Stigma or Cushion?
IMF Programs and Sovereign Creditworthiness

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Abstract: Policy-makers in crisis countries often hesitate to enter IMF programs out of the fear that they trigger adverse reactions on financial markets. We propose credit ratings and investor assessments as reliable measures of creditworthiness during crises, and examine how IMF programs affect them with three distinct identification strategies. The first strategy exploits the differential effect of changes in IMF liquidity on loan allocation, the second uses the exact timing of program announcements, and the third analyzes rating statements. When accounting for endogenous selection, we find that IMF programs help countries regain their creditworthiness. Even though they come with contractionary adjustments, IMF programs are perceived as positive signals on financial markets.

Keywords: financial crises, capital market access, IMF
JEL Classification: E44, F33, F34, G24

1 Introduction

In the early 2000s, the International Monetary Fund (IMF) was widely considered to be in terminal decline. The demand for its loan programs at a record low, the IMF reduced the size of its staff and focused on its "surveillance" activities (Reinhart and Trebesch 2016). The 2008 global financial crisis and the ensuing sovereign debt crises, however, re-established the crucial role that the IMF plays for the global economy. With the IMF's financial commitments reaching new all-time highs in the 2010s, pressing questions about the role and effectiveness of the "most powerful international institution in history" (Stone 2002, p.1) re-emerge.[1]

We take this resurgence of the IMF's lending activities as a motivation to evaluate how successful the IMF is in achieving one of its core mandates, namely helping countries overcome balance-of-payments problems. As these problems usually manifest themselves in both the government and private companies facing severe limitations in access to foreign capital, we focus on restoring market and investor confidence as a key outcome to evaluate the IMF's success.

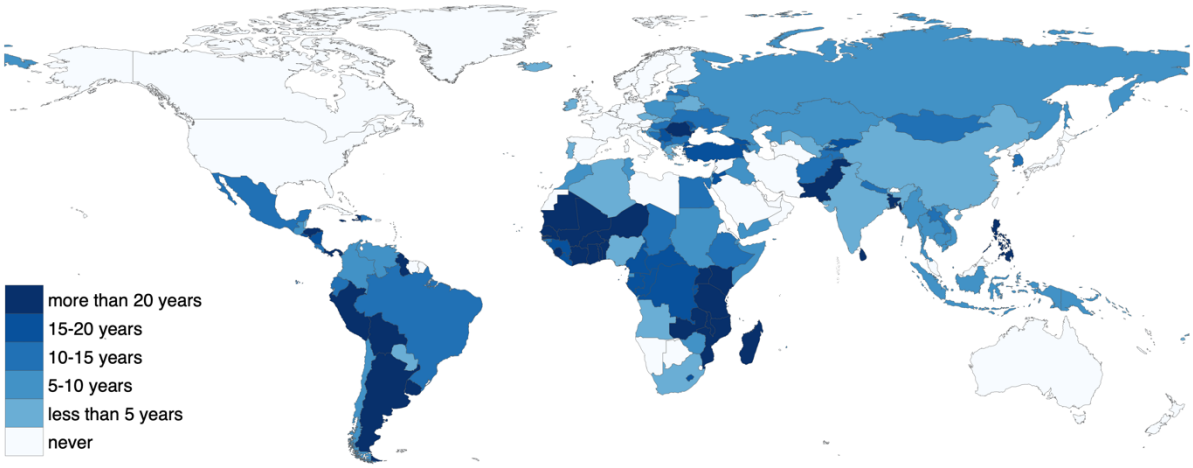
We consider this an urgent task for development economists, not only because of the IMF's widespread engagement in the developing world (see Figure 1), but also because the IMF's effectiveness in this regard has recently been questioned by policy-makers. Out of fear of a 'stigma' associated with the use of Fund resources triggering adverse market reactions, countries are often hesitant to enter IMF programs and question their benefits (Essers and Ide 2019; IMF 2017; Reinhart and Trebesch 2016). Economists so far have no clear answer to this. This is not only due to the alleged decline of the IMF, which reduced scholarly interest in the topic, but also because of the empirical challenges associated with assessing its effectiveness (Stubbs et al. 2018).

We begin our analysis of this question by illustrating the problem of endogenous selection into IMF programs. To measure market confidence in a country's creditworthiness, we use a large monthly panel data set of sovereign credit ratings from the major rating agencies as well as assessments from professional investors and data on bond spreads. Combined with start dates of IMF programs, these data unambiguously indicate that countries typically sign IMF agreements while their creditworthiness is already in severe decline. Thus, there is a

[1] Arguably, the World Bank is of comparable importance, but with a different policy focus. For related research on the World Bank, see Kersting and Kilby (2018).

substantial negative selection effect that biases any estimates of the IMF's effect on creditworthiness downwards when estimation strategies do not adequately account for this.

Figure 1 – IMF Lending, 1973-2013



Notes: years with an active IMF program in the 1973-2013 period.
Own illustration. Data source: Dreher (2006, updated)

We apply several empirical approaches to circumvent this endogeneity problem. Our main identification strategy is based on a Bartik-style instrumental variable (IV) that combines temporal variation in the IMF's liquidity with cross-sectional variation in a country's prior probability of participating in an IMF program (see Lang 2016). The IMF's liquidity varies primarily because of an institutional rule that requires the IMF to review the financial contributions of its members ("quotas") every five years. It thus peaks in years in which these quotas are increased and is, as we show, unrelated to global financial cycles. For identification, we exploit the fact that the IMF tends to expand its clientele in years in which its liquidity is higher, so that countries with an initially lower participation probability are then more likely to receive a program. The identifying assumption underlying this approach, which we explain in more detail in section 3, thus follows a difference-in-differences logic.

Using annualized panel data for a maximum of 100 countries over the 1987-2013 period, we find that the simple correlation of IMF programs with sovereign debt ratings is strongly negative. As one would expect in the presence of a negative selection bias, the OLS coefficient, while remaining negative, moves increasingly close to zero when conditioning step-by-step on country fixed effects, year fixed effects, and lagged macroeconomic controls, as well as when using first-differences. We then show that the effect turns positive when switching to the IV approach. This pattern emerges irrespective of whether we focus on credit ratings

issued by *Standard & Poor's*, *Moody's* or *Fitch* or when employing assessments by *Institutional Investors* based on surveys of professional investors and analysts at banks as well as money management and securities companies.

When turning to the mechanisms, we find that the aggregate estimate masks important underlying dynamics. Our evidence suggests that the immediate economic adjustments under IMF programs substantially reduce economic growth in the short run. As such contractionary effects would usually result in lower credit ratings, the overall positive effect suggests that IMF programs convey a positive signal. This signal creates positive expectations about the country's future policy path and 'cushions' the drop of creditworthiness that countries undergoing such contractionary adjustments would usually suffer from.

We, then, further examine this signaling effect. First, we use credit ratings at a monthly frequency along with information on the exact date of IMF agreements, and isolate variation within country-years with the help of country-times-year fixed effects. Event-based specifications then show that rating dynamics deteriorate before IMF agreements, but, on average, begin to improve exactly one month after programs start. These immediate improvements cannot plausibly be attributed to the success of economic adjustments and reforms, and further support the existence of a positive signaling effect.

Second, to better understand the nature of this signaling effect this, we conduct a systematic text analysis of statements about the IMF's influence on sovereign credit ratings available on the news database *Dow Jones Factiva*. Out of 117 statements from rating agencies that mention the IMF, 84 indicate a positive influence of an active IMF program on their assessment, while 32 are neutral and only one mentions a negative influence. A majority of these statements refer to the anticipated positive effects of policy reforms, implemented as part of the programs, on investor confidence. In sum, all three methods have different strengths and limitations, but together they paint a coherent picture of a positive effect of IMF programs on sovereign creditworthiness.

In the remainder of this paper, we first develop theoretical expectations regarding potential mechanisms and show how our paper contributes to the existing literature in section 2. Section 3 presents our data and identification strategies. We report and discuss the empirical results in section 4. Section 5 concludes. Online appendices A-L provide additional information on data, analyses, and robustness checks.

2 Potential Channels and Existing Literature

To increase creditworthiness, IMF programs need to increase investors' confidence in the "ability and willingness of an issuer […] to meet its financial obligations in full and on time" (Standard and Poor's 2016; see also Panizza et al. 2009; Tomz and Wright 2007). We differentiate between two main channels. A*djustment* effects are consequences of short-term changes in the country's economic and political fundamentals under IMF programs. S*ignaling* effects are ratings changes caused by changes in expectations about the country's expected future policy path that the presence of an IMF program sends to credit rating agencies and investors.

2.1 Adjustment Effects

A substantial share of differences in sovereign creditworthiness – as measured by credit ratings – is explained by a country's economic indicators like gross domestic product (GDP) per capita, GDP growth, inflation, external debt as well as political aspects like political stability and rule of law (Afonso 2003; Cantor and Packer 1996; Fuchs and Gehring 2017; Hill, Brooks, and Faff 2010). If IMF programs improve (or impair) these economic and political variables, they could improve (or impair) creditworthiness via these "adjustment effects."

The previous literature on the IMF examines how several of these indicators are influenced by IMF programs (see reviews in Dreher and Lang 2019 and Steinwand and Stone 2008). Regarding monetary and financial stability, as measured by the likelihood of experiencing banking or currency crises, the literature tends to find positive effects of IMF programs (e.g., Dreher and Walter 2010; Papi, Presbitero, and Zazzaro 2015; Steinwand and Stone 2008).

The IMF's track record is more negative as far as its effect on economic growth is concerned. While some studies find a positive (Bas and Stone 2014) or insignificant (Atoyan and Conway 2006) effect, the majority of empirical studies suggest immediate negative effects on total economic output (Barro and Lee 2005; Dreher 2006; Easterly 2005; Marchesi and Sirtori 2011; Przeworski and Vreeland 2000). What is more, these burdens of economic adjustments are often unequally distributed, leading to rising inequality (Forster et al. 2019; Lang 2016; Oberdabernig 2013; Vreeland 2002). These adverse distributional effects, in turn, are often considered to be the reasons for why studies focusing on political outcomes, also largely find negative effects: IMF programs were found to lead to a higher risk of civil war (Hartzell et al. 2010), of coup d'états (Casper 2017), and of government crises (Dreher and Gassebner 2012).

In sum, this literature suggests that IMF programs could affect creditworthiness through a range of political and economic effects, but does not unambiguously indicate whether this effect via the *adjustment* channel will be positive or negative.

2.2 Signaling Effects

Sovereign credit ratings, as assessments of a future default probability, are based not only on information about a country's current economic and political performance, but also on expectations of the country's future development (Fuchs and Gehring 2017). As economic indicators, like GDP and inflation are imperfect and noisy measures, it is rational for investors and rating agencies to use other signals to infer information and adapt their assessment. Any signal that gives an indication about the country's future policy path will influence this expectation. IMF programs can plausibly serve as such a signal.

