


# Explaining IMF lending decisions after the Cold War

**Journal Article****Author(s):**

Moser, Christoph; [Sturm, Jan-Egbert](#) 

**Publication date:**

2011-09

**Permanent link:**

<https://doi.org/10.3929/ethz-b-000039362>

**Rights / license:**

[In Copyright - Non-Commercial Use Permitted](#)

**Originally published in:**

The Review of International Organizations 6(3-4), <https://doi.org/10.1007/s11558-011-9120-y>

# Explaining IMF lending decisions after the Cold War

Christoph Moser · Jan-Egbert Sturm

Received: 18 October 2010 / Revised: 19 January 2011 / Accepted: 14 March 2011 /  
Published online: 3 May 2011  
© Springer Science+Business Media, LLC 2011

**Abstract** This paper empirically investigates the economic and political factors that affect a country's likelihood to sign an arrangement with the IMF and the determinants of the financial size of such a program. Arguably the world and the global financial architecture underwent structural changes after the ending of Cold War and so did the role of the IMF. Hence, we update and extend the work of Sturm et al. (*Economics and Politics* 17: 177–213, 2005) by employing a panel model for 165 countries that focuses on the post-Cold War era, i.e., 1990–2009. Our results, based on extreme bounds analysis, suggest that some economic and political variables are robustly related to these two dimensions of IMF program decisions. Furthermore, we show that it is important to distinguish between concessional and non-concessional IMF loans.

**Keywords** IMF · Lending facilities · Extreme bounds analysis

**JEL Classification** O19 · F33

## 1 Introduction

When the International Monetary Fund (IMF) saw the light of day in the mid-1940s, 29 IMF member countries signed the Articles of Agreement at first. International trade in goods, services and especially capital was limited as a consequence of the Great Depression and World War II. While one of the main

---

**Electronic supplementary material** The online version of this article (doi:10.1007/s11558-011-9120-y) contains supplementary material, which is available to authorized users.

C. Moser · J.-E. Sturm  
KOF Swiss Economic Institute, ETH Zurich, Weinbergstrasse 35, CH-8092 Zurich, Switzerland

J.-E. Sturm (✉)  
CESifo, Munich, Germany  
e-mail: sturm@kof.ethz.ch

objectives of the Fund has remained to help governments overcome temporary balance of payments problems, its role in the world economy has changed remarkably due to historical events of economic and political nature (see for instance Boughton 2004). There have been different epochs in the history of the IMF, but—at least—two structural changes during the last 20 years are worth mentioning that initiated the latest era. First, the latest big influx of new IMF members was associated with the end of the Cold War and the collapse of communism. Within 3 years, membership increased from 152 countries to 172 at the beginning of the 1990s and the IMF started to review and adapt its organization. The IMF has now become a truly international financial institution with 187 member countries. Second, developing countries increasingly liberalized their capital accounts during the 1990s and the Latin American Debt Crisis was finally resolved at the end of the 1980s, leading to increased and renewed access to international capital markets for a number of emerging market economies. Both developments have affected the role of the IMF by changing the nature and resolution of financial crises and the size of IMF resources relative to private capital flows.

Most of the empirical literature on the determinants of IMF involvement uses data covering several decades of information, but fails to reflect these two structural changes. Furthermore, as noted by Sturm et al. (2005), a wide variety of economic variables has been suggested in the literature as determinants of IMF involvement, but generally empirical studies focus on a limited number of political variables (if any at all). We seek to reconcile these facts: Our study focuses on the post Cold War period and builds on a rich set of political and economic variables that also includes recently proposed variables for political proximity to major shareholders at the IMF and variables related to the exchange rate regime, the capital account side of IMF member countries and financial crises. The goal of this empirical analysis is to carefully examine which of these variables are really *robust* determinants of the likelihood that a country signs a new arrangement with the Fund and the amount agreed under this arrangement. By robust we mean that a specific economic or political variable should have a significant partial effect (largely) independent of the additional control variables chosen. The extreme bounds analysis (EBA) represents a fairly neutral means to check this form of robustness and investigate the validity of existing findings in empirical research.<sup>1</sup> We employ an EBA in order to examine which variables robustly explain IMF involvement for a panel data set of 165 countries over the period 1990–2009. One of the advantages of focusing on the post Cold War period is that it is a relatively homogenous era in the history of the IMF. Except for Sturm et al. (2005) and Dreher et al. (2009)—focusing on a different sample period and without looking at the size of the program—an EBA has to the best of our knowledge not yet been used to check for the robustness of a relationship between IMF involvement and economic and political variables.

---

<sup>1</sup> It is worth noting that our conclusions about the robustness of determinants of IMF participation are conditional on the empirical models chosen. While our extreme bounds analyses are based on estimators that are commonly used in the literature, it is beyond the scope of this paper to test for the robustness of these results to for instance other estimators or functional forms. We leave this for future research.

Our main results from the extreme bounds analysis suggest that a number of economic and political variables indeed play a prominent role in signing an IMF program and its size. These robust determinants of IMF involvement include among others past IMF involvement and lagged legislative and executive elections (on the political side) and the level of international reserves, real economic growth rates and currency crises (on the economic side).

We contribute to the empirical literature on the IMF in three ways: First, this is the first study that uses an EBA framework to examine the determinants of the size of IMF loans, a topic that has received surprisingly little attention in the literature. Second, we separately test for robust determinants of IMF involvement for non-concessional and concessional loans. This distinction is potentially crucial, since the demand for IMF loans and the supply of IMF loans might depend on the type of the facility. Our results confirm this conjecture. Hence, pooling of data on IMF programs can be problematic, since the determinants for non-concessional and concessional loans vary substantially. These differences in results are best exemplified by GDP per capita. Perhaps related to the Heavily Indebted Poor Countries (HIPC) initiative and the wave of severe currency crises in the second half of the 1990s, this variable in some specifications even significantly changes signs. Third, we update and extend the work of Sturm et al. (2005) and also provide a summary table with the most robust determinants of IMF participation by loan facility at the end of Section 4. We hope that this list of variables serves as a useful guide for choosing control variables in future studies.

The remainder of the paper is organized as follows. Section 2 discusses the variables that we take into account on the basis of previous studies. Section 3 explains the modeling strategy and Section 4 contains the empirical results. The final section offers some concluding comments.

## 2 Economic and Political Determinants of IMF Involvement

We summarize all recent studies that we are aware of dealing with determinants of IMF program participation since 2005, using similar criteria as Sturm et al. (2005) who survey the literature up to 2005 (for further recent reviews, see for instance Steinwand and Stone 2008; Bird 2007; and Conway 2006).<sup>2</sup> The empirical literature typically employs binary choice models (logit or probit) and defines IMF program involvement as a binary variable that takes the value of one if either i) a country participates in an IMF program in a given year, or ii) a country signs a new IMF arrangement in a given year.<sup>3</sup> In this study, we are interested in the latter case. While Appendix A summarizes both types of IMF program participation, we select those variables as our “core variables” that turned out to be most frequently used by other empirical studies in a similar setting as ours (i.e., with a dependent variable measuring the signing of new IMF arrangements and using data at an annual frequency) and that tended to be significant determinants of IMF

<sup>2</sup> For a review of the older literature, see Bird (1995) and Knight and Santaella (1997).

<sup>3</sup> Beyond these two common definitions of IMF participation, Vreeland (2003) proposes to distinguish the initiation of an IMF participation spell from the continuation of such a spell.

involvement. Furthermore, we review the empirical literature on the size of IMF programs in Appendix B. Since this aspect of IMF involvement has not been studied by Sturm et al. (2005), we provide an overview of all studies that we have been able to find (and not only the most recent ones).

Based upon this screening of the literature, we have selected 15 economic variables for further empirical analysis. We discuss below why they can be expected to be associated with IMF involvement, cite related recent studies and recall results from Sturm et al. (2005). We start with three economic variables that have most frequently been used in empirical studies on the determinants of IMF programs. Given their frequency, we include them in all our tested models below.

Core economic variables:

- RESIMP (total reserves in months of imports): Countries with low levels of international reserves relative to imports are more likely to face balance of payments difficulties, are more vulnerable to speculative attacks and hence are more likely to request and receive IMF credit.<sup>4</sup> In Sturm et al. (2005), this variable was robustly negatively associated with signing an IMF program.
- GRGDP (real GDP growth): Countries experiencing relatively weak growth are more likely to face financial constraints and demand IMF credit. Furthermore, low growth rates worsen a country's ability-to-repay its sovereign debt. This variable was another robust explanatory variable with a negative sign in the extreme bounds analysis of Sturm et al. (2005).
- LGDPPC (GDP per capita, in logarithm): On the one hand, low-income countries may be more likely to seek concessional Fund assistance and among low-income countries poorer ones are more likely to sign concessional loans within the framework of the HIPC-initiative. On the other hand, more advanced developing countries with capital market access tend to be in need for non-concessional loans and within this group a number of relatively rich emerging markets like for instance South Korea or Brazil experienced severe currency crises during the 1990s, calling for short-term non-concessional IMF assistance. Hence, we expect that the sign of this coefficient depends on the type of IMF facility (positive/negative for non-concessional/concessional loans). For the overall sample Sturm et al. (2005) did not find that this variable was a robust explanatory variable for the initiation of an IMF program.

Of course, there are many other economic variables associated to the signing of new IMF arrangements. The following section summarizes the ones that we consider in our empirical analysis.

Further economic variables:

- INVGDP (investment as percentage of GDP): A low ratio of investment to GDP may indicate limited access to international capital markets, thereby making it

<sup>4</sup> As an alternative we also experimented with total reserves scaled by total external debt. Both variables are highly correlated. To circumvent multicollinearity problems, we do not include both variables, but opt for RESIMP because it increases our sample. However, the qualitative conclusions are not affected by this choice.

- more likely that a country requests Fund assistance. Investment was indeed another robust explanatory variable with negative sign in Sturm et al. (2005).
- DEBTSERVEXP (debt service scaled to exports): A heavy debt burden relative to national income increases countries' need for external finance to service that debt.<sup>5</sup> For instance, Sturm et al. (2005) confirmed this prior.
  - XDEBTGNI (external debt scaled to Gross National Income, GNI): First, a high debt ratio may reduce the creditworthiness of the country concerned and, hence, increase its demand for IMF credit. Second, so-called "highly-indebted poor countries" are only eligible for debt relief, if they maintain macroeconomic stability under a PRGF-supported program. Hence, we would expect a positive sign for especially non-concessional IMF programs.
  - XBALGDP (external balance on goods and services scaled to GDP): One of the main objectives of the IMF is to assist countries to overcome their balance of payments woes (see Article I of the IMF Articles of Agreement). In this vein, a country that has a negative trade balance tends to need more financial resources and is more likely to receive IMF credit.<sup>6</sup>
  - GLOBEC (economic globalization as measured by the KOF Index of Globalization): More globalized economies tend to be more prone to spill-over effects via trade or financial links and hence the likelihood that an IMF program is signed increases. On the other hand, economic isolation might more easily create an environment in which domestic crises can occur.<sup>7</sup>
  - TOTADJGDP (terms of trade adjustment scaled by GDP): A worsening of a country's terms of trade is likely to weaken a country's external position, thereby increasing the likelihood that it needs to seek Fund assistance.
  - INFL (inflation): Countries experiencing high inflation are more likely in need of IMF credit. However, the willingness of the IMF to provide funds may be lower in case of high inflation.<sup>8</sup>
  - DEFGDP (government budget deficit as percentage of GDP): High budget deficits might increase the necessity for adjustment and governments are more likely to turn to the Fund.
  - STDEBTXDEBT (short-term debt scaled by total foreign debt): One of the main lessons from the Asian Crisis 1997/98 was that not only the level of indebtedness, but also its structure matters. A higher portion of short-term debt implies that the roll-over risk increases and, hence, a country's vulnerability to a financial crisis.

