP: $(X_t - X_{t-1})/ GDP_{t-1.}$ Standard errors are in parentheses, followed by number of observations. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Sensitivity of results to controlling for "donor favorites"

In our benchmark results, we focus on the catalytic impact of IMF-supported programs measured by the first-differenced ODA for program versus nonprogram countries to eliminate the time-invariant or highly persistent political and strategic considerations of donors affecting the level of their ODA allocation. In this section, we examine the robustness of our results to matching on both the propensity score and the lagged level of ODA to see whether the change in ODA could also be systematically different for countries attracting similar donor assistance before the shock. For that purpose, we match program and nonprogram countries having a similar propensity score and receiving a similar level of ODA at *t-1*. With this strategy we aim to identify "donor favorites", which attract sizeable donor resources before the shock, and match them with other "donor favorites" experiencing a

similar shock but not having a program. Results (Table 9) are qualitatively similar to our benchmark results for total and multilateral disbursements. A noteworthy result is that the estimated impact of programs on the bilateral gross and net disbursements becomes insignificant for the full sample while it turns out to be significant for the sub-group with low propensity scores. This finding may suggest that bilateral donors tend to step up assistance to their favorites experiencing severe economic hardship regardless of the program status of these countries. Nevertheless, after controlling for donor favorites, bilateral donors appear to increase in their support significantly for LICs with IMF-supported programs when recipients experience only mild economic distress (low propensity scores).

Table 9: Robustness Checks: Matching on Propensity Scores and Lagged ODA Disbursements

Variables (first-differenced)	All LICs	PS<0.3	• 0.3<PS<0.7	• PS>0.7
Excluding Debt Relief				
Gross disbursement	2.086***	0.959	2.112***	2.518**
	(0.739)	(0.912)	(0.620)	(0.995)
	584	232	118	234
Net disbursement	2.677**	2.570	2.760**	2.755*
	(1.129)	(1.860)	(1.081)	(1.518)
	584	232	118	234
Untied ODA disbursement	2.049***	0.697	2.034***	2.421**
	(0.588)	(0.728)	(0.588)	(1.052)
	584	232	118	234
Bilateral gross disbursement	0.927	0.730**	1.017*	0.956
	(0.588)	(0.291)	(0.608)	(1.006)
	567	226	114	227
Multilateral gross disbursement	1.803***	1.606***	1.190***	2.055***
	(0.290)	(0.371)	(0.297)	(0.438)
	567	226	114	227
Bilateral net disbursement	1.252	1.544***	1.351	1.377
	(1.016)	(0.501)	(1.118)	(1.489)
	567	226	114	227
Multilateral net disbursement	1.899***	3.068**	1.545***	1.908***
	(0.416)	(1.385)	(0.365)	(0.579)
	567	226	114	227
Including Debt Relief				
Gross disbursement	2.390**	-0.266	1.901***	3.238**
	(1.184)	(2.087)	(0.691)	(1.570)
	584	232	118	234
Net disbursement	2.026***	0.532	2.065***	2.433**
	(0.730)	(1.097)	(0.463)	(1.220)
	584	232	118	234
Untied ODA disbursement	2.371**	-0.304	1.607**	3.251*
	(1.021)	(2.048)	(0.742)	(1.802)
	584	232	118	234
Bilateral gross disbursement	0.945	-0.117	1.057*	1.302
	(1.004)	(0.717)	(0.626)	(1.667)
	567	226	114	227
Multilateral gross disbursement	1.829***	0.871	0.798	2.444***
	(0.429)	(1.680)	(0.497)	(0.520)
	567	226	114	227
Bilateral net disbursement	1.352*	-0.122	0.782	2.112*
	(0.703)	(1.921)	(0.598)	(1.224)
	557	224	113	220
Multilateral net disbursement	1.405***	1.484	1.393***	1.279***
	(0.323)	(1.309)	(0.296)	(0.388)
	557	224	113	220