On the one hand, turning to the IMF may reveal negative information about a country's economic conditions indicating that problems are more severe than its indicators suggest (Andone and Scheubel 2017; Bas and Stone 2014; Ito 2012). The IMF (2014) itself is worried that countries under its loan programs carry a "stigma" that triggers adverse market reactions (see also Reinhart and Trebesch 2016, Essers and Ide 2019).[2] Our background research and interviews with IMF staff at the IMF's headquarters revealed that, in the recent past, several countries did indeed hesitate to sign Fund agreements out of fear of such a stigma.[3] In a recent statement on lending reforms the IMF (2017) states: "[a] key objective of the lending reform is to reduce the perceived stigma of borrowing from the IMF."

On the other hand, IMF programs can function as a "seal of approval" (Polak 1991). The Fund itself claims that "IMF resources provide a *cushion* that eases the adjustment policies and reforms that a country must make to correct its balance of payments problem" (IMF 2016a, emphasis added). With regard to the perception of those reforms, the IMF functions as a "screening device" about reform quality (Marchesi and Thomas 1999) , that can "lend credibility" (Stone 2002) and function as a commitment device to overcome time consistency

[2] Note that some observers also use the term "IMF stigma" to refer to the notion that policy-makers fear entering IMF programs because it weakens their political reputation by indicating that they implicitly admit to having made mistakes. Our definition focuses on the potentially negative signals that IMF programs send to financial markets.

[3] Conversations with several IMF employees in the period between November 2016 and November 2017.

problems (Dreher 2009).[4] Thus, the IMF could positively affect expectations about the reforms' effects on macroeconomic performance (Edwards 2006; Mody and Saravia 2006; Corsetti et al. 2006; Morris and Shin 2006).

Existing empirical studies linking IMF programs with creditworthiness have produced often negative, but overall inconsistent results. In an early literature review, Bird and Rowlands (2002) conclude that IMF programs reduce capital inflows. Subsequent studies found negative effects (Bird and Rowlands 2009; Edwards 2006; Jensen 2004), insignificant results (Rowlands 2001) or evidence for heterogeneous effects on capital inflows (Bauer, Cruz, and Graham 2012; Biglaiser and DeRouen 2010; Woo 2013). Jorra (2012) finds an increased probability of sovereign default as a consequence of IMF lending. In the literature that uses bond spreads as the outcome, Mody and Saravia (2006) and Eichengreen, Kletzer, and Mody (2006) find an association with lower bond spreads in some IMF program countries. Chapman et al. (2015) report that implementing an IMF program is associated with higher bond spreads, but find loan size and conditionality to lead to important heterogeneities.

In line with the literature reviews by Steinwand and Stone (2008) and Bauer et al. (2012), we argue that the inconsistency in this literature, is likely due to a) issues with the proxies that are used as outcome variables and b) issues with the way that selection bias is accounted for. In the subsequent section, we describe how our approach attempts to solve these two problems.

3 Data and Identification

3.1 Measuring creditworthiness: sovereign credit ratings

Our main proxy to measure the creditworthiness of a country is its sovereign's long-term foreign-currency rating.[5] Sovereign credit ratings possess several features that make them good proxies for sovereign creditworthiness. First, they predict sovereign defaults (Reinhart 2002). This makes them an informative measure of creditworthiness for countries with severe payment problems, an important feature for our research question. Second, they influence debt value and bond volatility (Kliger and Sarig 2002) and are closely related to changes in

[4] This conjecture is in line the literature on the effects of membership in international organizations more broadly (Dreher and Lang 2019). Membership in international organizations can improve borrowing conditions and increase inflows of foreign capital (Dreher, Mikosch, and Voigt 2015; Dreher and Voigt 2011; Gray 2009; 2013).

[5] Many developing countries issue foreign-currency debt to be able to access international financial markets (Caballero and Krishnamurthy 2003).

government bond spreads for countries that have bonds traded on financial markets (Afonso, Furceri, and Gomes 2012). They thus indicate the terms at which a country can access international capital markets.

Third, many investors, particularly pension funds, insurances and, to some degree, banks, are bound by internal regulations that restrict investments to bonds that rating agencies rate as "investment-grade." This "hard-wiring" is another reason why rating changes directly affect refinancing costs of governments. Fourth, ratings serve as a de-facto ceiling for credit ratings of private companies from the respective country (Borensztein, Cowan, and Valenzuela 2013), and hence also capture the private sector's ease of access to foreign capital.

For our baseline analysis, we use hand-collected ratings from *Standard and Poor's* (S&P), which offers the broadest country coverage over the longest time period.[6] In additional analyses, we use ratings from the other two of the "Big Three" agencies – *Moody's* and *Fitch* – to show that differences across agencies do not drive the results. All ratings are translated to a 21-point scale, assigning the highest value for a "AAA" rating, while "C" and below translates into a value of one. This is a standard approach in the literature (Hill et al. 2010).[7] In normal times, agencies update ratings regularly at a monthly, biyearly or yearly frequency, and ratings show little short-term fluctuations. In times of crisis, however, multiple changes within a year are common. Appendix B provides more background. The yearly regressions use the rating at the end of the year, the monthly regressions the one at the end of the month.

Alternative measures of creditworthiness that have been used in the previous literature are foreign direct investment (FDI), indicators of sovereign default, and governments bond spreads. In our view, credit ratings have advantages over these measures. FDI flows are certainly influenced by creditworthiness, but also by many other factors like economic openness. While FDI flows are a useful measure for several research questions on IMF programs, ratings are the more direct and precise proxy for creditworthiness. Defaults, as a second alternative, are very rare events that only capture an extreme end of the distribution of countries' creditworthiness. Compared to defaults, which ratings also capture, ratings provide

[6] S&P covers most high- and middle-income countries, and more low-income countries compared to other agencies. The IMF itself – jointly with the World Bank – rates the risk of debt distress of low-income countries under the Debt Sustainability Framework (see Lang and Presbitero 2018).

[7] Robustness tests in Appendix G show that results hold for alternative ways to translate ratings into numerical scales.

a more fine-grained assessment and indicate a wider spectrum of balance-of-payments problems.

Bond spreads are the third and, arguably, the best alternative measure. As market prices, they aggregate the opinions of all market participants. However, their main disadvantage relative to ratings is that they cover fewer countries and years, and are available only for countries that have already (re-)accessed international capital markets. Moreover, bond spreads of developing countries can be heavily affected by general market conditions such as shifts in demand for different asset classes (e.g., fixed income vs. equity) and risk categories (e.g., flight into quality). Furthermore, in times of crisis, liquidity for some bonds from developing countries can be low, making prices less informative. Finally, prices are influenced by demand and supply. During the types of crises that require an IMF engagement, countries often – endogenously – stop or reduce the issuance of bonds, which influences supply, and makes bond spreads a noisier signal. Nevertheless, to also make use of the advantages of bond spreads as market outcomes, we replicate the main analyses with bond spreads as the dependent variable in Appendix J.

3.2 Treatment Variable

The explanatory variable of interest – or "treatment" variable – *IMFprogram*, is an indicator that takes the value of one if country *i* was under an IMF program for at least five months in year *t* (as in Dreher 2006).[8] Following the previous literature, our definition encompasses all IMF programs under any of the following facilities: Stand-By-Arrangements (SBA), the Extended Fund Facility (EFF), the Structural Adjustment Facility (SAF), or the Poverty Reduction and Growth Facility (PRGF).[9] In alternative specifications, we also use the variable *IMFagreement,* which indicates only the year in which an IMF program was initially approved. In our analyses at a monthly frequency, we additionally use information on the exact date an IMF program was approved. The latter we coded based on the IMF's Monitoring of Fund Arrangements database (IMF 2016b).

[8] Robustness tests (Appendix G) show that results hold with an alternative variable that uses a threshold of one month in year *t* (taken from Kentikelenis, Stubbs, and King 2016).

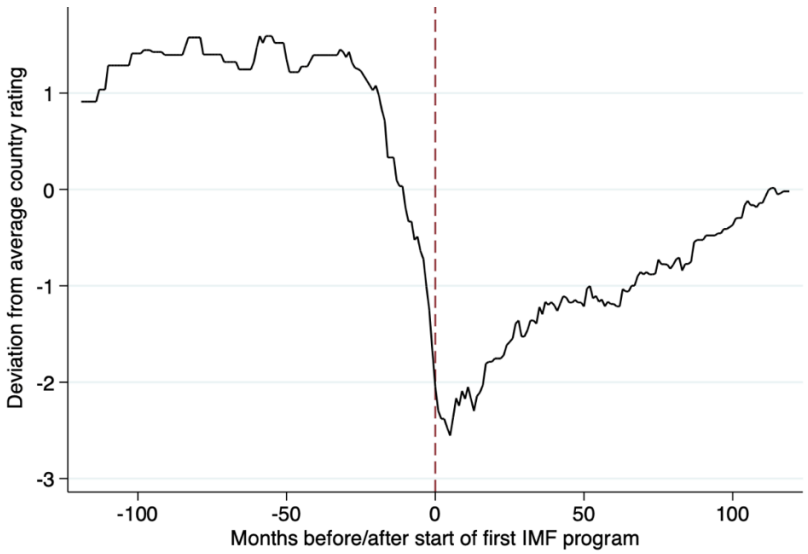
[9] Appendix G shows that results hold without the PRGF, which is a longer-term form of financial assistance.

3.3 Endogenous Selection into IMF Programs

We want to know whether the presence of an IMF program in country *i* during year *t* affects the country's credit rating at the end of year *t*. The fundamental methodological issue with this question is that selection into IMF programs is obviously not random. On the contrary, "treated" countries typically experience an economic crisis when entering into a program. The more severe the crisis, the more likely that a country is under an IMF program. As a consequence, simple comparisons between treated and non-treated country-year observations will not yield causal effects, but instead will capture the negative bias resulting from omitted variables and reverse causality. The deteriorating economic conditions that make a country more likely to enter an IMF program negatively affect a country's creditworthiness, and a country with lower creditworthiness is thus more likely to receive an IMF program.

To illustrate the problem graphically, we use our monthly panel data on sovereign credit ratings as well as data on the exact date that countries enter into an IMF arrangement. Figure 2 plots the average behavior of credit ratings around such *IMFagreements*. Specifically, on the y-axis the figure depicts the unweighted average of the month-specific deviations from each country's mean credit rating in the 1990–2013 period over all countries that received an IMF program at least once in this period.

Figure 2 – Rating Dynamics Around Starts of IMF Programs



Notes: The figure plots the mean across countries of the month-specific deviation from each country's average S&P credit rating in the 1990-2013 period. The number of months around the start of the country's first IMF program of this period is on the x-axis. Sample restricted to countries with at least one IMF program. Figure A1 in Appendix E zooms into the 12 months before and after the start of the IMF program.

Several important observations are evident. First, credit ratings appear to capture balance-of-payment crises well. As one would expect, countries enter into IMF programs several months after economic crises hit and creditworthiness collapses. On average, countries' credit ratings deteriorate by about three notches in the approximately one and a half years preceding the IMF program's beginning. Second, IMF programs start at a low point, but creditworthiness continues to fall for several months thereafter. After about a year, ratings begin to recover. Third, this recovery process is on average rather slow; it takes several years until creditworthiness is restored to pre-crisis levels.