<sup>5</sup> We have also experimented with total debt services scaled by gross national income. Given its high correlation with DEBTSERVEXP, we do not include this variable in our analysis. The qualitative conclusions are, however, not affected by this.

<sup>6</sup> As alternative we have also used the current account as percentage of GDP. The trade balance is available for a larger set of countries and is highly correlated with the current account balance. We opt for the trade balance in the results presented. The qualitative results are, however, not affected by this.

<sup>7</sup> The KOF globalization index can be downloaded from <http://www.kof.ethz.ch/globalisation> (cf. Dreher 2006b).

<sup>8</sup> Note that the inflation rate is highly correlated with the lending interest rate in a particular country ( $\rho=0.77$ ). For that reason, we opt to keep country-specific interest rate variables out of the analysis. To reduce the influence of potentially outlying observations this variable is rescaled using the formula  $x/(1+x)$ . For instance, Dreher et al. (2010) use this data transformation.

- PEG (fixed exchange rate): On the one hand, a credible fixed-exchange rate system can encourage international trade and investment. On the other hand, if the pegged exchange rate system is inconsistent with a government's current domestic policy, the likelihood of a speculative attack and a request for an IMF program increases. For instance, Bird and Rowlands (2009a) find evidence that fixed exchange rates are positively associated with the signing of IMF programs.<sup>9</sup>
- CURCRIS (currency crisis): A number of recent studies document that IMF program involvement becomes more likely during currency crises (e.g., Elekdag 2008; Bird and Rowlands 2009b; and Breen 2010), where the IMF acts as a lender-of-last resort. We follow Frankel and Rose (1996) and Laeven and Valencia (2008) by defining a currency crisis as a nominal depreciation of the currency of at least 30% that is also at least a 10% increase in the rate of depreciation compared to the year before.
- FINOPEN (de jure measure for financial openness): Many emerging markets liberalized their capital accounts in the 1990s, which not only allowed them to better tap international capital markets, but also tended to be associated with a higher probability of financial crises (if the reforms were not accompanied by adequate financial supervision). We draw on an indicator of capital account openness that was first introduced by Chinn and Ito (2006). Higher values of the index indicate that a country is more open to cross-border capital transactions.<sup>10</sup>

To mitigate possible endogeneity problems with the above economic variables, we enter all of them with a one period lag in our models.

There is a growing consensus in the literature that the decision to sign an IMF program is not only determined by economic but also by political considerations. But while the literature has suggested various political factors that may influence the decision-making process on IMF loans, there is little agreement on which political variables to include. For instance Dreher et al. (2009) and Reynaud and Vauday (2009) offer interesting new insights in the use of IMF facilities by exploring the exogenous variation in temporary UN Security Council membership and by gauging the geopolitical importance of the countries turning to the IMF.

From our literature research we conclude that one political variable stands out of the numerous political variables tested in recent studies in terms of frequency used and its explanatory power. Therefore, we include this variable in each of our models and consider an additional 14 political variables in our robustness analysis.<sup>11</sup>

<sup>9</sup> Trudel (2005) finds no direct effect of a fixed exchange rate on the likelihood of entering into an IMF program, but documents an indirect effect by showing that the dwindling of international reserves only in combination with a fixed exchange rate increases IMF participation.

<sup>10</sup> On the homepage of Menzie Chinn ([http://web.pdx.edu/~ito/Chinn-Ito\\_website.htm](http://web.pdx.edu/~ito/Chinn-Ito_website.htm)), an updated version of the data set of Chinn and Ito (2006) is available.

<sup>11</sup> To cope with multicollinearity, for four groups of political variables, we only incorporate the first principal component or averages in the EBA. Hence, we implicitly cover 24 political variables in our analyses.

## Core political variable:

- UNDERIMF5MA (years under IMF—last 5 years, moving average): Once countries turned to the IMF, there is marked persistence in IMF involvement, which is at odds with the original IMF goal to provide temporary balance of payment support to member countries. To capture this, we follow Przeworski and Vreeland (2000) using the lag of a five-years moving average of a dummy indicating whether or not a country was under an arrangement.<sup>12</sup> The extreme bounds analysis performed by Sturm et al. (2005) found robust evidence for such persistence in IMF programs.

## Further political variables:

- LAGEXELEC/LAGLEGELEC (lagged elections for the executive and legislative, respectively): Przeworski and Vreeland (2000) argue that governments are more likely to enter an arrangement right after an election, hoping that any potential negative connotation with the program will be forgotten by the time voters turn to the polls again, i.e., the next election.
- LEADEXELEC/LEADLEGELEC (lead in elections for the executive and legislative, respectively): While various safeguards against the misuse of IMF resources are routinely incorporated into IMF lending programs, Dreher and Vaubel (2004) suggest that the availability of IMF credit might indirectly help to finance electoral campaigns. They find that net credit supplied by the IMF is generally higher before elections.
- POLINSTAB (political instability): Political instability is measured by the first principal component of the number of political assassinations, revolutions, guerrilla problems, government crises and the instability within the government as measured by the percent of veto players who drop from the government in any given year.<sup>13</sup> On the one hand, the possibility of blaming the IMF for the necessary adjustment policies may be an incentive to resort to the Fund. On the other hand, the political costs to negotiate an IMF program might be higher in unstable countries.<sup>14</sup> The results from Sturm et al. (2005) suggest that government instability is negatively associated with signing an IMF arrangement.
- SOCUNREST (social unrest): Social unrest is measured by the first principal component of the number of demonstrations, strikes and riots—prior to the signing of an IMF arrangement. In general, the decision to involve the IMF crucially depends on governments' assessment of the political costs that may result from the adjustment policies.

<sup>12</sup> Some recent studies seek to empirically explain the duration and recidivism in IMF programs (see for instance Bird et al. 2004; Joyce 2005 and Conway 2007). This dimension has not been subject to an extreme bounds analysis yet. We leave this for future research.

<sup>13</sup> Given the conceptual similarity and to circumvent multicollinearity problems we use principal components analysis here. This is a statistical technique used for data reduction. The leading eigenvectors from the eigen decomposition of the correlation matrix of the variables describe a series of uncorrelated linear combinations of the variables that contain most of the variance. The first principal component accounts for as much of the variability in the data as possible and is therefore taken to represent political instability.

<sup>14</sup> Dreher and Gassebner (2008) provide evidence that IMF and World Bank involvement increases the likelihood of a government crisis.



- LIBERAL (Freedom House index): We use the average of the political rights index and the civil liberties index of Freedom House. Such a political rights index could be positively or negatively associated with the Fund's involvement. Autocratic regimes might be more inclined to turn to the IMF, since the perceived political costs are lower. But less democratic regimes also do not necessarily "need" the IMF as a scapegoat to pursue potential reforms.<sup>15</sup>
- GLOBPOL (political globalization as measured by the KOF Index of Globalization). Countries which are more integrated in world politics might have better access to IMF credits.<sup>16</sup>
- ICRG (quality of government indicator as measured by the International Country Risk Guide): We employ the mean value of the ICRG variables "Corruption," "Law and Order" and "Bureaucracy Quality" in our study, whereby higher values mean higher quality of government. Starting from the mid-1990s several international financial institutions started to act decisively against corruption. Hence, we expect lower quality of government to be negatively associated with IMF involvement.
- UNSC (temporary membership on the UN Security Council): Dreher et al. (2009) show that temporary membership on the UN Security Council increases the likelihood of these countries in receiving IMF support.
- RELSIZE (share in world GDP): This represents a rather crude proxy variable for the systematic or geopolitical importance of a country in the world economy. If size indeed matters for the IMF, then we would expect a positive sign on this coefficient.<sup>17</sup>
- TRADEUS (share of a country's bilateral trade with the United States relative to the country's GDP): This measure proxies for political and economic proximity to the United States. Since the United States are the only sovereign country that holds a veto power at the IMF, proximity to the U.S. might increase the likelihood of receiving IMF credit (see, e.g., Barro and Lee 2005).<sup>18</sup>
- VOTEINLINEUSA (vote in line with the United States): This variable captures how often countries do vote in line with the United States in the United Nations General Assembly. Once more, this can be seen as a proxy variable for political proximity. We follow the definition of Thacker (1999) and code votes in agreement with the United States as 1, votes in disagreement as 0, and abstentions or absences as 0.5. These are subsequently averaged over a year.

One important pillar of our dataset consists of information about the timing and nature of IMF lending arrangements. From the IMF website, we gather information on a) the year in which an arrangement has been signed and b) the agreed amount of money to be lent by the IMF during the arrangement. Appendix C gives the summary statistics of all variables employed.

<sup>15</sup> We have also experimented with the index of executive competitiveness. This variable is, however, highly correlated with our democracy measure and therefore omitted from the analysis.

<sup>16</sup> See footnote 7.

<sup>17</sup> For a more sophisticated approach to geopolitical importance, see for instance Reynaud and Vauday (2009).

<sup>18</sup> Another potential variable that proxies for political interest is the bank exposure of the United States or the G5 in a given country as recorded by the Bank of International Settlements (see for instance Oatley and Yackee 2004; Broz and Hawes 2006; Copelovitch 2010). The results from Breen (2010) indicate that the effects of bilateral trade and bank exposure on IMF program participation are very similar.

### 3 Modeling Approach

To examine the sensitivity of the individual variables on signing an IMF arrangement and its financial size, we apply (variants of) extreme bounds analysis, as suggested by Leamer (1983) and Levine and Renelt (1992). This approach has been widely used in the economic growth literature. The central difficulty in this research—which also applies to the research topic of the present paper—is that several different models may all seem reasonable given the data but yield different conclusions about the parameters of interest. Equations of the following general form are estimated:

$$Y = \alpha M + \beta F + \gamma Z + u, \quad (1)$$

where  $Y$  is the dependent variable;  $M$  is a vector of ‘standard’ explanatory variables;  $F$  is the variable of interest;  $Z$  is a vector of up to three possible additional explanatory variables, which the literature suggests may be related to the dependent variable; and  $u$  is an error term. The extreme bounds test for variable  $F$  states that if the lower extreme bound for  $\beta$ —the lowest value for  $\beta$  minus two standard deviations—is negative, and the upper extreme bound for  $\beta$ —the highest value for  $\beta$  plus two standard deviations—is positive, the variable  $F$  is not robustly related to  $Y$ .