Source: Authors' calculations. Using the propensity score matching (PSM) the average treatment effect for the treated is reported. PS stands for the propensity score. Each variable is first differenced and scaled by lagged GDP: $(X_t - X_{t-1}) / GDP_{t-1.}$ Standard errors are in parentheses, followed by number of observations. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

VI. CONCLUSION

This paper examines the catalytic impact of IMF-supported programs with LICs. We focus on a special subset of programs addressing immediate balance of payments needs of countries arising from policy or exogenous shocks. The premise of examining this group is twofold: First, regardless of the program status, these countries would need to adjust their policies to restore macroeconomic stability. To the extent that the IMF provides its own resources and catalyzes donor assistance in the context of IMF-supported programs it can help ease the pace of adjustment, thereby, alleviate the concomitant immediate output costs. Therefore, the catalytic impact of these programs is potentially an important channel of transmission for the impact of programs on near-term output. The second premise is related to the methodological challenge of addressing selection bias, i.e., systematic differences in initial economic conditions of a program versus a non-program country. Focusing on a homogenous subset of IMF-supported programs with LICs addressing immediate balance of payments needs is critical to identify the economic determinants of IMF programs, i.e., a strong participation equation to estimate the likelihood of such programs (propensity scores), thus, assess the catalytic impact of programs on donor support for countries experiencing similar economic difficulties using the PSM approach.

Using a comprehensive set of ODA measures, including gross and net disbursements (both including and excluding debt relief), net commitments, and untied disbursements we find that the IMF-supported programs in LICs have a significant catalytic impact on both the change in ODA, the primary source of financing to LICs, and the modality of ODA. Results are primarily driven by countries experiencing sizeable initial macroeconomic imbalances or large exogenous shocks (high propensity scores) while the catalytic impact is not significant for countries with low propensity scores. In other words, donors seem to respond to economic difficulties of recipients and within the group of countries experiencing substantial economic problems they tend to favor those with IMF-supported programs. Moreover, both multilateral and bilateral donors significantly raise their ODA (excluding debt relief) to countries with IMF-supported programs. We also assess the catalytic impact of IMF-supported programs on aid modality and find that programs tend to induce significantly higher proportion of aid allocated as general budget support from the IDA and the EC.

In order to remove the unobserved heterogeneity arising from country-specific factors we choose to test the catalytic impact on the change in ODA, rather than on its level. Nevertheless, results using levels offer some key insights as well. The catalytic impact of programs on the level of bilateral flows is insignificant while the impact on aggregate disbursements is significant, driven by multilateral flows. This finding is consistent with the aid allocation literature highlighting that political and strategic factors are more prominent for bilateral donors. Nonetheless, our results highlight that within the group of countries experiencing similar economic difficulties bilateral donors appear to favor, at the margin, those with the IMF-supported programs by raising the level of base aid, which is mainly determined by their political and strategic considerations, more for this group. We further examine if the impact would remain significant when we control for "donor favorites" by matching program and nonprogram countries having a similar propensity score and receiving a comparable level of ODA in the previous year. With this strategy we aim to identify "donor favorites", which attract sizeable donor resources before the shock, and match them with

other “donor favorites” experiencing a similar shock but not having a program. While our results remain qualitatively similar for total and multilateral disbursements the estimated catalytic impact of programs on bilateral disbursements (gross and net), though still positive, become insignificant. This finding as well as the high sensitivity of results for bilateral flows to hidden bias indicates that the catalytic impact of programs with LICs is primarily attributed to multilateral flows.

As another robustness check we examine how results would change if programs supported under ECF, addressing protracted balance of payments needs of LICs, are added to the set of programs while still using the participation equation estimating the likelihood of programs addressing urgent financing needs. Overall, results get weaker for all ODA measures as programs under ECFs predominantly add to the observations with low propensity scores. Nonetheless, results for the high to medium and very high propensity scores gets weaker as well, suggesting that further research could usefully explore the catalytic impact of programs supported under ECFs using a participation model explaining these programs.