Figure 2 also illustrates the problem of endogenous selection into treatment. During the early months of IMF programs, credit ratings are at a low level, and in an ongoing process of decline, for reasons at least partly unrelated to the IMF program itself. Given that the average IMF program in our sample lasts for about three years (with large variance), simple regressions of credit ratings on variables indicating the start or presence of an IMF program are biased by the fact that programs typically start when ratings are low and trending down.

A basic model designed to estimate the effect of *IMFprogram* in year *t* on the *Rating* at the end of that year based on controlling for selection-on-observables looks like the following:

$$Rating_{i,t} = \beta\, IMFprogram_{i,t} + \boldsymbol{X}'_{i,t-1}\gamma + \delta_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

In a regression equation of this type $\boldsymbol{X}'$ is a vector of country-year specific observable control variables, δ_i and θ_t stand for country fixed effects and year fixed effects, which control for unobserved time-invariant country characteristics and for year-specific global shocks that affect all countries equally. $\varepsilon_{i,t}$ is the i.i.d. error term.

We expect that the bias introduced by endogenous selection into the program is reduced but not eliminated by the fixed effects and controls variables. Formally:

$$E(IMFprogram_{i,t}\varepsilon_{i,t}) < E(IMFprogram_{i,t}\varepsilon_{i,t}|\delta_i, \theta_t) < E(IMFprogram_{i,t}\varepsilon_{i,t}|\boldsymbol{X}', \delta_i, \theta_t) < 0 \quad (2)$$

It is natural to expect that these fixed effects reduce the negative bias in this estimation: Global financial cycles could affect both creditworthiness and the demand for IMF programs. More importantly, typical IMF program countries tend to be economically weaker and thus less creditworthy because of time-invariant country characteristics. Country-year-specific control variables can further reduce this bias because they make treatment and control groups more

comparable in terms of observables. Nevertheless, such an empirical strategy is insufficient and problematic for at least three reasons.

First, the available cross-country panel data on macroeconomic and political fundamentals are unlikely to capture all information that ratings agencies, national policy-makers, and IMF staff evaluate when making decisions about creditworthiness and IMF participation. This includes information on context-specific economic vulnerabilities or political events that are taken into account. Second, even if all relevant economic and political fundamentals could be observed and measured at the country-year level, this would not solve the entire problem. Most of these indicators are available only at the yearly level – if they are available for a large panel at all – and ignore the crucial dynamics *within* a year that are highlighted in Figure 2. Economic fundamentals in countries that will enter into IMF programs are likely to further deteriorate during the year. A focus on the available country-year-level observable controls would hence not control for these differences between treatment and control group. Third, as IMF programs last for several years and can affect the same economic and political fundamentals that also correlate with ratings, control variables need to be lagged by a substantial time period to avoid "bad control" problems. This limits their function to increase the comparability of treatment and control group.

In sum, estimation strategies that rely on controlling for selection on observables alone cannot adequately address the question at hand. Ideally, we would want a mechanism that randomly assigns countries that are on comparable trajectories to an IMF program. We approach such an ideal assignment mechanism by employing an instrumental variable (IV) that changes the likelihood that a particular country receives a program based on factors that are plausibly exogenous to the creditworthiness trajectory of this particular country.

3.4 Instrumental Variable and First-Stage Results

It is well known that countries that have received IMF programs in the past are more likely to receive them in the present (Bird, Hussain, and Joyce 2004; Sturm, Berger, and de Haan 2005). Measures indicating a country's prior probability of having participated in an IMF program – in our case the variable *IMFprobability* (defined below) – are thus strong predictors of *IMFprogram* participation. What we exploit for identification is that the influence of the prior *IMFprobability* on current *IMFprogram* participation differs conditionally on the amount of liquid resources that are available to the IMF in a given year, *IMFliquidity* (see Lang 2016).

Specifically, in years with relatively low levels of *IMFliquidity*, IMF resources go to the more regular IMF clientele, i.e., countries that have received more IMF programs in the past. The reasons include path dependency and "recidivism" of program countries (Bird, Hussain, and Joyce 2004), political favoritism of the Fund's major shareholders (Copelovitch 2010; Thacker 1999), and staff incentives and preferences (Nelson 2014). Accordingly, *IMFprobability* is a strong predictor of *IMFprogram* in these years.

However, during years in which the IMF's liquidity is high, a country's IMF participation history matters to a much lesser degree. A plausible explanation for this pattern lies in the political economy literature on the IMF that shows that international bureaucracies aim to maximize their budgets, remits, staff, relevance, and political influence (Babb and Buira 2005; Dreher and Lang 2019). These bureaucratic incentives contribute to the expansion of international organizations in size, power and responsibilities in an increasing number of countries (Barnett and Finnemore 2004; Vaubel 2006). When the IMF has substantial amounts of unused resources during high-liquidity years, this increases both bureaucratic incentives and financial opportunities to look for additional program countries beyond the more regular clientele. Anecdotal evidence from conversations with IMF staff reflects that inside the IMF there is a concern to lose relevance when many IMF resources are unused. Several IMF staff members described attempts to make loan programs more attractive for new program countries in recent, high-liquidity years (conversations in Washington, D.C., November 2016 and November 2017). Such efforts are in line with political economy models of international organizations and increase, if successful, the probability to receive programs for countries beyond the more regular clientele.

To capture this relationship, we construct the following IV (see also Lang 2016):

$$IV_{i,t} = IMFprobability_{i,t} \times IMFliquidity_t \quad (3)$$

IMFprobability is defined as the share of past years that a country was under an IMF program.[10] *IMFliquidity* denotes the IMF's time-varying liquidity ratio, which is defined as the organization's liquid resources divided by its liquid liabilities. The IMF uses such a measure to determine the amount of available resources for loan programs in a given year. It is collected from IMF Annual Reports (1973-2013) and the IMF International Financial Statistics.

[10] We start the count of years of past IMF participation in 1973 and thus 15 years before our observation period starts. This ensures that the variable does not fluctuate strongly from one year to the next for the early years of the sample and increases the plausibility of the exclusion restriction because it is determined by earlier periods.

We then run two-stage least squares (2SLS) panel regressions over an unbalanced sample of 100 countries in the 1987–2013 period:

$$1^{\text{st}} \text{ stage: } IMFprogram_{i,t} = \alpha_1 \left(IMFprobability_{i,t} \times IMFliquidity_t\right) + \alpha_2 IMFprobability_{i,t} + \boldsymbol{X'_{i,t-4}}\boldsymbol{\gamma} + \delta_i + \tau_t + u_{i,t} \quad (4)$$

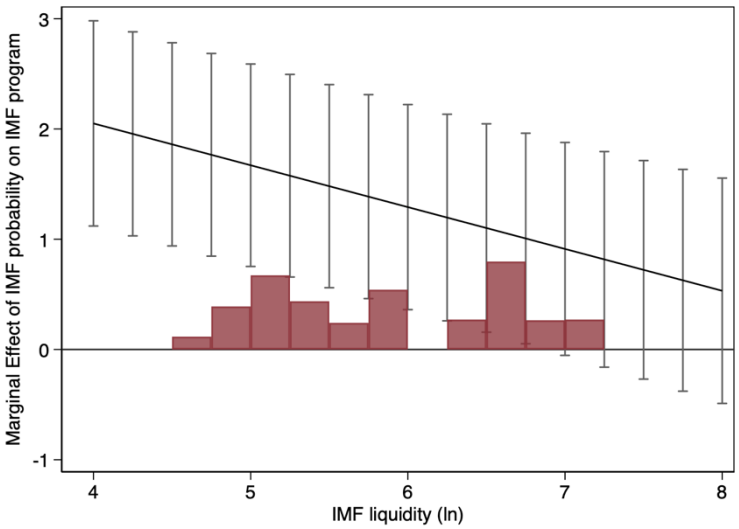
$$2^{\text{nd}} \text{ stage: } Rating_{i,t*} = \beta_1 \widehat{IMFprogram}_{i,t} + \beta_2 IMFprobability_{i,t} + \boldsymbol{X'_{i,t-4}}\boldsymbol{\gamma} + \delta_i + \tau_t + \varepsilon_{i,t} \quad (5)$$

This means that we control for the initial, pre-determined *IMFprobability* in both stages while year fixed effects absorb the level effect of *IMFliquidity*. Hence, for identification we only need to assume the exogeneity of the interaction term conditional on its two constituent terms (as well as the fixed effects and the control vector $\boldsymbol{X}$, which is described below).

$$E(\varepsilon \times IMFprobability \times IMFliquidity \mid IMFprobability, IMFliquidity, \boldsymbol{X}, \delta, \tau) = 0 \quad (6)$$

Figure 3 illustrates the first-stage effect by plotting the marginal effects of *IMFprobability* on *IMFprogram* conditional on the level of *IMFliquidity*.

Figure 3 – First-Stage Effect



IMF liquidity: The IMF's liquid resources divided by its liquid liabilities.

The IMF uses such a measure to determine the amount of available resources for loan programs in a given year.

Sources: IMF Annual Reports (1973-2013), IMF International Financial Statistics

Notes: The figure plots the marginal effects of *IMFprobability* on *IMFprogram* for varying levels of *IMFliquidity* (along with 95% confidence intervals). It corresponds to the first-stage regression of the baseline IV regression, as reported below in column 6 of Table 1. The histogram shows the variation in liquidity over time. It becomes visible that a country's history of program participation in a strong predictor of present program participation in low-liquidity years, whereas in high-liquidity years this relationship is insignificant. This creates exogenous variation in the likelihood of receiving a program.

This strategy follows a difference-in-differences logic as in Nunn and Qian (2014) or in Temple and Van de Sijpe (2017), and is similar to shift-share or Bartik instruments (see Goldsmith-Pinkham et al. 2020). For the exclusion restriction to be violated, omitted variables would have to follow a similar time trend as the year-specific *IMFliquidity* and affect creditworthiness *differently* in countries with *different* levels of *IMFprobability*. We think this is unlikely for the following reasons.

The main source of variation of the IMF's liquidity ratio is an institutional rule in the IMF's Articles of Agreement, which requires the Fund to review the quota subscriptions of its members every five years.[11] As these quota reviews usually recommend quota increases, member countries then negotiate the specifics and get domestic approval. Once the quota increase is decided, members commit more resources, hence causing a spike in the Fund's liquid resources. Due to the predetermined schedule, the timing of these spikes is thus plausibly exogenous to creditworthiness dynamics in individual countries.