As argued by Temple (2000), it is rare in empirical research that we can say with certainty that one model dominates all other possibilities in all dimensions. In these circumstances, it makes sense to provide information about how sensitive the findings are to alternative modeling choices. Extreme bounds analysis (EBA) provides a relatively simple means of doing exactly this. Still, the approach has been criticized in the literature. Sala-i-Martin (1997) argues that the test applied poses too rigid a threshold in most cases. Assuming that the distribution of  $\beta$  has at least some positive and some negative support, the estimated coefficient changes signs if enough different specifications are considered. We therefore report not just the extreme bounds, but also the percentage of the regressions in which the coefficient of the variable  $F$  is significantly different from zero at the 10% level. Moreover, instead of analyzing just the extreme bounds of the estimates of the coefficient of a particular variable, we follow Sala-i-Martin’s (1997) suggestion to analyze the entire distribution. Following this suggestion, we not only report the unweighted parameter estimate of  $\beta$  and its standard deviation, but also the unweighted cumulative distribution function (CDF(0)), that is, the fraction of the cumulative distribution function lying on one side of zero.<sup>19</sup>

<sup>19</sup> Sala-i-Martin (1997) proposes using the (integrated) likelihood to construct a weighted CDF(0). However, the varying number of observations in the regressions due to missing observations in some of the variables poses a problem. Sturm and de Haan (2001) show that this goodness of fit measure may not be a good indicator of the probability that a model is the true model, and the weights constructed in this way are not equivariant to linear transformations in the dependent variable. Hence, changing scales result in rather different outcomes and conclusions. We thus restrict our attention to the unweighted version. Furthermore, for technical reasons—in particular our unbalanced panel setup—we are unable to use extensions of this approach, like Bayesian Averaging of Classical Estimates (BACE), as introduced by Sala-i-Martin et al. (2004), or Bayesian Modeling Averaging (BMA).

## 4 Results

The main results of the extreme bounds analysis are summarized in Tables 1 to 6. As discussed earlier, our choice of the economic and political “core variables” that enter the  $M$ -vector is driven by the recent related empirical literature. Given these core variables, our dataset includes annual data for 165 member countries over the period 1990 to 2009. Our empirical results are structured along two main lines: First, we distinguish between two different dependent variables. On the one hand, we look for robust determinants of signing of an IMF arrangement by estimating pooled logit models (for comparability with many studies) and alternatively conditional fixed effects logit models. On the other hand, we analyze the robust determinants of IMF loan size. Following important contributions in this strand of literature, we use a Tobit estimator. Second, we investigate whether the determinants of non-concessional and concessional IMF loans are the same. Non-concessional loans are Standby Arrangements (SBAs), Extended Fund Facilities (EFFs) and Flexible Credit Lines (FCLs) and concessional loans consist of the Extended Credit Facility (ECF—formerly PRGF, poverty reduction and growth facility), the Exogenous Shock Facility (ESF) and the Structural Adjustment Facility (SAF). All our models include time fixed effects and standard errors are clustered at the country-level.<sup>20</sup>

### 4.1 The Determinants of Signing an IMF Arrangement

Our first dependent variable concerns the signing of an IMF arrangement. We define a binary variable equal to one, if a country signs a new IMF arrangement in a given year and zero otherwise.

Table 1 provides the results of an extreme bounds analysis for two different regression models. The results for the pooled logit model are reported on the left hand side and the results for the conditional (country fixed effects) logit model on the right hand side of this table.<sup>21</sup> The first and second column in each block of results refers to the average beta coefficient (*Avg. Beta*) and the average standard error (*Avg. Std. Err.*), respectively. Then, the third column reports the percentage of the regressions in which the coefficient on the variable of interest differs significantly from zero at a 5% level (*% Sign.*). Our main attention is on column four that shows the unweighted cumulative distribution function ( $CDF(0)$ ). If an explanatory variable has a  $CDF(0)$  of at least 0.95, we regard this variable as a robust determinant of IMF involvement. Furthermore, columns five and six report the lower and upper bounds for the coefficients. Finally, columns seven and eight

<sup>20</sup> The only exception is the conditional fixed effects logit model for which we do not report clustered standard errors. Note that the time fixed effects control for variables like the LIBOR (London Interbank Offered Rate) or the number of countries that are under an IMF program in a given year.

<sup>21</sup> Note that the conditional fixed effects logit estimator as proposed by Chamberlain (1980) is a conditional maximum likelihood estimator based on a log density for country  $i$  that conditions on the total number of signed IMF programs equal to 1 for a given country  $i$  over time. Since it is not possible to condition on those countries that either never signed an IMF program or those that signed one in every single year, these observations are lost. The sum of outcomes varies between 0 and 8 in our sample, whereby 63 countries never signed an IMF program during the sample period.

**Table 1** Economic and political determinants of signing of IMF programs (EBA—logit and conditional fixed effects logit)

Variable	Avg. Beta	Avg. Std.Err	%Sign.	CDF(0)	Lower Bound	Upper Bound	Comb.	Avg. Obs.	Avg. Beta	Avg. Std.Err	%Sign.	CDF(0)	Lower Bound	Upper Bound	Comb.	Avg. Obs.
<b>Logit - Base model</b>									<b>Conditional Fixed Effects Logit - Base model</b>							
underimf5ma	1.8004	0.4147	97.5%	1.00	-0.64	4.71	2625	1797	-2.3860	0.5587	100.0%	1.00	-6.55	-0.58	2569	1191
resimp1	-0.0515	0.0397	25.3%	0.88	-0.22	0.14	2625	1797	-0.1312	0.0670	73.3%	0.96	-0.44	0.43	2569	1191
grgdpl	-0.0575	0.0176	99.3%	1.00	-0.17	0.02	2625	1797	-0.0389	0.0182	78.8%	0.96	-0.19	0.04	2569	1191
lgdppe1	-0.2067	0.0735	68.0%	0.83	-0.77	0.42	2625	1797	-0.8383	0.9206	17.7%	0.82	-7.08	6.67	2569	1191
<b>Logit - Further economic variables</b>									<b>Conditional Fixed Effects Logit - Further economic variables</b>							
invgdpl	0.0025	0.0107	0.6%	0.61	-0.10	0.05	2324	1721	0.0135	0.0203	3.1%	0.73	-0.15	0.19	2197	1128
debtstvcxpl	0.0092	0.0050	62.6%	0.95	-0.02	0.04	2324	1374	0.0010	0.0079	0.0%	0.55	-0.03	0.06	2245	1120
xdebtgn1	0.0010	0.0006	64.8%	0.93	0.00	0.01	2324	1372	0.0001	0.0015	0.0%	0.52	-0.02	0.01	2281	1122
xbalgdpl	-0.0070	0.0048	39.8%	0.88	-0.05	0.02	2324	1759	-0.0020	0.0142	0.5%	0.52	-0.19	0.07	2277	1168
globec1	-0.0057	0.0071	3.4%	0.77	-0.04	0.03	2324	1594	0.0118	0.0203	2.3%	0.72	-0.17	0.11	2324	1091
totaljgdpl	-0.0082	0.0101	8.5%	0.71	-0.10	0.05	2324	1571	-0.0318	0.0219	46.8%	0.83	-0.29	0.08	2289	1070
inflisc	0.0099	0.0053	60.8%	0.93	-0.02	0.03	2324	1685	-0.0112	0.0074	29.3%	0.91	-0.06	0.01	2270	1112
defgdpl	0.0106	0.0267	1.2%	0.63	-0.09	0.17	2324	849	0.0021	0.0441	0.0%	0.50	-0.20	0.26	2308	473
sidebtxdebt1	-0.0040	0.0079	0.2%	0.68	-0.03	0.03	2324	1375	-0.0192	0.0128	42.6%	0.92	-0.11	0.04	2275	1124
peg	-0.0206	0.1753	1.4%	0.52	-1.51	0.79	2324	1620	0.2547	0.3832	0.0%	0.75	-1.61	1.93	2324	1076
curcis	0.9885	0.2690	100.0%	1.00	-0.11	2.74	2324	1760	0.7829	0.2863	99.9%	0.99	-0.19	3.31	2285	1158
finopen	0.0472	0.0644	14.4%	0.71	-0.19	0.47	2324	1687	-0.1145	0.1175	9.5%	0.83	-0.69	0.59	2324	1106
<b>Logit - Further political variables</b>									<b>Conditional Fixed Effects Logit - Further political variables</b>							
leadexleec	0.1236	0.2243	1.2%	0.70	-1.05	0.92	2324	1744	-0.0901	0.2312	0.0%	0.63	-1.88	0.99	2279	1164
lagexleec	0.6813	0.2307	94.6%	0.99	-0.35	1.63	2324	1743	0.4617	0.2153	85.2%	0.95	-0.59	1.82	2278	1166
leadlegelec	0.0078	0.1913	0.0%	0.52	-0.89	1.06	2324	1744	-0.0998	0.1949	0.0%	0.69	-0.85	1.48	2279	1164
laglegelec	0.7665	0.1888	99.3%	1.00	-0.27	1.48	2324	1743	0.6584	0.1799	96.3%	0.99	-0.78	1.27	2269	1166
polinstab	0.0569	0.0585	13.4%	0.79	-0.21	0.35	2324	1117	0.0561	0.0860	0.0%	0.73	-0.30	0.45	2324	726
socumrest1	0.0849	0.0622	25.3%	0.90	-0.15	0.30	2324	1406	0.0872	0.0682	12.9%	0.89	-0.16	0.30	2324	908
liberal	-0.1095	0.0564	73.2%	0.96	-0.52	0.11	2324	1766	-0.3294	0.1323	97.3%	0.99	-1.18	0.23	2271	1170
globpol	0.0100	0.0048	70.6%	0.95	-0.02	0.03	2324	1666	0.0215	0.0142	58.4%	0.91	-0.11	0.09	2324	1104
icrg	-1.7156	0.6874	67.4%	0.89	-6.34	1.76	2324	1464	0.7178	1.2227	0.0%	0.72	-5.06	6.90	2299	992
unsc	-0.1861	0.3095	5.4%	0.68	-1.67	1.07	2324	1684	-0.1799	0.3547	10.9%	0.64	-1.86	1.46	2018	1108
relsize1	-0.1964	0.1805	40.7%	0.80	-1.34	0.76	2324	1769	0.7251	0.9544	0.0%	0.76	-2.51	5.44	2281	1176
tradesu	-0.5304	0.8701	12.9%	0.65	-5.85	4.02	2324	1694	0.7924	1.9440	1.8%	0.62	-8.69	32.59	2237	1141
voteinlinesea	1.4308	0.7672	38.1%	0.87	-3.07	5.83	2324	1759	1.9551	1.8428	11.3%	0.80	-10.81	18.16	2301	1174

Extreme bounds analysis (EBA) are based on (conditional fixed effects) logit regressions with time fixed effects. Standard errors for the logit regressions are clustered. No distinction is made between concessional and non-concessional loans

document the number of regressions (*Comb.*) run for testing each variable and the average number of observations for each regression (*Avg. Obs.*).