Annex 1. List of Countries and Average Annual ODA Disbursements to GDP (1980–2010)

	Country	Gross	Net	Untied ODA	Bilateral Gross	Multi Gross
1	Albania	9.03	9.20	6.57	5.32	3.71
2	Armenia	5.64	5.66	1.50	0.37	5.27
3	Azerbaijan	1.02	1.03	0.55	(0.56)	1.58
4	Bangladesh	2.42	2.71	1.61	0.30	2.12
5	Benin	10.34	10.02	7.69	5.67	4.67
6	Bolivia	5.14	5.31	2.84	2.36	2.78
7	Burkina Faso	13.79	13.64	9.74	8.17	5.62
8	Burundi	25.83	24.48	16.03	12.16	13.67
9	Cambodia	5.69	5.78	3.19	2.31	3.38
10	Cameroon	3.52	3.54	2.56	2.38	1.14
11	Central African Republic	12.63	12.19	8.67	7.25	5.38
12	Chad	12.59	13.01	8.84	6.43	6.16
13	Comoros	20.04	20.58	13.45	11.34	8.70
14	Congo, Republic of	5.29	5.82	3.73	4.09	1.20
15	Cote Divoire	4.35	4.83	3.42	2.62	1.72
16	Democratic Republic of Congo	8.15	8.20	5.19	4.11	4.04
17	Ethiopia	9.59	8.84	5.97	4.95	4.64
18	Gambia	16.16	16.45	11.82	7.70	8.46
19	Georgia	3.86	3.87	1.66	(0.26)	4.11
20	Ghana	6.12	5.80	5.18	3.08	3.04
21	Guinea	9.01	9.84	6.62	4.51	4.49
22	Guinea-Bissau	21.92	21.52	15.45	11.49	10.43
23	Guyana	3.21	4.06	1.87	(4.23)	7.44
24	Haiti	13.92	14.00	7.44	9.51	4.41
25	Honduras	6.41	6.16	4.60	3.86	2.55
26	India	0.40	0.54	0.31	0.07	0.32
27	Kenya	5.94	6.77	4.09	3.87	2.06
28	Kyrgyz Republic	5.08	5.10	2.36	(1.29)	6.37
29	Laos PDR	6.28	6.35	3.90	0.65	5.63
30	Madagascar	10.65	9.95	8.02	5.38	5.27
31	Malawi	21.76	19.29	15.89	10.79	10.98
32	Mali	17.07	16.81	12.63	10.28	6.78
33	Mauritania	19.92	20.43	15.13	10.38	9.55
34	Moldova	6.39	6.51	3.78	3.35	3.04
35	Mongolia	6.37	6.50	3.62	2.99	3.63
36	Mozambique	25.10	24.17	18.64	16.80	8.30
37	Nepal	4.90	4.98	2.97	1.24	3.66
38	Nicaragua	15.61	14.41	11.42	10.50	5.11

	Country	Gross	Net	Untied ODA	Bilateral Gross	Multi Gross
39	Niger	14.54	13.78	10.16	8.61	5.93
40	Nigeria	0.68	0.74	0.46	0.36	0.32
41	Pakistan	1.20	1.46	0.82	0.02	1.18
42	Papua New Guinea	7.80	8.10	5.78	6.56	1.23
43	Rwanda	19.18	18.09	12.45	10.82	8.36
44	Senegal	10.99	10.85	7.73	7.15	3.84
45	Sierra Leone	19.08	18.11	12.96	9.22	9.87
46	Sri Lanka	3.94	4.59	2.90	1.84	2.11
47	Sudan	8.52	8.85	4.93	5.33	3.19
48	Tajikistan	4.25	4.28	1.07	(1.33)	5.62
49	Tanzania	14.07	13.85	11.15	9.22	4.86
50	Togo	10.65	12.04	7.94	6.05	4.60
51	Uganda	12.06	11.22	9.41	6.10	5.96
52	Uzbekistan	0.75	0.77	0.43	0.57	0.17
53	Vietnam	1.95	2.07	1.45	0.84	1.11
54	Zambia	16.01	15.51	12.52	9.30	6.71
55	Zimbabwe	9.57	9.66	4.35	7.28	2.30

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