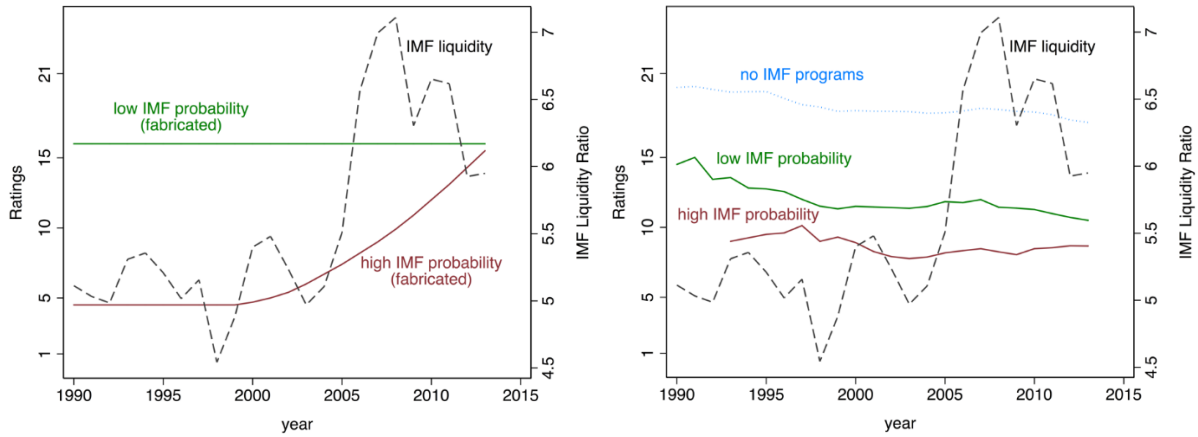
However, since the process from quota review to actual commitment of resources can take several years, the result and timing of the process could be endogenous to the state of the financial cycle and thus sovereign creditworthiness. For any such unobserved trend the following point is crucial: The identifying assumption is not directly threatened by unobserved trends that correlate with both *IMFliquidity* and credit ratings. The exclusion restriction is only in danger if such a long-term trend differs between countries with different levels of *IMFprobability*, and dominates year-on-year variation (Christian and Barrett 2017). We illustrate an example in Figure 4.

Assume the (fabricated) trend for low-probability countries is flat, whereas ratings of high-probability countries systematically increase over time (Panel A). This spuriously correlates with the long-term trend in *IMFliquidity*, and would create a bias in our IV estimates. Panel B shows that the actual long-term rating trends are parallel and for none of the three groups are correlated with the long-term trend in *IMFliquidity*.

[11] The second source of variation in the liquidity ratio are changes in the Fund's liquid liabilities. However, only the purchases and repurchases of very few extraordinarily large loans for large countries have a sizeable effect on the IMF's overall liquid liabilities. Furthermore, most of these transactions are agreed upon years in advance and follow predetermined schedules. It is thus unlikely that the Fund's liquid liabilities are associated with future creditworthiness of individual countries. We also show that the results are robust to omitting these few cases (Appendix G). There are two additional minor sources of variation in the liquidity ratio. Changes in the Fund's basket of currencies that it considers "usable" and the Fund's borrowing from its members. Changes in the basket of usable currencies are rare and have negligible effects. Similarly, total borrowing by the Fund is zero in many years and its average share of liquid liabilities is approximately 15%.

Figure 4 – The IMF's Liquidity Ratio and Trends in Credit Ratings

***Panel A**: Problematic Trends* ***Panel B**: Actual Trends*



Notes: The dashed line is the time series of the IMF's liquidity (ln). The remaining lines plot mean credit ratings in the group of countries that have a low probability of receiving a program (green line, below 85th percentile), and a high probability (red line, above 85th percentile).
Panel A shows a fabricated, potentially problematic case. If there is a long-term trend in high-probability countries that – for reasons unrelated to the IMF – overlaps with the long-term trend in *IMFliquidity*, this would cause a bias in our estimates of *IMFprogram* (see Christian and Barrett, 2017).
Panel B shows the actual trends. There are no strong differences in low- and high-probability regions that overlap with the long-term trend in IMF liquidity. Trends are similar when using other percentiles as cutoffs.

We also compare the liquidity series with other global financial cycles such as global GDP cycles, capital flows to emerging economies, and the global number of systemic banking crises. As shown in Figures A2-A7 in Appendix G, there do not seem to be problematic overlaps with these financial cycles; the correlation coefficients are -0.17, 0.22, and -0.21, respectively. Nonetheless, we further address this concern by adding interactions of these global cycles with *IMFprobability* as control variables to all our regressions to ensure that the IV only picks up variation of the liquidity ratio net of these cycles. Furthermore, we add 25 macroeconomic and political control variables that could determine credit ratings (following Fuchs and Gehring 2017, see Appendix F) as well as the interactions of all these variables with *IMFliquidity* to account for their potentially heterogeneous influence. In sum, the control variables contain:

$$\boldsymbol{X'_{i,t}}\boldsymbol{\gamma} = \sum_{c=1}^{25} C_{c,i,t}\,\kappa_c + \sum_{c=1}^{25} C_{c,i,t} \times IMFliquidity_t\ \lambda_c + \sum_{g=1}^{3} G_{g,t} \times IMFprobability_{i,t}\,\eta_g$$

where $C_{c,i,t}$ contains the 25 macroeconomic country-year-specific controls described in Appendix D and F, while $G_{g,t}$ contains the 3 year-specific global cycles (global growth, systemic banking crises, global capital flows) described above. In addition to including these controls, the robustness section presents exercises and placebo tests.

4 Main Results

4.1 Baseline: Country-Year Level

Table 1 shows the results of six regressions of *S&P ratings* on *IMFprogram*, which eliminate selection effects step by step. In Figure 5, we plot those results together with results of the same specifications for the other agencies and *Institutional Investor*. Overall, selection effects seem to be strong. Once the regressions take these into account, the negative relationship between IMF programs and creditworthiness disappears and turns positive.

The first specification shows the simple correlation between the treatment variable *IMFprogram* and the outcome *S&P rating*, relying on variation between and within countries. The large coefficient of nearly six rating notches to a large extent demonstrates how different countries that typically receive IMF programs are from those that do not. This becomes evident in specification 2, which conditions on country fixed effects, using only variation within countries over time. The negative point estimate of about 1.5 allows a better assessment of the extent of selection bias in OLS, still suggesting that credit ratings of a given country drop by one to two notches due to an IMF program.

Controlling for global time trends that affect both ratings and countries' likelihood of receiving an IMF program by including year fixed effects in specification 3 further lowers the point estimate in absolute terms, although to a much more limited extent. Adding controls in specification 4 to condition on the state in which countries enter into an IMF program further reduces selection bias, but the effect remains negative and statistically significant.[12] Similarly, when eliminating the influence of county-specific time-invariant omitted variables with first-differences instead of fixed effects in specification 5 – both being theoretically consistent panel estimators – the coefficient is much smaller in absolute terms compared to the pooled cross-section approach in column 1, but still negative.[13] In sum, these regressions show that we can reduce the selection problem by conditioning on observables and by applying panel methods to control for country- and time-specific omitted variables. This increases the coefficients, but they remain negative.

[12] As average IMF programs in our sample last about three years, we lag the variables by four years to mitigate bad control concerns. Appendix F describes all controls and their coefficients in this regression

[13] Compared to the fixed-effects model, the first-difference treatment variable captures only starts and ends of IMF programs, rather than all years in which the program was active.

Then, we implement our instrumental variable approach. In the first stage, which is reported in the bottom panel of the table, the interaction term is negative and statistically significant at the one percent level. As discussed above, this shows that a high IMF liquidity increases the likelihood of IMF assistance more for the countries with an otherwise lower probability of receiving an IMF program than for those who already had a high initial probability. The IV passes the underidentification test with a p-value of less than 0.001. The Kleibergen-Paap (K-P) F-statistic is about 22, well above the rule of thumb of 10, as well as above the more conservative threshold of 16.66 proposed by Stock and Yogo (2005).

Table 1 – Baseline Results (Standard & Poor's)

Estimation Method	OLS	OLS-FE	OLS-FE	OLS-FE	OLS-FD	IV
	(1)	(2)	(3)	(4)	(5)	(6)
IMF program	-5.858	-1.508	-1.356	-0.990	-0.135	2.334
	[0.525]	[0.335]	[0.364]	[0.244]	[0.118]	[1.110]
	{0.000}	{0.000}	{0.000}	{0.000}	{0.256}	{0.036}
Observations	1345	1345	1345	1343	1238	1343
Adjusted R-squared	0.224	0.096	0.135	0.311	0.066	0.100
Country FE	No	Yes	Yes	Yes	No	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Controls(t-4)	No	No	No	Yes	Yes	Yes
First Stage Results						
IMFprobability X IMFliquiditity						-0.382
						[0.081]
						{0.000}
IMFprobability						3.483
						[0.604]
						{0.000}
K-P underid. p						0.000
K-P weak id. (F-statistic)						22.164

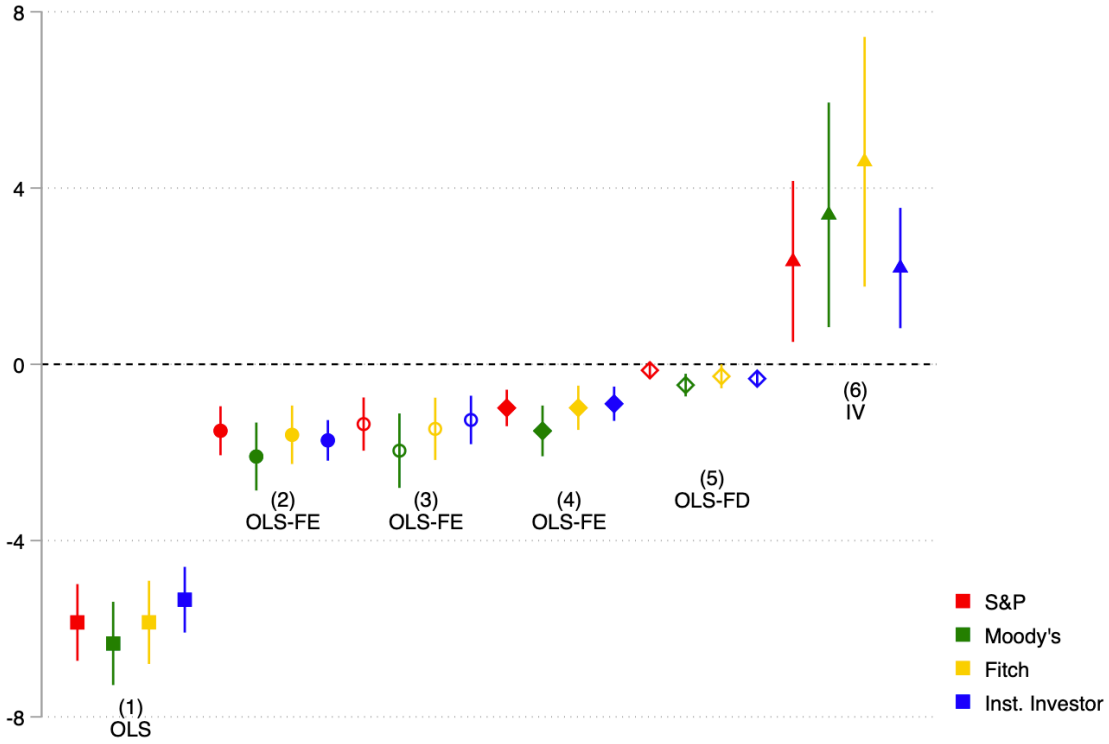
Notes: The dependent variable is the country's long-term foreign-currency rating on a 21-point scale by Standard and Poor's at the end of the year. Standard errors clustered at the country level are displayed in brackets, p-values in curly brackets. Appendix D provides a comprehensive list of all economic and political controls added in column 4. Table A5 shows the full results including the controls.