The EBA for the conditional (country fixed effects) logit model shows that three out of the four variables of the *M*-vector prove to be robust in the sense that their CDF(0) is at least 0.95. To be more precise, lower import coverage and lower real economic growth rates are associated with a higher likelihood of signing an IMF arrangement. Furthermore, past IMF involvement conditional on having had any IMF arrangement during the sample period reduces the probability of an IMF deal. This is an interesting result, since it constitutes one of the main differences between the pooled logit and the conditional fixed effects logit. In fact, the EBA for the pooled logit finds past IMF involvement to be robustly and positively associated with signing a new IMF arrangement. Hence, if we do not condition on the fact that a country has signed at least one IMF program during the sample period—which is highly correlated with past IMF involvement<sup>22</sup>—we observe the persistence in this latter variable. However, once we condition on the number of IMF arrangements, the results show that having recently signed an arrangement reduces signing one this year. Other than that, many of the results are pretty similar. For both types of logit models we find that currency crises, lagged elections for the executive and legislature and more autocratic countries are more likely to turn to the IMF and sign a new deal. Beyond these considerable similarities, we additionally find a

<sup>22</sup> An alternative measure for past IMF participation is a dummy variable that takes the value of one if a country has been under an IMF arrangement in the past and zero otherwise.

higher debt servicing burden and increased political globalization increases the probability of an IMF program for the pooled logit model.

There are five important takeaways from this first table: First, the EBA shows that a number of economic and political variables turn out to be robust in explaining IMF involvement. Second, if we compare the baseline results from this EBA with the results from Sturm et al. (2005), we see that the investment rate and government instability no longer robustly explain IMF involvement. Third, there are a number of new variables that we test for in this EBA that were not considered in Sturm et al. (2005) and that either were used in other studies or are expected to reflect the structural breaks in the international financial architecture and the role of the IMF in the 1990s. Thereby, the economic variable that measures currency crises is the only new robust explanatory variable. As expected, in times of financial turmoil countries tend to turn to the IMF more often (and the IMF is more inclined to provide assistance). To foreshadow some of the further results, currency crises indeed prove to be one of the most robust explanatory variables for IMF involvement after 1989. Fourth, lagged executive and legislative elections prove to be one of the most robust political variables that are positively associated with signing a new IMF arrangement. Finally, another very robust political variable for the pooled IMF programs indicates that more autocratic countries are more inclined to sign an IMF arrangement.

Next, we investigate whether the determinants of signing an IMF program depend on the type of facility, distinguishing between non-concessional and concessional loans. Table 2 reports the EBA results separately for these two groups, estimated with country fixed effects.

We opt for this estimator, since the results are reasonably similar in Table 1 and one of the strengths of this estimator is to control for unobserved time-invariant country characteristics that might be correlated with the decision to sign a new IMF program. Turning to the determinants of non-concessional loans first, we find that many of the robust explanatory variables for the overall sample are relevant here as well. Signing a non-concessional loan is robustly and negatively associated with past IMF participation, real economic growth rates and becomes more likely for more autocratic countries and in the year after legislative election. Furthermore, chances of a new IMF deal clearly increase with the occurrence of a currency crisis. This pattern seems to characterize a number of emerging market crises in the 1990s: When a strong depreciation or devaluation of the exchange rate occurs—for instance forced by speculative attacks—the affected country turns to the IMF for assistance.

In contrast to the non-concessional loans, we find relatively few variables that can robustly explain the signing of concessional IMF loans. Only one economic and one political core variable turn out to be robustly and negatively associated with IMF involvement, namely past IMF programs and the ratio of international reserves to imports. Beyond that, only one further variable can robustly explain concessional IMF facilities: A legislative election in the year prior to the concessional IMF loan. To sum up, while our EBA results detect a few robust explanatory variables for non-concessional loans, the usual suspects for IMF involvement are only of limited help in explaining the signing of concessional loans.

Before turning to our second dependent variable it is worth examining the most robust explanatory variables jointly in a “normal” regression setting. We can give

**Table 2** Economic and political determinants of signing of IMF programs non-concessional/concessional IMF programs (EBA—conditional fixed effects logit)

Variable	Avg.	Avg.	%Sign.	CDF(0)	Lower	Upper	Avg.	Avg.	%Sign.	CDF(0)	Lower	Upper	Avg.			
	Beta	Std.Err			Bound	Bound					Bound	Bound		Bound	Bound	Bound
<b>Non-concessional loans - Base model</b>																
underimf5ma	-1.2036	0.6518	59.7%	0.95	-5.94	0.89	2460	805	-5.6327	1.2444	100.0%	1.00	-24.39	2.56	2622	615
resimpl1	-0.1229	0.0870	48.9%	0.89	-0.45	0.57	2460	805	-0.2514	0.1314	69.9%	0.95	-3.57	0.81	2622	615
rgdp1	-0.0615	0.0246	90.1%	0.98	-0.22	0.06	2460	805	-0.0258	0.0298	8.1%	0.74	-0.47	0.27	2622	615
lgdp1	0.0827	1.3030	0.0%	0.51	-8.01	8.72	2460	805	-0.8929	1.5359	0.2%	0.74	-26.46	31.18	2622	615
<b>Concessional loans - Base model</b>																
invgdp1	-0.0222	0.0329	9.1%	0.75	-0.21	0.28	2186	765	0.0192	0.0284	9.0%	0.76	-0.39	0.49	2324	595
debtservepx1	0.0082	0.0104	0.0%	0.79	-0.05	0.06	2186	747	0.0116	0.0146	3.6%	0.68	-0.08	0.81	2323	603
xdebtgni1	0.0031	0.0035	0.0%	0.81	-0.02	0.02	2186	746	-0.0003	0.0022	0.5%	0.57	-0.06	0.09	2324	603
xbalgrp1	-0.0206	0.0207	11.3%	0.80	-0.34	0.07	2187	791	0.0132	0.0215	1.9%	0.67	-0.19	0.73	2324	603
globec1	0.0140	0.0265	0.0%	0.70	-0.25	0.16	2324	756	0.0331	0.0366	7.0%	0.82	-0.56	0.70	2324	538
totaljgdp1	-0.0514	0.0349	34.7%	0.92	-0.31	0.11	2187	735	-0.0315	0.0317	4.1%	0.71	-2.79	0.48	2324	532
inflisc	-0.0153	0.0087	53.0%	0.94	-0.06	0.02	2180	759	-0.0057	0.0192	0.0%	0.69	-0.22	0.93	2320	555
defgdp1	0.0491	0.0524	3.2%	0.81	-0.25	0.28	2300	367	-0.0384	0.0834	0.0%	0.75	-0.99	1.68	2315	177
stdtcbxdtbt1	-0.0099	0.0149	0.7%	0.73	-0.10	0.05	2186	747	-0.0510	0.0378	18.5%	0.87	-0.77	0.22	2324	604
peg	0.7798	0.4391	76.2%	0.94	-2E+00	3E+00	2324	736	-3.0020	700.02	32.5%	0.87	-2E+06	2E+06	2300	537
curris	1.4232	0.3725	100.0%	1.00	0.11	4.02	2186	779	-0.3899	0.5704	0.0%	0.73	-5.26	5.13	2324	605
finopen	-0.0525	0.1493	0.6%	0.63	-0.90	0.79	2324	728	-0.1801	0.0267	0.4%	0.76	-5.87	1.61	2324	581
<b>Non-concessional loans - Further economic variables</b>																
leadexelec	-0.1271	0.3091	0.2%	0.63	-1.95	0.98	2187	785	-0.0350	0.3672	0.0%	0.54	-6.00	3.76	2324	600
lagexelec	0.4627	0.2869	55.8%	0.93	-1.00	1.78	2179	787	0.4395	0.3577	26.1%	0.85	-1.52	13.31	2319	600
leadlegelec	-0.0573	0.2510	0.0%	0.59	-1.08	1.46	2186	786	-0.0985	0.3256	0.0%	0.64	-1.93	6.21	2324	600
laglegelec	0.4854	0.2309	87.6%	0.97	-0.53	1.53	2179	787	0.8172	0.2990	88.6%	0.97	-3.72	4.49	2322	600
polinstab	0.0773	0.0929	0.0%	0.79	-0.32	0.49	2324	481	-0.2094	0.3602	0.0%	0.72	-11.92	3.15	2323	372
socunrest1	0.0779	0.0809	1.8%	0.82	-0.22	0.32	2324	618	0.0759	0.1438	0.0%	0.71	-0.89	1.26	2323	447
liberal	-0.5018	0.1921	97.9%	0.99	-1.72	0.28	2186	793	-0.0254	0.2084	0.0%	0.59	-3.59	1.51	2324	605
globpol	0.0046	0.0181	0.0%	0.61	-0.12	0.08	2324	746	0.0278	0.0261	4.4%	0.82	-0.42	0.95	2324	572
icrg	0.7876	1.4917	0.0%	0.69	-5.50	7.55	2186	691	0.3465	2.6855	0.0%	0.53	-41.12	62.78	2324	460
unsc	-0.0828	0.4196	0.0%	0.56	-1.68	1.66	1481	696	-0.6620	0.7421	0.2%	0.79	-9.77	3.80	2324	596
relsize1	1.3256	1.0147	17.9%	0.89	-2.24	6.38	2180	794	-8.4482	26.629	0.1%	0.63	-205.00	333.91	2320	606
tradeu	2.3416	2.4976	8.4%	0.75	-7.5	35.30	2177	775	-6.2087	5.2514	10.2%	0.57	-1033.2	200.76	2324	578
votelineusa	1.9550	2.7406	11.8%	0.68	-15.77	21.28	2187	792	0.9388	2.6998	0.0%	0.59	-57.02	58.74	2324	605

Extreme bounds analysis (EBA) are based on (conditional fixed effects) logit regressions with time fixed effects. Standard errors for the logit regressions are clustered. Concessional and non-concessional loans are estimated separately

two different interpretations to this exercise. While the EBA tests for a large number of different combinations of variables, here we only report a limited number of combinations. In this sense, we demand less from the incorporated variables. But since we include up to 10 variables as compared to five to seven variables in our extreme bounds analyses, these regressions are in a sense also more demanding to the variables. In Table 3, we report on the left hand side the four core variables of our M-vector and on the right hand side extended models that include those further economic and political variables that showed to be robust explanatory variables in the extreme bounds analyses.

The first column in Table 3 shows the pooled logit results for the M-vector. Three out of four variables are significant and all have the expected signs, which is in line with many other studies surveyed in the Appendix A. Columns (2) to (4) use the conditional fixed effects logit estimator for the overall sample, non-concessional loans and concessional loans, yielding similar results for the core economic and political variables.<sup>23</sup> In columns (5) to (8) we augment the baseline regressions with those variables that turned out to be robust in the EBA. If robust in the EBA then most of these additional variables prove to be significant in this specific combination of variables as well. The only exception is lagged executive elections. Finally, the lagged GDP per capita variable proves to be the least robust variable in these specifications.

<sup>23</sup> Note that the observations on non-concessional (3) and concessional loans (4) for the conditional fixed effects logit estimator do not add up to the overall number of observations (2), because some countries receive a non-concessional and a concessional loan during our sample period.