The effect of the IMF program in the second stage now turns positive with a value of 2.3. The confidence interval of the IV estimate does not contain the prior OLS estimates. Such a big difference would raise concerns in some settings, but here the change is exactly as one would expect in the presence of a large negative selection bias. The IV coefficient is less precisely estimated than the OLS coefficients, but statistically significant at the five percent level. The confidence intervals are quite wide, suggesting some heterogeneity in the effect of programs.

As Figure 5 shows, using ratings from *Moody's* or *Fitch* yields not only the same pattern of removing selection bias by conditioning on fixed effects, controls or with first differences, but we also find a similar, positive effective when using the IV. We also examine assessments from *Institutional Investor*, which are based on surveys among investors and finance analysts (see Appendix C for details) and find the same pattern and a similar, positive IV effect.

In sum, this analysis suggests that there is no negative effect ("stigma") on perceptions of creditworthiness. Rather, IMF programs improve sovereign creditworthiness. The next section examines the underlying channels behind this positive effect.

Figure 5 – Baseline Results (All Agencies)



Notes: The figure plots the coefficients on *IMFprogram* estimated in different regressions along with 90 percent confidence intervals. Specifications 1 - 6 correspond to those reported in Table 1 and each specification is estimated for four different outcome variables: Ratings from S&P (red), ratings from Moody's (green), ratings from Fitch (yellow), assessment from Institutional Investor (blue). Institutional Investor assessments are rescaled to be comparable to ratings in the same graph.

4.2 Channels: Adjustment vs. Signaling

As discussed above, we distinguish between two main channels of how IMF interventions can influence creditworthiness. First, as IMF programs often lead to far-reaching economic reforms, they can influence a country's creditworthiness via immediate economic *adjustments*. Second, an IMF program is also a signal that can affect expectations. Independent of its actual

economic effects, agreeing on a specific program with the IMF conveys information about the country's future policy path to those assessing its creditworthiness.

We begin to differentiate between these two channels by investigating the short-term *adjustment* effects of an IMF program on the most important economic factors determining creditworthiness. We focus on GDP growth, inflation, the change in government debt and the current account balance. These are cited as the most important predictors of sovereign credit ratings (Archer, Biglaiser, and DeRouen 2007; Cantor and Packer 1996; Hill, Brooks, and Faff 2010) and data coverage is good.[14] As an additional, specific form of adjustment, we also consider debt restructurings. IMF programs potentially increase the probability of a debt relief or restructuring, which could improve a country's creditworthiness.

It is difficult or often impossible to estimate the precise contribution of specific mediating variables econometrically.[15] Our aim here is more modest. If we find that IMF programs improve relevant macroeconomic conditions in the short run, this is a potential explanation for the improvements in ratings. In this case, it would not be possible to disentangle *adjustment* from *signaling* effects. In contrast, if there is no significant improvement – or a deterioration – in macroeconomic conditions in the short term, it is unlikely that economic *adjustments* are the main channel through which ratings improve. This would suggest that the effect is driven more by *signaling* and changes in expectations.

Table 2 shows the baseline IV results with these five macroeconomic measures at the end of the same year (t) and one year later (t+1) as outcomes. We find no evidence for consistent short-term improvements in these key economic indicators. The only consistent effect that is statistically significant at the five percent level in t+1 is a *reduction* in the growth rate of GDP. According to this specification, IMF programs reduce growth rates by about three percentage points.[16] In the average IMF program country in our sample – where growth rates fluctuate substantially more than in the average country – this is equivalent to a change of about three

[14] Note that we can replicate the explanatory power of these variables in our sample. We find significant associations with S&P ratings for all variables except the change in government debt. In a simple OLS regression of S&P ratings these variables explain 75 percent of the variance. Interestingly, most of the variation is explained by the variables indicating level and growth rate of GDP. These two variables alone explain 71 percent of the variation in an OLS rating regression and 27 percent of the within-country variation in a fixed-effects regression.

[15] Adding the adjustment variables as "bad" controls, which are themselves influenced by IMF programs, to the same equation does not necessarily yield the conditional causal effect of IMF program.

[16] Note that IMF programs usually last for multiple years, and thus most of the country-year observations with an active program are years in which IMF programs were already active in the year(s) before. The estimates, thus, also includes lagged effects of previous program years.

fourths of a standard deviation and thus similar to results in some of the previous literature (Barro and Lee 2005, Dreher 2006).[17]

Several economic policies that IMF programs typically entail – like cutting public sector employment (Rickard and Caraway 2018), budget cuts, or tax increases – could cause these short-run contractionary consequences. In fact, IMF staff recently argued that the IMF underestimated the size of the fiscal multiplier in past crises and thus projected smaller negative effects of fiscal austerity on GDP than those that eventually materialized (Blanchard and Leigh 2013). Many program countries also rely on debt-financed growth in the years before they start IMF programs, and cannot maintain such growth under a program because the IMF often sets limits on new debt (Kentikelenis, Stubbs, and King 2016).

Table 2 – Channels

Dependent Variable at end of year t:	GDP Growth	Inflation	Change in Government Debt	Current Account Balance	Debt restructuring
	(1)	(2)	(3)	(4)	(5)
IMF program	-0.794	0.013	5.148	2.623	0.039
	[1.454]	[0.038]	[4.248]	[4.651]	[0.052]
	{0.585}	{0.733}	{0.226}	{0.573}	{0.455}
Observations	1343	1252	1247	1241	1343
K-P underid. p	0.000	0.000	0.000	0.000	0.000
K-P weak id. F	22.136	18.101	19.640	18.038	22.136

Dependent Variable at end of year t:	GDP Growth	Inflation	Change in Government Debt	Current Account Balance	Debt restructuring
	(1)	(2)	(3)	(4)	(5)
IMF program	-3.336	-0.002	1.388	1.505	0.023
	[1.478]	[0.038]	[3.761]	[4.018]	[0.047]
	{0.024}	{0.963}	{0.712}	{0.708}	{0.621}
Observations	1343	1162	1157	1151	1343
K-P underid. p	0.000	0.000	0.000	0.000	0.000
K-P weak id. F	22.136	16.748	17.862	16.455	22.136

Notes: Results are based on the baseline IV regression (Table 1, column 6), but with other dependent variables. All regressions include country and year FE, as well as the controls in t-4. Standard errors clustered at the country level in brackets, p-values in curly brackets.

[17] As in our sample there are only 14 debt restructurings, it is not surprising that the coefficient on IMF program in the debt restructuring regressions does not reach conventional levels of statistical significance. However, an examination of the raw data shows that about three quarters of observed debt restructurings (data by Cruces and Trebesch (2013)) occur while the country receives an IMF program. The relationship between IMF programs and debt restructurings could thus be a promising avenue for future research.

As all official rating agency manuals highlight changes in GDP as an important factor influencing credit ratings,[18] it is thus remarkable that the effect of IMF programs on ratings is positive. This suggests that IMF programs cause negative economic adjustments that would usually lead to a declining creditworthiness, but also have a positive effect that prevents this decline. We argue that this additional positive effect is due to the signal IMF programs send to financial markets. The next section tries to better understand this *signaling* effect.

4.3 Examining the Signaling Effect: Event-based Evidence at the Monthly Level

4.3.1 Agreements on IMF programs

In this section, we use monthly rating data in combination with the timing of the *agreement* on a program with the IMF. The aim and strategy used here differs from our previous approaches. With monthly data we can exploit variation within years for a given country, and use country-times-year fixed effects to capture any differences between countries with and without programs, as well as all differences between years for a given country. Using monthly data is useful as the short-term effect of the *agreement* is more likely to capture *signaling* effects, because economic adjustments usually take more than a few months.

A limitation of the monthly approach is that we cannot use quasi-exogenous variation in the probability to receive an IMF program. Thus, it can only show a temporal correlation in an event-study like setting, which allows us to examine the timing and temporal pattern of rating changes in more detail. Looking at these patterns can help to examine (i.) whether ratings further decline until the agreement even within a year , (ii.) whether ratings start to recover at the time of the agreement, (iii.) whether there is a measurable improvement in ratings following the agreement within a country-year.

Our dependent variable is the *S&P rating* at the end of month m. The treatment variable $IMFagreement_{i,m,t}$ indicates the month within a year in which an IMF program officially started. We employ an event-time specification and add *IMFagreement,* as well as 11 lags and 11 leads (indicated by l) of the same variable.[19] Moreover, we include month fixed effects μ_m and country-times-year fixed effects $\theta_{i,t}$. We then estimate:

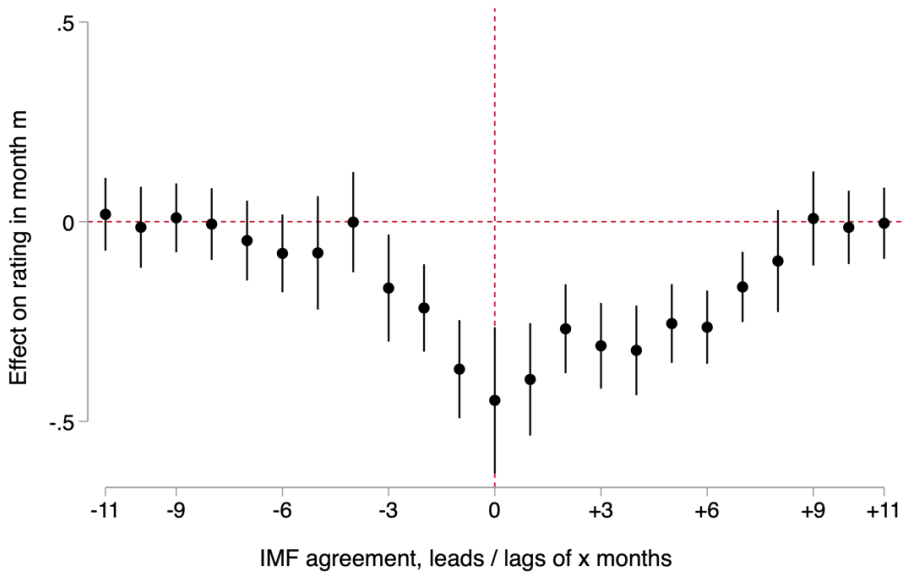
[18] According to the manual published by Standard & Poor's a credit rating can be best understood as a scoring model. There is an economic and a political dimension, which are each composed of different factors. For each factor the country gets assigned a grade, and the factors are summed up to a grade for the given dimension.

[19] We do this to model a full year before and after program agreement. The patterns of the results are very similar when using fewer lags and leads.

$$Rating_{i,m,t} = \sum_{r=-11}^{11} \beta_{\mathrm{r}}\ IMFagreement_{i,m+l,t} + \theta_{i,t}\ +\ \mu_m +\ \varepsilon_{i,m,t} \qquad (6)$$

The coefficients β_r estimate the extent to which the rating in the months around the start of an IMF program deviate from the mean rating of country *i* in year *t*. Note that ratings are rarely adjusted every month for an individual country. Hence, the estimated monthly coefficients capture the average timing and reaction over all IMF program countries. Figure 6 plots all those coefficients.