**Table 3** Economic and political determinants of signing of IMF programs (logit and conditional fixed effects logit)

Variable	Panel A: Base model				Panel B: Extended model			
	Logit (1) all programs	Logit (fe) (2) all programs	Logit (fe) (3) non-concess.	Logit (fe) (4) concessional	Logit (fe) (5) all programs	Logit (fe) (6) all programs	Logit (fe) (7) non-concess.	Logit (fe) (8) concessional
underimfma	2.1717*** (0.3762)	-1.9719*** (0.4468)	-0.7226 (0.5231)	-4.8511*** (0.9179)	0.9337* (0.3790)	-2.0679*** (0.4696)	-0.9054 (0.5638)	-4.9584*** (0.9496)
resimp1	-0.0558 (0.0344)	-0.1602** (0.0524)	-0.1876** (0.0707)	-0.1665* (0.0845)	-0.0901* (0.0375)	-0.1295* (0.0546)	-0.1075 (0.0755)	-0.1660 (0.0870)
grgdp1	-0.0539*** (0.0155)	-0.0318* (0.0138)	-0.0657*** (0.0193)	-0.0041 (0.0194)	-0.0414* (0.0162)	-0.0173 (0.0147)	-0.0522* (0.0216)	0.0019 (0.0213)
lgdppe1	-0.3346*** (0.0527)	-0.9209 (0.6110)	0.6945 (0.8794)	-1.1778 (0.8919)	-0.1002 (0.0763)	-1.2120 (0.6590)	0.1553 (1.0256)	-1.2484 (0.9050)
cuncris					0.7653*** (0.2227)	0.6161* (0.2448)	1.2746*** (0.3173)	-0.4723 (0.4419)
lagexelec					0.1720 (0.2200)	0.0351 (0.2092)	0.1019 (0.2912)	-0.1894 (0.3178)
laglegelec					0.6212*** (0.1791)	0.6056*** (0.1711)	0.3792 (0.2282)	0.9529*** (0.2616)
liberal					-0.1107* (0.0499)	-0.2474* (0.1066)	-0.3932* (0.1632)	-0.0119 (0.1536)
debservexp1					0.0062* (0.0038)			
globspol					0.0105* (0.0046)			
No. of obs.	2753	1683	1162	877	1608	1359	914	700
Pseudo R2	0.11	0.08	0.12	0.10	0.08	0.10	0.15	0.13

\*\*\*, \*\*, \* represents a significant coefficient at the 1, 5 and 10 % level, respectively



## 4.2 The Determinants of IMF Agreed Upon Loan Size

Our second dependent variable is defined as the amount of IMF credit a country and the IMF agree upon in the year a new IMF arrangement is signed. This IMF loan size variable is scaled by a country's IMF quota and takes the value of zero, if no new arrangement is signed.<sup>24</sup> We start by investigating the determinants of IMF loan size for all IMF programs in Table 4.

Two out of the four core variables are robust determinants of IMF loan size according to the extreme bounds analysis. Past IMF involvement is positively associated with the amount of the IMF facility and negative real economic growth tends to increase the loan size. Furthermore, a country's indebtedness as measured by its debt servicing capacity (the debt servicing ratio) and currency crises also increase IMF loan size. Turning to the political variables, IMF facilities tend to be higher in the year after an election (executive and legislative), but not in the year before an election. This could be seen as evidence that the Fund is more hesitant to provide lending before elections in order to not fuel potential political business cycles or incumbent governments simply fear the political costs of an IMF involvement shortly before an election. Finally, there are further robust political variables: countries that are more politically integrated (KOF political globalization index) and those countries with a more stable government (political instability) are positively linked to IMF loan size. To conclude, many of the robust explanatory variables for signing a new IMF program (pooled logit) are also robust determinants for the IMF program size (pooled Tobit), even though the political dimension apparently plays a bigger role, when it comes down to the size of the IMF program.

In the next step, we are once more interested whether the economic and political determinants are different depending on the type of IMF facility. Table 5 allows for a comparison between the EBA for non-concessional loans (on the left side) and concessional loans (on the right side).

The examination of the four core variables already documents two interesting differences. While past IMF involvement tends to lead to higher IMF facilities for non-concessional loans, this coefficient for concessional loans is negative. Such differences can be also found when we look at the impact of GDP per capita on IMF loan size. There is robust evidence that poorer countries sign IMF deals for concessional loans that guarantee more financial assistance, but richer countries are more inclined to sign a new non-concessional loan. The last result highlights an important difference in the outcome between non-concessional and concessional loans. Finally, real economic growth is negatively associated with IMF loan size for non-concessional loans and low international reserves are a robust explanatory variable for concessional loan size.

The differences between these two facilities are also reflected in the other economic variables. While non-concessional loan size can be robustly explained after the Cold War by debt-servicing and the occurrence of currency crises, concessional loans are well explained by a low ratio of short-term debt to GDP. The last result can be explained by the fact that poorer countries tend to have only limited access to international capital markets. Hence, if such a country faces severe re-financing problems, one might expect for these countries that international loans are withdrawn altogether rather than that the maturity of loans is decreased.

<sup>24</sup> South Korea and Turkey have signed the biggest IMF arrangements in our sample period.



**Table 4** Economic and political determinants of IMF programs' size (EBA—Tobit)

<i>Variable</i>	<i>Avg. Beta</i>	<i>Avg. Std.Err</i>	<i>%Sign.</i>	<i>CDF(0)</i>	<i>Lower Bound</i>	<i>Upper Bound</i>	<i>Comb.</i>	<i>Avg. Obs.</i>
<b>Base model</b>								
underimf5ma	312.896	97.5134	95.7%	0.99	-135.90	942.10	2625	1798
resimp1	-6.9080	6.1944	21.0%	0.84	-36.75	22.68	2625	1798
grgdp1	-9.4807	3.2663	99.4%	1.00	-32.45	6.19	2625	1798
lgdppc1	-26.1043	14.3114	63.8%	0.74	-188.20	92.12	2625	1798
<b>Further economic variables</b>								
invgdp1	0.9188	2.0060	0.9%	0.64	-14.23	21.88	2324	1721
debtsexp1	3.5269	1.2793	98.3%	0.99	-1.48	10.96	2324	1374
xdebtgni1	0.1629	0.0970	62.6%	0.92	-0.52	1.86	2324	1372
xbalgrp1	-1.2722	0.8648	40.2%	0.88	-13.80	2.44	2324	1759
globec1	-1.6975	1.4214	23.0%	0.82	-12.57	3.89	2324	1594
totadjgdp1	-0.7626	1.4638	1.5%	0.63	-10.80	7.75	2324	1571
infl1sc	1.9119	1.1254	52.2%	0.92	-2.98	7.21	2324	1685
defgdp1	-1.6479	4.3041	0.6%	0.62	-22.81	13.95	2324	850
stdebtdebt1	-0.1062	1.0830	0.0%	0.54	-4.1	4.38	2324	1375
peg	-20.830	32.262	0.2%	0.67	-276.95	117.63	2324	1620
curcris	157.311	51.343	100.0%	1.00	-19.73	619.67	2324	1760
finopen	-3.818	13.424	2.4%	0.57	-61.05	60.25	2324	1687
<b>Further political variables</b>								
leadexelec	10.5285	34.4238	0.3%	0.62	-181.58	175.02	2324	1744
lagexelec	93.8212	36.5669	89.4%	0.98	-95.50	362.89	2324	1744
leadlegelec	-9.1429	30.5668	0.0%	0.60	-206.10	146.64	2324	1744
laglegelec	116.644	40.275	95.2%	0.99	-81.05	402.64	2324	1744
polinstab	21.7276	10.6462	77.3%	0.96	-14.83	61.68	2324	1117
socunrest1	12.4275	7.4004	52.8%	0.93	-15.42	40.06	2324	1406
liberal	-10.1901	10.2782	10.5%	0.80	-105.79	25.25	2324	1767
globpol	2.1836	1.0349	87.2%	0.98	-1.45	6.85	2324	1666
icrg	-404.931	165.761	68.9%	0.94	-1'679.2	248.97	2324	1464
unsc	26.820	63.105	0.2%	0.58	-226.59	448.90	2324	1685
relsize1	12.864	22.200	14.6%	0.56	-90.07	257.30	2324	1769
tradeus	-108.836	147.656	15.9%	0.70	-824.88	535.69	2324	1694
voteinlineusa	161.000	138.887	32.7%	0.75	-561.58	1'082.7	2324	1760

Results are based on tobit regressions with clustered standard errors and time fixed effects. No distinction is made between concessional and non-concessional loans

Turning to the results for political variables, concessional loans can be robustly and negatively associated with the geopolitical importance as proxied by a country's relative economic size and lagged legislative elections. The latter variable is also the only robust political factor in explaining non-concessional loan size. Furthermore, these IMF facilities tend to be larger after an executive election, with rising political instability and social unrest, with lower government quality and with a higher score in the KOF index of political globalization. All in all, our results from the EBAs based on Tobit regressions corroborate our earlier finding that only one "new" variable as compared to the study of Sturm et al. (2005) turns out to be a very robust explanatory variable for the IMF loan size: currency crises.

**Table 5** Economic and political determinants of non-concessional/concessional IMF programs' size (EBA—Tobit)

Variable	Avg. Beta	Avg. Std.Err	%Sign.	CDF(0)	Lower Bound	Upper Bound	Comb.	Avg. Obs.	Avg. Beta	Avg. Std.Err	%Sign.	CDF(0)	Lower Bound	Upper Bound	Comb.	Avg. Obs.
	Non-concessional loans - Base model								Concessional loans - Base model							
underimf5ma	585.898	151.642	99.8%	1.00	-74.07	1530.7	2625	1695	-49.287	94.304	27.8%	0.82	-172767	173006	2604	1644
resimp1	-0.9782	8.3159	0.9%	0.54	-41.60	47.42	2625	1695	-16.1844	5.9439	98.9%	1.00	-4757.18	4708.08	2604	1644
grgdpl	-15.5352	4.9124	97.8%	1.00	-38.31	10.19	2625	1695	-1.6851	1.5610	22.0%	0.80	-295.72	289.74	2604	1644
lgdppc1	62.3912	27.1504	62.2%	0.89	-119.84	287.69	2625	1695	-75.6246	15.9812	99.8%	1.00	-26995.1	26935.4	2604	1644
Non-concessional loans - Further economic variables								Concessional loans - Further economic variables								
invgdpl	0.2874	3.4043	1.9%	0.53	-19.11	27.67	2324	1621	1.9841	3.1558	74.9%	0.94	-3547.15	3556.61	2313	1575
debtstvxpl	4.4507	1.6186	97.4%	0.99	-1.88	13.02	2324	1273	0.2771	0.6714	1.6%	0.63	-176.09	181.67	2324	1231
xdebtgn1	0.0037	0.1816	1.6%	0.54	-1.67	2.29	2324	1271	0.1310	0.1517	55.2%	0.93	-330.29	331.60	2324	1230
xbalgdpl	-0.8792	1.5468	3.1%	0.69	-15.80	7.10	2324	1658	-1.1595	1.3903	58.0%	0.92	-1814.32	1810.03	2324	1611
globec1	-3.1835	2.3767	30.9%	0.85	-19.52	4.87	2324	1501	0.4550	1.6428	3.5%	0.71	-1451.27	1448.91	2324	1449
totaldjgdpl	-2.3004	2.9218	7.4%	0.75	-19.61	11.43	2324	1479	-0.7754	2.9500	10.0%	0.70	-7752.92	7746.73	2310	1425
defgdpl	2.8778	1.5400	58.3%	0.92	-3.63	10.43	2324	1591	-0.8646	1.3524	27.3%	0.82	-2122.46	2125.80	2311	1537
dfgdpl	1.1487	5.8566	0.8%	0.58	-25.55	26.48	2324	1815	5.2668	27.9940	49.4%	0.81	-28995.4	29008.3	2323	1676
sidebtdebt	1.6267	1.3262	15.5%	0.87	-3.30	7.32	2324	1274	-2.9785	1.0945	96.6%	0.99	-9.69	1.31	2324	1232
peg	-23.4499	52.1845	0.0%	0.62	-335.04	161.45	2324	1530	-15.7161	43.3879	4.5%	0.73	-31481.0	31364.6	2324	1479
curcis	282.331	74.3564	100.0%	1.00	-2.77	785.37	2324	1659	-16.502	35.3865	3.5%	0.66	-3242.40	3191.79	2324	1614
finopen	-13.1951	23.2091	0.4%	0.64	-108.87	81.98	2324	1590	7.9930	31.8294	30.1%	0.87	-80809.4	80797.2	2324	1554
Non-concessional loans - Further political variables								Concessional loans - Further political variables								
leadexelec	6.5532	46.9338	2.7%	0.55	-271.96	199.45	2324	1643	7.1180	36.3848	6.3%	0.61	-16877.2	16935.3	2324	1597
lagexelec	123.418	49.2904	92.9%	0.98	-132.86	425.67	2324	1643	41.774	113.3319	59.6%	0.91	-345830	345995	2313	1593
leadlegelec	-11.4333	42.3702	0.0%	0.60	-272.08	171.56	2324	1643	-8.4860	23.3311	4.7%	0.64	-9600.65	9598.14	2324	1597
laglegelec	124.492	54.7486	87.9%	0.98	-119.89	472.80	2324	1643	67.991	33.0218	98.6%	1.00	-21862.8	22023.2	2313	1593
polinstab	38.9037	11.9713	100.0%	1.00	-5.24	94.51	2324	1048	-19.1062	10.8727	68.0%	0.92	-981.78	964.23	2324	1005
socialrest1	22.3892	9.9333	86.8%	0.97	-14.81	62.07	2324	1324	6.8068	6.7728	15.1%	0.82	-2380.79	2406.05	2324	1270
liberal	-5.6313	16.7856	1.8%	0.59	-141.32	58.25	2324	1665	-6.3765	20.1787	49.9%	0.86	-20006	20081	2324	1618
globpol	3.5610	1.6864	83.6%	0.97	-1.87	12.36	2324	1568	0.0929	1.0106	8.1%	0.55	-887.04	887.12	2324	1521
icrg	-703.877	271.200	69.3%	0.96	-2337.3	320.30	2324	1386	2.329	200.947	7.6%	0.54	-211999	211477	2324	1333
unsc	46.0593	79.7384	0.0%	0.63	-229.49	554.74	2324	1586	-24.0813	45.4808	7.8%	0.66	-2289.93	2392.60	2324	1542
resize1	13.771	26.025	54.8%	0.60	-99.8	306.09	2324	1667	-311.183	254.629	51.0%	0.95	-184622	183669	2323	1621
tradeus	-150.401	207.497	28.8%	0.66	-1201.4	795.58	2324	1596	33.016	349.602	7.4%	0.64	-670106	669509	2324	1549
voteintinea	66.871	216.882	30.4%	0.51	-1149.2	1371.05	2324	1658	138.952	264.247	66.9%	0.89	-753039	752938	2324	1611

Extreme bounds analysis (EBA) are based on tobit regressions with clustered standard errors and time fixed effects. Concessional and non-concessional loans are estimated separately

We conclude our analysis by having a look at some “classical” regression results. Table 6 displays the pooled Tobit results for the base model (on the left side) and the extended model (on the right side) that additionally includes some further robust explanatory variables from the EBAs.

In the base model, all four core variables are significant explanatory variables for IMF loan size. The distinction between non-concessional and concessional loans in column (2) and column (3) is again important and the same coefficients are relevant in both the pooled Tobit and in the EBA. With respect to the augmented Tobit regressions that include nine independent variables, it is worth mentioning that once more the partial effect of the lagged election of the legislature apparently dominates the lagged election of the executive, when both variables are tested for in the same specification.

In future studies of IMF participation, researchers should be guided, of course, by the specific theory being tested when they choose what control variables to include. But our study suggests that there are certain variables that are too important to be ignored as potential determinants. Table 7 provides a summary of the most robust determinants of IMF lending activities.

### 5 Concluding Comments

The public and academic debate about the activity of the International Monetary Fund has once more regained momentum during the late 1990s and the beginning of the new century. A wide range of political and economic variables have been proposed in a number of empirical studies. The goal of our paper is a modest and an important one at the same time. This paper empirically investigates the *robust* economic and political

**Table 6** Economic and political determinants of IMF programs' size (Tobit)

Variable	Panel A: Base model			Panel B: Extended model		
	all programs (1)	non-concess. (2)	concessional (3)	all programs (4)	non-concess. (5)	concessional (6)
underimf5ma	463.5977*** (108.0944)	883.7835*** (171.5551)	-30.0621 (43.7099)	100.0093* (53.9511)	207.1867** (79.0971)	-61.7040 (45.8595)
resimp1	-9.6892 (6.4857)	-1.7782 (8.6844)	-15.9875*** (4.2347)	-11.2789* (5.1040)	-12.1692 (8.6337)	-15.0053*** (4.3391)
grgdp1	-9.7400** (2.9900)	-17.9269*** (4.5700)	-1.0287 (1.3265)	-6.0047* (2.6016)	-11.7394** (4.1148)	-0.4268 (1.3117)
lgdppc1	-59.4473*** (12.4866)	19.2611 (19.1699)	-84.3246*** (8.3046)	6.4733 (9.9022)	106.9349*** (27.5382)	-72.1570*** (8.9816)
debtservepl				2.7740** (1.0463)	3.2864* (1.3791)	0.1108 (0.4885)
curcris				85.1518** (31.1132)	160.9079*** (41.2452)	-22.3772 (32.3920)
lagexelec				10.1508 (27.1283)	26.6723 (33.0880)	-1.2868 (27.7164)
laglegelec				76.5032** (23.6788)	58.1691* (31.2711)	67.3587** (21.3861)
globalpol				1.5997* (0.7563)	2.8442* (1.3522)	-0.0715 (0.4808)
No. of obs.	2753	2615	2560	1608	1485	1449
Uncensored	331	193	138	282	159	123
Pseudo R2		0.03	0.04	0.10	0.03	0.07

\*\*\*, \*\*, \* represents a significant coefficient at the 1, 5 and 10% level, respectively

factors that affect a country's likelihood to sign an arrangement with the IMF and the determinants of the financial size of such a program. By robust we mean that economic and political variables should have a significant partial effect (largely) independent of additional control variables chosen. The extreme bounds analysis (EBA) exactly fulfills this requirement. Hence, we update and extend the work of Sturm et al. (2005) by employing a panel model for 165 countries that focuses on the post-Cold War era, i.e., 1990–2009. Important structural changes at the beginning of the 1990s that affected the global financial architecture and the role of the IMF alike called for a thorough examination of robust political and economic determinants of IMF involvement.

Our results, based on extreme bounds analysis, suggest that some of the most important economic and political explanatory variables of IMF program participation are past IMF involvement, lagged legislative and executive elections and—to a smaller extent—a proxy for how autocratic a country is (on the political side) and the level of international reserves, real economic growth rates and currency crises (on the economic side).

This study contributes to the literature in three ways: First, the determinants of the signing of IMF arrangements and the size of such loans are examined and largely

**Table 7** Summary of most robust determinants of IMF participation after the Cold War

Variables	Pooled IMF Programs	Non-concessional IMF Programs	Concessional IMF Programs
Panel A: Signing of IMF Programs (Conditional fixed effects logit)			
Past IMF participation	–	–	–
International reserves	–		–
GDP growth (real)	–	–	
Currency crisis	+	+	
Elections (executive, lagged)	+		
Elections (legislative, lagged)	+	+	+
Liberal	–	–	
Panel B: Loan Size of IMF Programs (Tobit)			
Past IMF participation	+	+	
International reserves			–
GDP growth (real)	–	–	
GDP per capita (real)			–
Debt servicing	+	+	
Short-term debt			–
Currency crisis	+	+	
Elections (executive, lagged)	+	+	
Elections (legislative, lagged)	+	+	+
Political instability	+	+	
Social unrest		+	
Political globalization (KOF)	+	+	
Government quality (ICRG)		–	
Geopolitical importance			–

If an explanatory variable never has a CDF(0) above 0.95 within a given panel, it is not displayed here

comparable (when we compare the results from the pooled logit and Tobit results), even though political factors tend to matter more for the size of the loan than for its signature. Second, we document that the pooling of non-concessional and concessional loans can be problematic, since the determinants vary substantially by facility type. These differences in results are best exemplified by GDP per capita. Perhaps related to the Heavily Indebted Poor Countries (HIPC) initiative and the wave of severe currency crises in the second half of the 1990s, this variable in some specifications even significantly changes signs. Third, we offer a summary of the most robust political and economic determinants of IMF participation by loan facility (Table 7). We hope that this list of variables serves as a useful guide for choosing control variables in future studies.

**Acknowledgements** We would like to thank two anonymous referees, Axel Dreher, Martin Gassebner, Michael Lamla, and James Vreeland for fruitful discussions and participants of the conference on “The Political Economy of International Financial Institutions” in Tübingen (10–13 June 2010) for helpful comments. All remaining errors are ours.