Figure 6 – Event-based Identification: Rating Levels around Program Start within Country-Year



Notes: The figure plots the coefficients and 90 percent confidence intervals of different lags and leads from a regression of monthly S&P ratings on *IMF agreement*. See regression equation 6. Detailed results are displayed in Appendix H, Table A11.

We discuss the coefficients in 'chronological' order. First, even though all variation between treated and non-treated country-years is absorbed, a negative pre-trend begins to emerge three months before the agreement with the IMF. The most plausible reason for this, as we argue above, is that deteriorating economic conditions make an agreement more likely. This underlines the necessity for our IV approach in the main specification.

Second and most importantly, the negative trend in ratings begins to reverse exactly one month after the agreement with the IMF. As credit rating agencies usually take at least one month to react to new information and update their ratings (Fuchs and Gehring 2017), and economic adjustments cannot take place so quickly, this is in line with a positive *signaling* effect. As mentioned above, this is not guaranteed to capture a causal effect of the program start, but the simultaneity of the trend reversal and the program start suggest that it is the

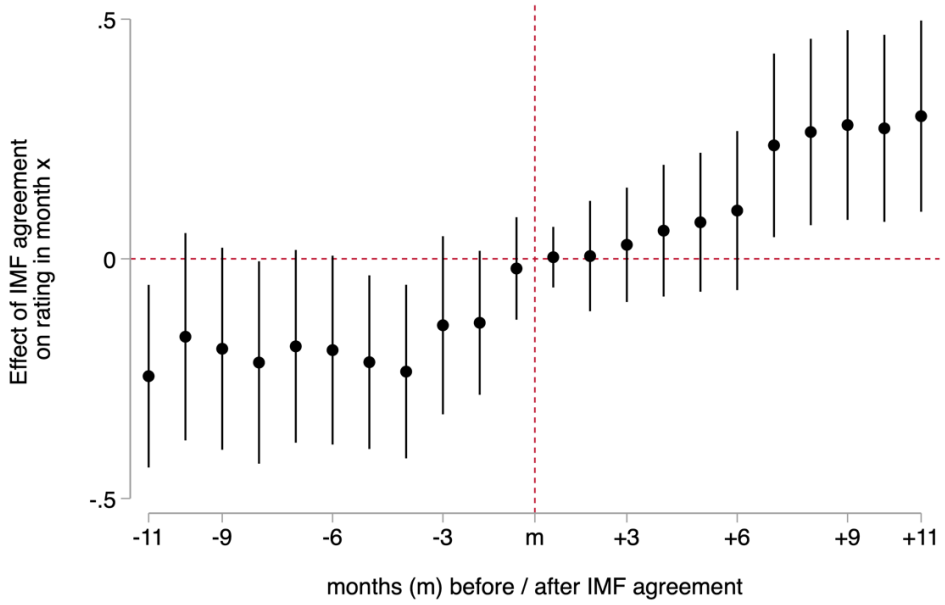
program itself that is perceived as a positive signal. Third, in the subsequent months, ratings further improve. About eight months after program approval (l = 8), the negative deviation from the mean rating of the country-year is no longer significantly different from zero.

Building on this, we also estimate how long it takes until the positive signal significantly improves the rating compared to its lowest level at the time of the agreement. To do so, we compute and use the changes between the rating in the month of the agreement compared to the rating x months before or after the agreement. We then estimate:

$$\Delta Rating_{i,m+x} \equiv (Rating_{m+x} - Rating_m) = \beta\ IMFagreement_{i,m} + \theta_{i,t} + \ \mu_m + \ \varepsilon_{i,m+x} \quad (7)$$

Figure 7 plots the results. Each coefficient comes from a separate regression estimating equation 7 for varying values of x, capturing changes within one year before and after the agreement. Again, we observe the deterioration in the rating compared to the time of the agreement before the program is announced. After the agreement, ratings start to improve. Starting seven months after the agreement, ratings become statistically significantly better than at the time of the agreement with the IMF. These results are again in line with our interpretation that there is a positive *signaling* effect associated with IMF interventions, despite some negative short-term economic adjustments. These results further underline that there is no financial market stigma associated with IMF programs themselves.

Figure 7 – Event-based Identification: Rating Changes around Program Start within Country-Year



Notes: The figure plots the coefficients from individual regressions of changes in monthly S&P ratings on *IMF agreement*. Each rating change is computed as rating(m+x) – rating(m). See equation 7.

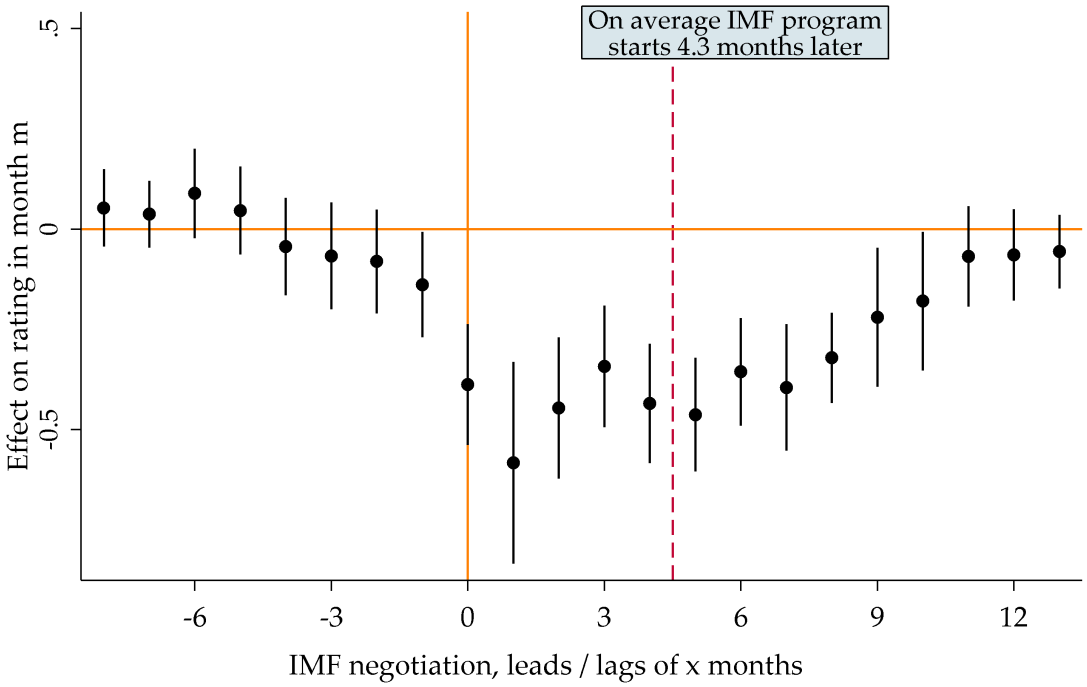
4.3.2 Program Agreements vs. Program Negotiations

A related, but slightly different question is whether a country, by turning to the IMF and beginning to negotiate about a potential program, conveys negative information regarding its creditworthiness. It is plausible that when this information becomes public, investors perceive it as an information that a country's economic situation is worse than was previously known based on observable publicly available data. At the same time, there is still uncertainty (i.) whether the two parties will agree on a program, (ii.) how long the negotiation will take, and (iii.) whether the program will be designed in a way that is perceived as a positive signal by investors.

Coding the start of negotiations is more challenging than using the official dates of the program start. We collected these data and coded the begin of negotiations based on information from IMF websites, LEXIS NEXIS, and local language newspapers. The coding procedure is described in detail in Appendix I. This way, we were able to receive information on negotiation starts for 137 out of 160 agreements. Those dates in all likelihood still contain significant measurement error. For the following analysis we assume the measurement error is randomly distributed, but this limitation should be kept in mind.

We find that most negotiations are finished rather quickly. The average duration is 4.3 months. However, there is significant heterogeneity as some take up to a year or even more, leading to a period of considerable uncertainty (we plot the full distribution in Appendix I, Figure A11). We employ this information by re-estimating equation 6 with the begin of negotiations (rather than of the program itself) as the treatment variable. The results, plotted in Figure 8, indicate how the begin of negotiations overlaps with the decline during a year, and when ratings start to improve again. In line with the previous results, the estimates suggest that creditworthiness is in decline during the year already before the country turns to the IMF. However, the begin of the negotiations is associated with an additional visible drop in ratings. After the begin of the negotiations, the effect remains negative at a similar level for about five months, mirroring the average duration of the negotiations. In line with our previous results, when the average negotiation is successfully completed and the programs starts, we begin to observe a steady improvement in ratings during the subsequent months.

Figure 8 – Event-based Identification: Rating Levels around Negotiation Start and Program Start



If this improvement is due to the program start, we should also be able to observe a significant difference in ratings between the negotiation period and the subsequent early program period. To test that, we use a simple regression that compares ratings during the months with ongoing negotiations with the ratings during the first program year in Table 3. The results show a significant improvement during the first program year relative to the negotiation period, indicating that ratings are on average 0.4 rating notches higher in the first months of the program after the negations ended successfully.

Table 3: Negotiation Period vs. Program Period

	(1)
IMF program	0.399
	[0.164]
	{0.015}
Observations	1402
Sample	negotiation period & first program year

Notes: OLS regression. Dependent variable: S&P ratings. This regression compares only the months during ongoing negotiations with the first 12 months of the programs.

In sum, the analysis at the monthly level shows that ratings decline before an IMF program starts. The lowest point is reached when the country approaches the IMF and starts negotiating

about a potential program. Average ratings remain at this low point during the negotiation period and start increasing when the IMF program begins This suggests that the positive signal relies on the successful completion of the negotiations and the design of the respective programs. The next section uses an exploratory text analysis of statements by rating agencies to investigate whether these verbal statements help to further understand how IMF programs and their design influence creditworthiness assessments.

4.4 Text Analysis: How Agencies Assess IMF Program Agreements

Naturally, there are limits to understand the *signaling* effect caused by an IMF program in a framework that focuses on one condensed number alone, in our case credit ratings. For this reason, we augment our quantitative analysis by examining verbal rating agency statements published along with the ratings. This helps to (i.) critically examine the plausibility of the econometric results, and (ii.) better understand what we can generalize about the type of signal that IMF programs convey.

We evaluate rating statements that are issued when a rating or its outlook is changed, based on the *Dow Jones Factiva* database. The statements we can extract represent only a small subset of the universe of statements but we see no reason to expect a systematic bias in the statements we can access. Initially, we study these statements in an exploratory way (see Appendix K and L for details and a list of exemplary statements.) It becomes evident that rating agencies indeed often associate the IMF's presence with a positive signal about the country's future policy path. Examples include statements like: "[w]e think the new IMF program [….] will help in addressing fiscal and external imbalances" (S&P on Ghana in 2015), or "the International Monetary Fund program will serve as a policy anchor for fiscal consolidation" (S&P on Albania in 2014).