### Appendix A: Summary of studies on the determinants of IMF program participation since 2005

Study	Type of model	Definition of dependent variable	Economic variables included	Effect	Political variables included	Effect
Sturm et al. (2005)	Extreme Bounds Analysis on Probit model for IMF programs; 118 countries; 1971–2000 using yearly data.	Binary variable of one, if a country signs an IMF agreement in a given year.	International reserves	-	Past IMF program (5 years)	+
			GDP growth (real, p.c.)	-	Number of countries currently under IMF program	0
			Debt service to exports	+	Election year executive	0
			Current account to GDP	0	Election year legislative	0
			External debt to GDP	0	Election year executive (lagged)	-
			GDP per capita	0	Election year legislative (lagged)	-
			Inflation (in logarithm)	0	Election year executive (lead)	0
			Nominal exchange rate growth	0	Election year legislative (lead)	0
			Budget deficit to GDP	0	Assassinations	0
			Terms of trade growth rate	0	Revolutions	0
			Investment to GDP	-	Guerrilla problems	0
			LIBOR	0	Government crisis	0
			Government expenditure to GDP	0	Government instability	-
					Demonstrations	0
		Strikes	0			
		Riots	0			
		Competitiveness, index	0			
		Bank exposure (U.S.)	0			





Nooruddin and Simmons (2006)	Linear Probability model for IMF programs (SBA, EFF, SAF, ESAF); 130 countries; 1980–2000 using yearly data.	Binary variable of one, if the country participates in an IMF program (Vreeland 2003).	year for at least 5 months.	GDP growth	-	Past IMF program	+
				Current account to GDP	-	Democracy, index	0
Eichengreen et al. (2006)	Probit model for IMF programs; 24 emerging countries with significant access to international capital markets; 1980–2003 using yearly data.	Binary variable of one for the first two years of a new IMF program.		Budget balance to GDP	0		
				GDP per capita	-		
				GDP growth (real)	+	Political proximity to U.S. (UN General Assembly voting)	-
				Trade Balance to GDP	+	Bank exposure (U.S.)	0
				Debt servicing to exports	+	Exports (G3)	0
				Domestic credit to GDP	-		
				$\Delta$ Domestic credit to GDP	-		
				Foreign debt to GDP	+		
				$\Delta$ Foreign debt to GDP	0		
				International reserves	0		
Harrigan et al. (2006)	Probit model for IMF programs (SAF, ESAF and PRGF); 11 Middle East and North Africa (MENA) countries; 1975–2000 using yearly data.	Binary variable of one, if country signs an IMF agreement in a given year.		Short-term debt to reserves	-		
				Fixed exchange rate	+		
				Limited flexible exchange rate	0		
				GDP per capita	0	Democracy	-
				GDP growth	0	Election year legislative	0
				Current account to GDP	0	Election year legislative (past)	0
				Debt service to exports	+	Election year legislative (future)	+
				Short-term debt to total debt	-		
				$\Delta$ Net reserves to GDP	0	Peace treaty with Israel	+
				Net international reserves	-	Past IMF program	+
Current account	0	(2 years)					
Cerutti (2007)	Probit model for short-term IMF programs (SBA and EFF);	Binary variable of one in the first quarter of a new					





Bird and Rowlands (2009b)	Capital account restrictions	0			
	Fixed exchange rate	+			
	Freely floating exchange rate	0			
	Freely falling exchange rate	+			
	GNP per capita	0	Past IMF program (2 years)		+
	GDP growth	-			
	International reserves	0			
	Δ International reserves	0			
	Current account to GDP	0			
	Δ Current account to GDP	0			
	Real exchange rate depreciation	0			
	Debt service to exports	0			
	Δ Debt service to exports	0			
	Public external debt to GDP	0			
	Debt rescheduling	0			
Past debt rescheduling (2 years)	0				
Inflation	0				
Fixed exchange rate	0				
Flexible exchange rate	0				
Market pressure index	+				
Foreign debt	0/+0	Government orientation		-0/0	
International reserves	-0/-	Quality of bureaucracy		0/0/+	
Interest payments to GNI	+0/0	Political regime		0/0/0	
Inflation	+0/+	Past IMF program (fraction last 5 year)		+0/0	
GDP per capita	0/0/0				
GDP per capita (real)	-	UN Security Council		+	
Pop-Eleches (2009)	Panel Logit model (random effects) for IMF programs; 47 countries (three subsamples: Latin America 1982–1989; Latin America 1990–2001; Eastern Europe 1990–2001); 1982–2001 using quarterly data.		Binary variable of one, if a new IMF program is signed in a given quarter.		
Dreher et al. (2009)	Logit model for IMF programs		Binary variable of one, if a		

Copolovitch (2010)	Logit model for nonconcessional IMF programs (SBA, EFF and SRP); 47 countries; 1984–2003 using yearly data.	country participates in an IMF program during part of a given year.	membership (temporary)	Investment to GDP	–	Past IMF program	+				
				Debt service to GDP	+	Checks and Balances	+				
				Budget surplus to GDP	+						
				GDP (in logarithm)	0	Bank exposure (G5)	0				
				GDP per capita (in logarithm)	0	Variation bank exposure (G5)	0				
				GDP growth	–	Bank exposure (U.S.)	0				
				Current account to GDP	–	Bank exposure (UK)	0				
				External debt to GDP	0	Bank exposure (Japan)	0				
				Debt service to exports	0	Bank exposure (Germany)	0				
				Short-term debt to reserves (in logarithm)	+	Bank exposure (France)	0				
				Currency crisis dummy	0	S-score (G5)	0				
				Number of currency crises	+	Variation S-score (G5)	0				
				LIBOR	0	Years since last IMF loan	0				
Biglaiser and De Roven (2010)	Selection equation of a treatment effects regression model for IMF programs (four subgroups: All, SBA, EFF and PRGF); 126 developing countries; 1980–2003 using yearly data.	Binary variable of one, if a country participates in an IMF program.	membership (temporary)	Inflation (in logarithm)	0/-/0/+	Veto players (in logarithm)	0				
				GDP per capita (in logarithm)	-/+/0/	IMF liquidity ratio	0				
				International reserves	-/-/0/0	IMF quota review	0				
				Budget balance	0/0/0/0						
				International reserves	–	Bank exposure (G5) (in logarithm)	+				
				Current account to GDP	0	IMF quota review	0				
				External debt to GDP	0	IMF delegation index	0				
				Breen (2010)	Probit model for IMF programs (SBA, EFF, SAF/ESAF/PRGF); 159 countries; 1983–2006 using yearly data.	Binary variable of one, if a new IMF program is approved in a given year.	membership (temporary)	International reserves	–	Bank exposure (G5) (in logarithm)	+
								Budget balance	0/0/0/0	IMF quota review	0

Debt service to GDP	0	U.S. military aid	0
GDP growth	-	System transition (exclusion restriction)	+
GDP per capita (in logarithm)	0		
Financial crisis	+		

+/- represent significant positive and negative coefficients in the respective studies. 0 stands for an insignificant coefficient. Whenever possible, we seek to summarize the “preferred” specification of the respective study. The variable international reserves is measured as international reserves in months of imports if not otherwise indicated. Most authors incorporate the independent variables with a lag of one period in order to mitigate potential endogeneity concerns. Δ represents a year-to-year change

### Appendix B: Summary of studies on the determinants of IMF loan size

Study	Type of model	Definition of dependent variable	Economic variables included	Effect	Political variables included	Effect
Bird and Orme (1981)	OLS model for IMF programs; 31 countries in the year 1976.	Amount of IMF loan (in SDR) for a country in a given year.	Current account to trade Debt service ratio Inflation GNP per capita Imports International reserves Eurocurrency credits to imports	+ 0 + - + 0		
Cornelius (1987)	OLS models for IMF programs; 11 sub-Saharan African countries; two subsamples; 1975–1977 and 1981–1983 using yearly data.	Amount of IMF loan (in SDR) for a country in a given year.	Current account Debt service ratio Inflation GNP per capita Imports International Reserves Foreign borrowing	0/0 +/ 0/0 -/ +/ -/0 -/0		
Oatley and Yackee (2004)	OLS model for IMF programs (SBA and EFF; only for positive values of loan size); 61 countries; 986–1998 using yearly data.	Amount of IMF loan (in SDR) in a given year.	GNP Foreign debt Current account Debt service Dummy stand-by arrangement	+ 0 0 0 -	Bank exposure (U.S.) Bank exposure (Britain) Bank exposure (Japan) Political regime Political proximity to US (UN GA voting) Military aid (U.S.) Dummy Cold War Cold War * UN vote	+ 0 0 0 + + + -

Barro and Lee (2005)	Tobit models for short-term IMF programs (SBA and EFF); 130 countries; 1975–1999 using five-year intervals.	Average IMF loan program to GDP over 5-year period.	GDP growth (p.c.)	-	IMF quota (in logarithm)	+
			International reserves	-	IMF staff (in logarithm)	+
			GDP per capita	+	Political proximity (U.S.)	0
			GDP per capita squared	-	Political proximity (EU)	+
			GDP (in logarithm)	+	Intensity of trade (U.S.)	+
Dreher (2006a)	OLS model for short-term IMF programs (SBA and EFF); 98 countries; 1970–2000 using five-year intervals.	5-year average of disbursed loans to GDP.	GDP (in logarithm) squared	-	Intensity of trade (EU)	0
			OECD dummy	0		
			LIBOR	+	Political stability	+
					Government special interest	-
					Rule of law	+
Pop-Eleches (2009)	OLS model for IMF programs (only for positive values of loan size); 47 countries (three subsamples: Latin America 1982–1989; Latin America 1990–2001; Eastern Europe 1990–2001); 1982–2001 using quarterly data.	Amount of an IMF loan relative to a country's IMF quota (annualized).	Foreign debt	+ / + / +	Government orientation	0 / + / 0
			International reserves	0 / 0 / -	Quality of bureaucracy	0 / - / 0
			Interest payments to GNI	0 / - / 0	Political regime	0 / 0 / +
			Inflation	- / 0 / +	Past IMF program	0 / 0 / 0
			GDP per capita	0 / 0 / 0	(fraction last 5 year)	
Reynaud and Vauday (2009)	Tobit models for IMF programs (SBA and EFF; PRGF); 107 developing and emerging countries; 1990–2003 using yearly data.	Amount of a new IMF loan relative to a country's IMF quota.	GDP growth (real)	-	Geopolitical factors	+
			GDP per capita (in logarithm)	+		
			International reserves	-		
			Total debt service to exports	+		
			GDP (in logarithm)	+	Bank exposure (G5)	0
Copelovitch (2010)	OLS model for nonconcessional IMF programs (SBA, EFF and SRF); 47 countries; 1984–2003 using yearly data.	Amount of a new IMF loan relative to a country's IMF quota.	GDP per capita (in logarithm)	-	Variation bank exposure (G5)	-
			GDP growth	0	Bank exposure (U.S.)	+
			Current account to GDP	0	Bank exposure (UK)	0
			External debt to GDP	0	Bank exposure (Japan)	0
			Debt service to exports	+	Bank exposure (Germany)	+

Breen (2010)	Heckman selection model for IMF programs (SBA, EFF, SAF/ESAF/PRGF); 159 countries; 1983–2006 using yearly data.	Amount of IMF loan relative to a country's IMF quota.	Short-term debt to reserves (in logarithm)	0	Bank exposure (France)	+
			Currency crisis dummy	+		
			S-score (G5)	+	Variation S-score (G5)	0
			Number of currency crises	0	Past IMF program	-
			LIBOR	0	Veto players (in logarithm)	0
				0	IMF liquidity ratio	0
				0	IMF quota review	0
				0	Propensity score	0
				-	Bank exposure (G5) (in logarithm)	+
			International reserves	0	IMF quota review	0
			Current account to GDP	0	IMF delegation index	0
			External debt to GDP	0	U.S. military aid	0
			Debt service to GDP	-		
			GDP growth	0		
Binder and Bluhm (2010)	Panel Tobit model (random effects augmented with Mundlak variables) for IMF programs (SBA, EFF, SAF, ESAF/PRGF); 68 countries; 1975–2005 using yearly data.	Amount of (all) IMF loan(s) relative to a country's IMF quota.	GDP per capita (in logarithm)	+	Democracy, index	-
			Financial crisis	-	Years under IMF program	+
			Investment to GDP	0	Fertility rate (mean)	+
			Inflation	0	Intensity of trade (Europe) (mean)	-
			International reserves	0		
			Government share to GDP	0		
			Current account to GDP	0		
			Openness	0		
				0		
				0		

+/- represent significant positive and negative coefficients in the respective studies. 0 stands for an insignificant coefficient. Whenever possible, we seek to summarize the “preferred” specification of the respective study. The variable international reserves is measured as international reserves in months of imports if not otherwise indicated. Most authors incorporate the independent variables with a lag of one period in order to mitigate potential endogeneity concerns.  $\Delta$  represents a year-to-year change

## Appendix C: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Dependent variables					
Signing (all)	3700	0.1122	0.3156	0.0000	1.0000
Signing (non-conc.)	3700	0.0641	0.2449	0.0000	1.0000
Signing (conc.)	3700	0.0481	0.2140	0.0000	1.0000
Size (all)	3700	15.7624	97.3621	0.0000	3182.841
Size (non-conc.)	3522	11.8763	96.9263	0.0000	3182.841
Size (conc.)	3463	4.7626	25.9396	0.0000	700.0000
Base Model					
underimf5ma	3700	0.1161	0.1707	0.0000	1.0000
resimp1	2849	3.6050	3.1507	0.0022	43.6915
grgdp1	3498	3.5953	6.6509	-51.0309	106.2798
lgdppc1	3443	7.5489	1.5646	4.1309	10.9365
Further economic variables					
invgdp1	3184	21.9191	8.6505	-23.7626	113.5779
debtserexp1	1984	15.1844	13.6285	0.0226	152.2670
xdebtgmi1	2240	79.4170	89.6522	0.1437	1209.3030
xbalgdp1	3325	-6.5101	16.9839	-135.6007	53.6586
globecl1	2479	55.8736	17.9050	10.4721	98.7163
totadjgdp1	2736	0.3818	9.2123	-57.2151	148.1556
infl1sc	3046	9.9287	15.1371	-16.0704	99.5920
defgdp1	1336	1.5565	7.8145	-40.4263	203.7191
stdebrxdebtl	2188	12.5903	12.4755	0.0000	85.0791



peg	2816	0.3817	0.4859	0.0000	1.0000
curctis	3275	0.0577	0.2332	0.0000	1.0000
finopen	2950	0.2471	1.5673	-1.8081	2.5408
Further political variables					
leadexelec	3190	0.1028	0.3038	0.0000	1.0000
lagexelec	3313	0.1035	0.3047	0.0000	1.0000
leadlegelec	3189	0.2114	0.4083	0.0000	1.0000
laglegelec	3312	0.2147	0.4107	0.0000	1.0000
polinstab	1701	0.0032	1.3632	-0.6774	13.4223
socumrest1	2393	-0.0481	1.1322	-0.4916	16.4803
liberal	3413	3.5387	1.9791	1.0000	7.0000
globpol	3098	56.2411	23.2876	1.5588	98.7830
icrg	2478	0.5588	0.2200	0.0417	1.0000
unsc	3156	0.0567	0.2313	0.0000	1.0000
relsizel	3520	0.5572	2.4466	0.0001	31.7090
tradeus	2994	0.0923	0.1186	0.1186	1.5142
voterlineusa	3377	0.3317	0.1629	0.0000	1.0000

## References

- Andersen, T. B., Harr, T., & Tarp, F. (2006). On US politics and IMF lending. *European Economic Review*, 50, 1843–1862.
- Bal-Gunduz, Y. (2009). Estimating Demand for IMF Financing by Low-Income Countries in Response to Shocks. IMF Working Paper No. 09/263.
- Barro, R., & Lee, J.-W. (2005). IMF programs: Who is chosen and what are the effects? *Journal of Monetary Economics*, 52, 1245–1269.
- Biglaiser, G., & DeRouen, K. (2010). The effects of IMF programs on U.S. Foreign direct investment in the developing world. *Review of International Organizations*, 5, 73–95.
- Binder, M., & Blum M. (2010). On the Conditional Effect of IMF Program Participation on Economic Growth. CESifo Working Paper No. 3161.
- Bird, G. (1995). IMF Lending to Developing Countries. Issues and Evidence. Routledge, London.
- Bird, G. (2007). The IMF: A bird's eye view of its role and operations. *Journal of Economic Surveys*, 21, 683–745.
- Bird, G., Hussain, M., & Joyce, J. (2004). Many happy returns? Recidivism and the IMF. *Journal of International Money and Finance*, 23, 231–251.
- Bird, G., & Orme, T. (1981). An analysis of drawings on the international monetary fund by developing countries. *World Development*, 9, 563–568.
- Bird, G., & Rowlands, D. (2009a). Exchange rate regimes in developing and emerging economies and the incidence of IMF programs. *World Development*, 37, 1839–1848.
- Bird, G., & Rowlands, D. (2009b). A disaggregated empirical analysis of the determinants of IMF arrangements: Does one model fit all? *Journal of International Development*, 21, 915–931.
- Boughton, J. (2004). The IMF and the Force of History: Ten Events and Ten Ideas That Have Shaped the Institution. IMF Working Paper No. 04/75.
- Breen, M. (2010). Domestic Interests, International Bargaining, and IMF Lending. Working Paper No. 07/2010, Centre for International Studies, Dublin City University.
- Broz, L., & Hawes M. B. (2006). U.S. Domestic Policies and International Monetary Fund Policy. In: Hawkins, D., Lake, D. A., Nielson, D., & Tierney, M. J. (Ed.) *Delegation and Agency in International Organizations*. Cambridge University Press.
- Cerutti, E. (2007). IMF Drawing Programs: Participation Determinants and Forecasting. IMF Working Paper No. 07/152.
- Chamberlain, G. (1980). Analysis of covariance with qualitative data. *Review of Economic Studies*, 47, 225–238.
- Chinn, M., & Ito, H. (2006). What matters for financial development? capital controls, institutions, and interactions. *Journal of Development Economics*, 61, 163–192.
- Copelovitch, M. (2010). Master or servant? Common agency and the political economy of IMF lending. *International Studies Quarterly*, 54, 49–77.
- Conway, P. (2006). The international monetary fund in a time of crisis: A review of stanley fischer's IMF essays from a time of crisis: The international financial system. stabilization, and development. *Journal of Economic Literature*, 44, 115–144.
- Conway, P. (2007). The revolving door: Duration and recidivism in IMF programs. *Review of Economics and Statistics*, 89, 205–220.
- Cornelius, P. (1987). The demand for IMF credits by sub-Saharan African countries. *Economics Letters*, 23, 99–102.
- Dreher, A. (2006a). IMF and economic growth: The effects of programs. loans, and compliance with conditionality. *World Development*, 34, 769–788.
- Dreher, A. (2006b). Does globalization affect growth? Evidence from a new Index of globalization. *Applied Economics*, 38, 1091–1110.
- Dreher, A., & Gassebner M. (2008). Do IMF and World Bank Programs Induce Government Crises? An Empirical Analysis. KOF Working Papers No. 200.
- Dreher, A., Sturm, J.-E., & de Haan, J. (2010). When a central bank governor replaced? Evidence based on a new data set. *Journal of Macroeconomics*, 32, 766–781.
- Dreher, A., Sturm, J.-E., & Vreeland, J. (2009). Global horse Trading: IMF loans for votes in the United Nations. *European Economic Review*, 53, 742–757.
- Dreher, A., & Vaubel, R. (2004). Do IMF and IBRD cause moral hazard and political business cycles? Evidence from panel data. *Open Economies Review*, 15, 5–22.

- Eichengreen, B., Gupta P., & Mody A. (2006). Sudden Stops and IMF-supported Programs. NBER Working Paper No. 12235.
- Elekdag, S. (2008). How does the global economic environment influence the demand for IMF resources? *IMF Staff Papers*, 55, 624–653.
- Frankel, J., & Rose, A. (1996). Currency crashes in emerging markets: An empirical treatment. *Journal of International Economics*, 41, 351–366.
- Harrigan, J., Wang, C., & El-Said, H. (2006). The economic and political determinants of imf and world bank lending in the Middle East and North Africa. *World Development*, 34, 247–270.
- Joyce, J. (2005). Time past and time present: A duration analysis of IMF program spells. *Review of International Economics*, 13, 283–297.
- Knight, M., & Santaella, J. A. (1997). Economic determinants of IMF financial arrangements. *Journal of Development Economics*, 54, 405–436.
- Laeven, L., & Valencia F. (2008). Systematic Banking Crises: A New Database. IMF Working Paper No. 08/224.
- Leamer, E. (1983). Let's take the con out of econometrics. *American Economic Review*, 73, 31–43.
- Levine, R., & Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *American Economic Review*, 82, 942–963.
- Oatley, T., & Yackee, J. (2004). American interests and IMF lending. *International Politics*, 41, 415–429.
- Nooruddin, I., & Simmons, J. W. (2006). The politics of hard choices: IMF programs and government spending. *International Organization*, 60, 1001–1033.
- Pop-Eleches, G. (2009). Public goods or political pandering: Evidence from IMF programs in Latin America and Eastern Europe. *International Studies Quarterly*, 53, 787–816.
- Przeworski, A., & Vreeland, J. R. (2000). The effect of IMF programs on economic growth. *Journal of Development Economics*, 62, 385–421.
- Reynaud, J., & Vauday, J. (2009). Geopolitics and international organizations: An empirical study on IMF facilities. *Journal of Development Economics*, 89, 139–162.
- Sala-i-Martin, X. (1997). I just ran two millions regressions. *American Economic Review*, 87, 178–183.
- Sala-i-Martin, X., Doppelhofer, G. and Miller, R. I. (2004). Determinants of long-term growth - a Bayesian Averaging of Classical Estimates (BACE) Approach. *American Economic Review*, 94, 813–835
- Steinwand, M., & Stone, R. (2008). The fund: A review of the recent evidence. *Review of International Organization*, 3, 123–149.
- Sturm, J.-E., Berger, H., & de Haan, J. (2005). Which variables explain decisions on IMF credit? An extreme bounds analysis. *Economics and Politics*, 17, 177–213.
- Sturm, J.-E., & de Haan J. (2001). How Robust is Sala-i-Martin's Robustness Analysis. University of Groningen, mimeo.
- Temple, J. (2000). Growth regressions and what the textbooks don't tell you. *Bulletin of Economic Research*, 52(3), 181–205.
- Thacker, S. (1999). The high politics of IMF lending. *World Politics*, 52, 38–75.
- Trudel, R. (2005). Effects of exchange rate regime on IMF program participation. *Review of Policy Research*, 22, 919–936.
- Veiga, F. J. (2005). Does IMF support accelerate inflation stabilization? *Open Economies Review*, 16, 321–340.
- Vreeland, J. R. (2003). *The IMF and Economic Development*. New York: Cambridge University Press.