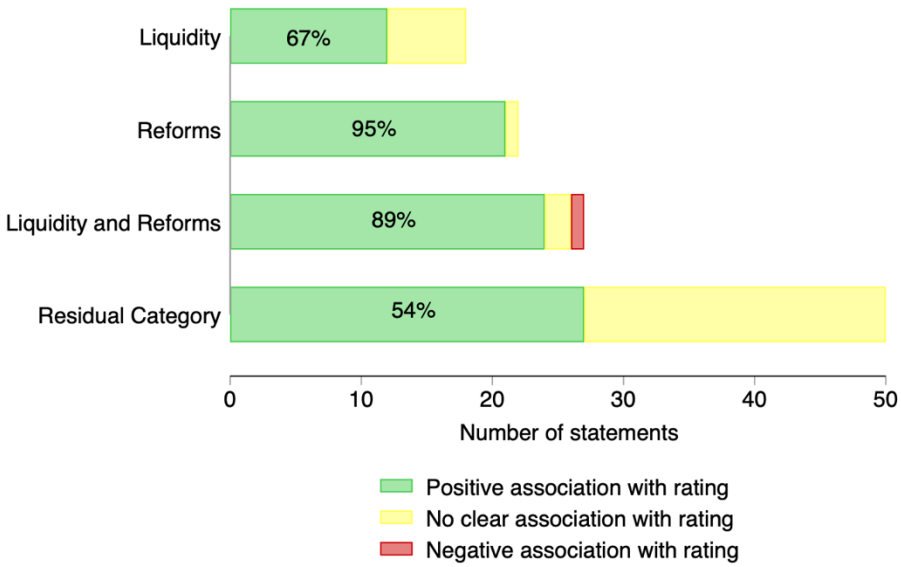
Some statements emphasize the IMF's role in helping countries to overcome short-term liquidity problems; others emphasize the increased likelihood of successful reform implementation. For example, with regard to Sri Lanka, Moody's stated in 2016 that "the IMF program will alleviate Sri Lanka's external liquidity pressures." However, liquidity alone often does not seem to be sufficient. Many statements mention the importance of the IMF to "support the implementation of fiscal and economic reforms" (Moody's on Egypt in 2016). If

liquidity is mentioned, it is often jointly with reforms, for instance as providing "the fiscal space for needed reforms and infrastructure investment" (S&P, Bosnia and Herzegovina 2016). Based on this initial inspection, we then conduct a more systematic analysis. We extract all available articles on *Factiva* using all possible combinations of the search terms "IMF/International Monetary Fund," "rating," "program," "reform," in English or German, focusing on the industry category "Rating Agency." We then use a *Python* script to extract the paragraphs before and after statements mention the IMF. This approach yields 117 statements. Two research assistants then coded these statements following a pre-defined codebook (see Appendix L for details). The aim of this coding procedure was twofold: First, to distinguish between negative, neutral/mixed, and positive assessments associated with IMF programs. Second, to differentiate between texts mentioning the pure liquidity provision aspect of IMF programs, the reform dimension, or a combination of both. The codebook was designed to be conservative in the sense of biasing against support for our priors resulting from the econometric analysis. In ambiguous cases, the statement was categorized as "no clear association with rating." If it was not obvious whether the statement relates to liquidity or reform aspects of IMF programs, it was put in a residual category.

Figure 9 graphically illustrates the results of this exercise. The first and most noticeable finding is that, out of the 117 statements, the large majority of statements across all categories attributes a positive effect to IMF programs. 32 statements show no clearly positive or negative association. Only one statement notes that an IMF programs had a negative influence.

The second finding is that statements mentioning reforms under IMF programs have the highest positive share (95%), followed by statements linking reforms and liquidity provision (88% positive). Statements concerning solely the provision of liquidity are more mixed (66% positive). The residual category, quite naturally, captures a number of neutral statements, in which no clear association could be noted (54% positive). It seems that rating agencies associate more with IMF programs than just the temporary increase in liquidity. The expectation of successful reforms appears to be a crucial part of the IMF's positive *signaling* effect on creditworthiness assessments.

Figure 9 – Text Analysis of Rating Statements



Notes: The bar chart plots the absolute number of statements depending on whether IMF liquidity or IMF-mandated reforms (or both, or none) were mentioned as having an effect on the rating. The different colors indicate whether the mentioned effect was positive, negative or whether there was no clear association with the rating. The percentages inside the bars indicate the share of statements that mention a positive effect.

Overall, the text analysis is in line with the results of the econometric analysis. Exemplary statements like the following illustrate this: "We view the risk of another default in the next two to three years as diminished due to the Ukrainian authorities' commitment to the reforms set out in the International Monetary Fund (IMF) program." Standard & Poor's made this statement in October 2015 during a period of substantial GDP contraction under multiple consecutive IMF programs in Ukraine. The country's growth rate stood at -6.6 percent in 2014 and at -9.8 percent in 2015. Nevertheless, S&P raised Ukraine's credit rating because of positive expectations associated with the reforms under the IMF program.

Our results in their entirety suggest that this piece of anecdotal evidence is representative of a general pattern. IMF programs, rather than coming with a *stigma*, arouse positive expectations. Thereby, they send a positive signal that – despite the economic contractions under a program – *cushions* against further deteriorations in sovereign creditworthiness.

4.5 Robustness

The subsequent section provides a summary of the tests we conduct to examine the robustness of the results. Appendix G provides a more detailed description and contains all tables and figures that are not shown here.

The first set of robustness tests employ **alternative outcome variables**. We already showed above that the results hold for sovereign credit ratings from all major credit rating agencies (*S&P*, *Moody's*, *Fitch*), as well as for the assessments by *Institutional Investor.* To challenge the results along another dimension, in Table A8, we modify the coding rule of ratings that assigns letter-based credit ratings to a numerical score. While the baseline follows the literature's standard by assigning letter-based ratings to numbers ranging from 1 to 21 (Fuchs and Gehring 2017; Hill, Brooks, and Faff 2010), we now assign only 10 or 7 categories. Additionally, we provide results for two binary dependent variables with the ratings BBB and A, respectively, as the cutoff (see Appendix B, Table A1 for details on the rating letter system). All results remain positive and statistically significant.

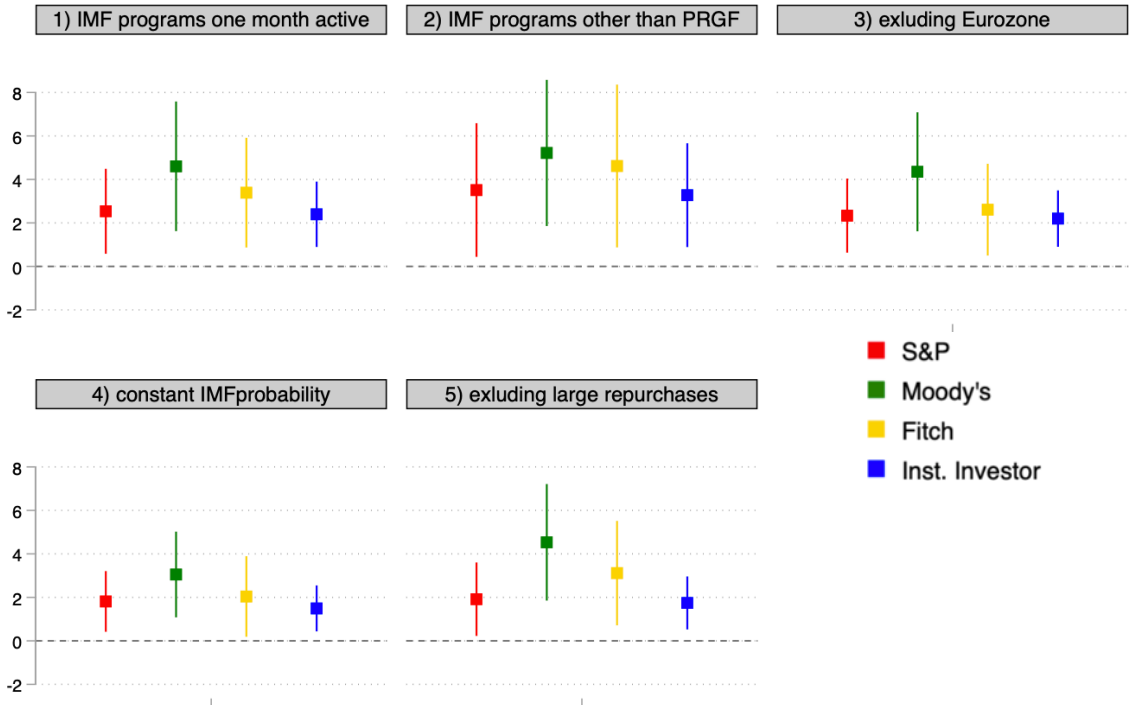
Despite lower coverage, we repeat the main analyses at the country-year and monthly level with **bond spreads** (relative to US treasuries) gathered from Bloomberg and Haver Analytics in Appendix J. At both levels of analysis, this produces the same pattern of results as with ratings. OLS coefficients point to higher bond spreads (lower creditworthiness) for countries under IMF programs, while the IV coefficients in Table A12 and Figure A12 suggests that IMF programs reduce bond spreads (increase creditworthiness). The monthly analysis with bond spreads also yields the same pattern as for ratings (Figures A13 and A14). All estimates based on bond spreads are, however, less precisely estimated than before, leading to results at the yearly level that are not statistically significant at conventional levels. This reflects the less comprehensive data coverage, which shrinks the sample by approximately a third.

Building on these results, we then examine whether the sample for which bond spread data are not available is considerably different as compared to the sample for which they are available. Table A10 shows no evidence that the results for credit ratings differ significantly between these two samples. In both samples the coefficients are positive and their confidence intervals overlap substantially. To further examine potential heterogeneities**,** we test (in the same table) how the baseline IV effect differs in countries with different economic fundamentals. We find that the effect is more positive and statistically significant in countries

with lower GDP per capita rates, suggesting that the signal sent by the IMF's "seal of approval" is more valuable for poorer economies.

Having modified the outcome variable, the next step tests the robustness of the results to **modifications of the treatment variable**. First, we code countries as receiving IMF programs as soon as they spend at least one month (rather than five as in the baseline) under a program in year *t*. Second, we exclude all IMF programs that are organized under the Poverty Reduction and Growth Facility, which one might expect to bear less of a stigma. Third, we exclude all countries that were members of the Eurozone in year *t*, as IMF programs in these countries were potentially atypical.[20] Figure 10 below plots these results for ratings from all agencies in panels 1-3. As can be seen, the results hold for all these modifications.

Figure 10 – Results of Various Robustness Tests



Notes: Coefficient plot of the regression results described in the text. Each plotted point estimate (and its 90 percent confidence interval) corresponds to the coefficient on the treatment variable from a separate regression. The different colors indicate the different agencies whose ratings are used as outcome variables. Ratings from S&P (red), ratings from Moody's (green), ratings from Fitch (yellow), assessment from Institutional Investor (blue).

[20] In addition, and more generally, Table A7 shows that the results are also robust to excluding individual, atypical observations. To identify the most influential observations we calculate the DFBETA value of all observations and then drop those with the largest absolute values in the first and second stage. DFBETA values measure the difference in the estimated parameters with and without the observation.

The next set of tests further examines the **validity and robustness of the instrumental variable strategy**. First, we modify the two constituent terms forming our interaction instrument. Regarding the first constituent term, *IMFprobability*, panel 4 in Figure 10 shows that the results are robust to using a constant probability, which is multicollinear with country fixed effects, instead of our preferred cumulative probability. Regarding the second constituent term, *IMFliquidity*, panel 5 in Figure 10 demonstrates that excluding the observations with the largest purchases and repurchases of IMF loans, which could affect the IMF's liquidity, does not affect the estimates.

As described above, all regressions control for a set of global financial cycles and their interactions with *IMFprobability*. This ensures that the IV only picks up the variation in IMF liquidity that is orthogonal to these global cycles. As an alternative way to rule out the influence of those global cycles on our first stage, we use these interactions as **placebo IVs**. Table A9 shows that none of these placebo IVs produces a strong first stage, as indicated by the low Kleibergen-Paap F-statistics.

Next, Figure A10 (in Appendix H) shows the coefficient of *IMFprobability* variable interacted with leads and lags of *IMFliquidity*. If the relationship we exploit in the first stage is driven by long-term trends rather than **year-on-year variation**, this should be visible in significant pre- or post-trends. However, the figure shows that only the interaction with liquidity in t is negative and significant, in line with our suggested mechanism.

Lastly, we run a second set of placebo regressions that consist of **simulations** with 1000 repetitions where we randomly assign either (i) the liquidity across years or (ii) the probability across countries in the first stage as placebo tests, as suggested by Christian and Barrett (2017). The coefficients that these placebo tests yield are close to normally distributed and centered around zero, further supporting the assumption that the IV specification does not pick up any spurious trends (see Figure A8 and A9).

5 Conclusion

As the international lender of last resort, the IMF's main objective is to help countries resolve their balance-of-payments problems. Its loan programs need to restore the creditworthiness of countries with severely limited access to external financial resources. In light of the IMF's resurgence as the most important multilateral actor in the global financial system (Reinhart and Trebesch 2016), this study investigates the IMF's effectiveness in achieving this key goal. To do so, we use new data and new identification strategies, and provide evidence on the channels through which the IMF helps to prevent the creditworthiness of crisis countries from deteriorating.

As we show, the fear that IMF programs convey a negative stigma to investors can be explained by the endogenous selection of countries with already deteriorating economic conditions into programs. Our results, rather than pointing to a financial stigma, paint an alternative, more nuanced, picture. While IMF programs differ in many dimensions (Stone 2008), we find that they, on average, do not negatively affect the creditworthiness of a program country. Although short-term adjustments under programs are often contractionary, the IMF sends a positive signal to financial markets that *cushions* against the decline of a country's creditworthiness.

Based on our results we do not want to make claims about the long-term benefits of reforms under IMF programs. The successful implementation of reforms that provide a sustainable solution to the country's underlying economic problems comes with many obstacles along the way. Our study only highlights that the IMF's engagement sends a positive signal regarding creditworthiness that provides countries with important time and maneuvering room to overcome crises. This is a precondition, not a guarantee for success.

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ONLINE APPENDICES

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Appendix A: Construction of the Sovereign Ratings Database

The description of how the sovereign rating database was constructed is in most parts identical to the respective part in the online appendix of Fuchs and Gehring (2017), but reprinted here for the reader's convenience. Fuchs and Gehring also provide more details about the ratings and the individual agencies.

The ratings from Fitch have been obtained directly from the company. Data on sovereign ratings assigned by Moody's and S&P were obtained from Bloomberg. The data were downloaded in late September 2012 in the Princeton University Library and updated information was added on June 28, 2013.

Fuchs and Gehring (2017) describe the approach as follows:

(1) To access the data, they logged on to a Bloomberg terminal and typed "CSDR." The variables selected are *Foreign Currency LT Debt* for Moody's and S&P. They followed Bloomberg and collected Moody's foreign currency issuer rating if Moody's had not assigned a foreign-currency debt rating to a country. They took screenshots for each page displaying sovereign ratings.

(2) Using these screenshots, two student assistants entered the letter-ratings into a database. The double-coding was used to identify and correct typing errors.

(3) They then checked the data for potential errors, for example by examining rating changes by more than two steps.

(4) The three-letter ratings were translated to numerical values according to the 21-point scale presented in Appendix B.

Appendix B: Background on Ratings and Agencies

Table A1: Translation of Sovereign Ratings into Numerical Values

Fitch	Moody's	S&P	Numerical scale
AAA	Aaa	AAA	21
AA+	Aa1	AA+	20
AA	Aa2	AA	19
AA-	Aa3	AA-	18
A+	A1	A+	17
A	A2	A	16
A-	A3	A-	15
BBB+	Baa1	BBB+	14
BBB	Baa2	BBB	13
BBB-	Baa3	BBB-	12
BB+	Ba1	BB+	11
BB	Ba2	BB	10
BB-	Ba3	BB-	9
B+	B1	B+	8
B	B2	B	7
B-	B3	B-	6
CCC+	Caa1	CCC+	5
CCC	Caa2	CCC	4
CCC-	Caa3	CCC-	3
CC	Ca	CC	2
C	C	C	1
DDD		SD	1
DD			1
D		D	1
RD			1

Table A2: Overview on major credit rating agencies

Agency	Location of headquarters	Founded in	Sovereign rating since	Registered (certified) in	Number of country offices	Staff size	Ownership (as of December 2012)	Ownership history	Number of rated sovereigns by the end of	
									2000	2012
Fitch	New York City, USA; London, UK	1913	1994	EU Japan USA	35	~2,000	50% Hearst Corporation (family-owned US-based multinational mass media group) and 50% FIMALAC (French holding company, major owner Marc Ladreit de Lacharrière)	Part of Fitch Group (100% owned by FIMALAC) until 2006; 20% sold to the Hearst Corporation in 2006, additional 20% 2009 and 10% 2012	69	101

Agency	Location of headquarters	Founded in	Sovereign rating since	Registered (certified) in	Number of country offices	Staff size	Ownership (as of December 2012)	Ownership history	Number of rated sovereigns by the end of	
									2000	2012
Moody's	New York City, USA	1909	1918	EU Japan USA	24	~6,800	Publicly traded since 2000; institutional ownership: 95.34%; top 5 institutional shareholders: Berkshire Hathaway Inc. (13.4%), Capital World Investors (8.1%), Vanguard Group Inc. (6.2%), Bank of New York Mellon Corp (4%), Massachusetts Financial Services Co. (3.8%); further shareholders: BlackRock, Morgan Stanley, State Street, Northern Trust Corp., T. Rowe Price Associates	Owned by US company Dun & Bradstreet from 1961-2000	82	113

Agency	Location of headquarters	Founded in	Sovereign rating since	Registered (certified) in	Number of country offices	Staff size	Ownership (as of December 2012)	Ownership history	Number of rated sovereigns by the end of	
									2000	2012
S&P	New York City, USA	1860	1922	EU Japan USA	25	~5,000	100% owned by McGraw Hill Companies, Inc., since 1966; major shareholders of the publicly-traded McGraw Hill Companies: Capital World Investors, Vanguard Group, State Street Corp., Oppenheimer Funds Inc., Morgan Stanley, Inc.; further shareholders: BlackRock, Bank of New York Mellon Corp., Northern Trust Corp., T. Rowe Price Ass.	In 1941, merger of Poor's Publishing (founded 1860) and Standard Statistics (founded in 1906)	87	125

Source: Fuchs and Gehring (2017)

Table A3: Comparison of credit rating process (sovereign ratings)

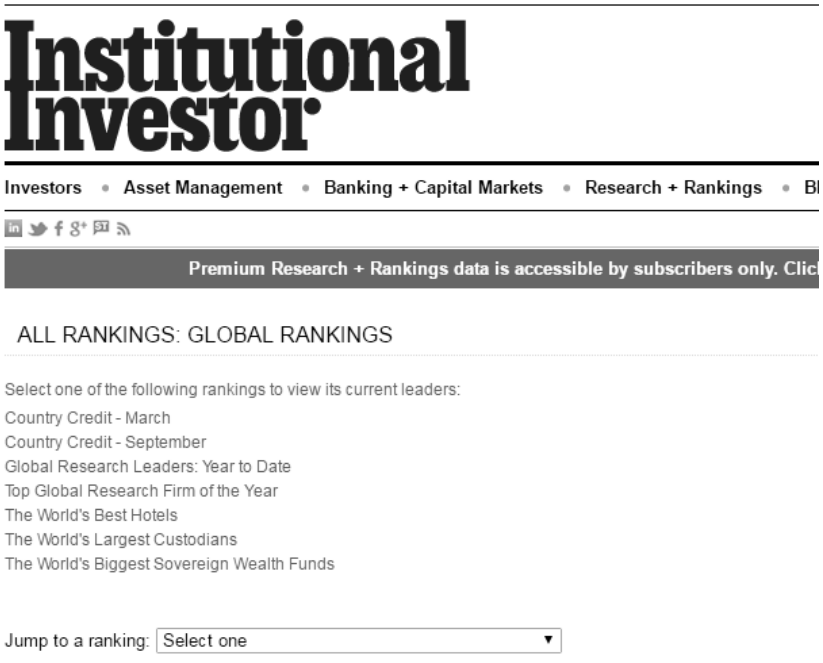
Agency	Fitch	Moody's	S&P
Home country (location)	USA	USA	USA
Home country (ownership)	France	USA	USA
Does the agency provide - solicited sovereign ratings? - unsolicited sovereign rating?	Yes Yes	Yes Yes	Yes Yes
How long does a typical rating process take?	30-60 days	60-90 days	30-45 days
How many analysts are involved in the rating process (per sovereign rating)?	Two analysts	One analyst	Two analysts
Does the agency collect and analyze publically available data?	Yes	Yes	Yes
Does the agency make an official cooperation offer to the sovereign?	Yes	Yes	Yes
Does an interview with the sovereign take place (in case of solicited ratings)?	Yes	Yes	Yes
Who is part of the rating committee responsible for the final rating decision?	At least five analysts and senior director	Unspecified	Five to seven analysts and chairperson
Are the issuers notified prior to the publication of the rating?	Yes	Yes	Yes
Can sovereigns appeal against a rating publication?	Yes	Yes	Yes
Surveillance: Does the agency follow a regular updating interval?	At least annually	Quarterly	Unspecified
Who initiates an update?	All analysts	Lead analyst	All analysts

Source: Fuchs and Gehring (2017)

Appendix C: Institutional Investor Data

We use data from Institutional Investor as an alternative assessment of a country's creditworthiness. Regarding the methodology, the company states that "Institutional Investor's Country Credit ratings are based on information provided by senior economists and sovereign-risk analysts at leading global banks and money management and securities firms. The respondents have graded each country on a scale of zero to 100, with 100 representing the least likelihood of default. We weighted participants' responses according to their institutions' global exposure. Names of respondents are kept strictly confidential."

The access to the individual reports is easy for subscribers, or to those with access to a data provider like "EBSCOhost." To access the data, a reader interested in replication or extending this study can go to http://www.institutionalinvestor.com, select "Research + Rankings" and then "Country Credit". For most years there exist two reports, one for March and one for September.



For older ratings, the reports look as follows:

The beat goes on
Shapiro, Harvey D
Institutional Investor; Mar 1996; 30, 3; ABI/INFORM Collection
pg. 135

COUNTRY CREDIT

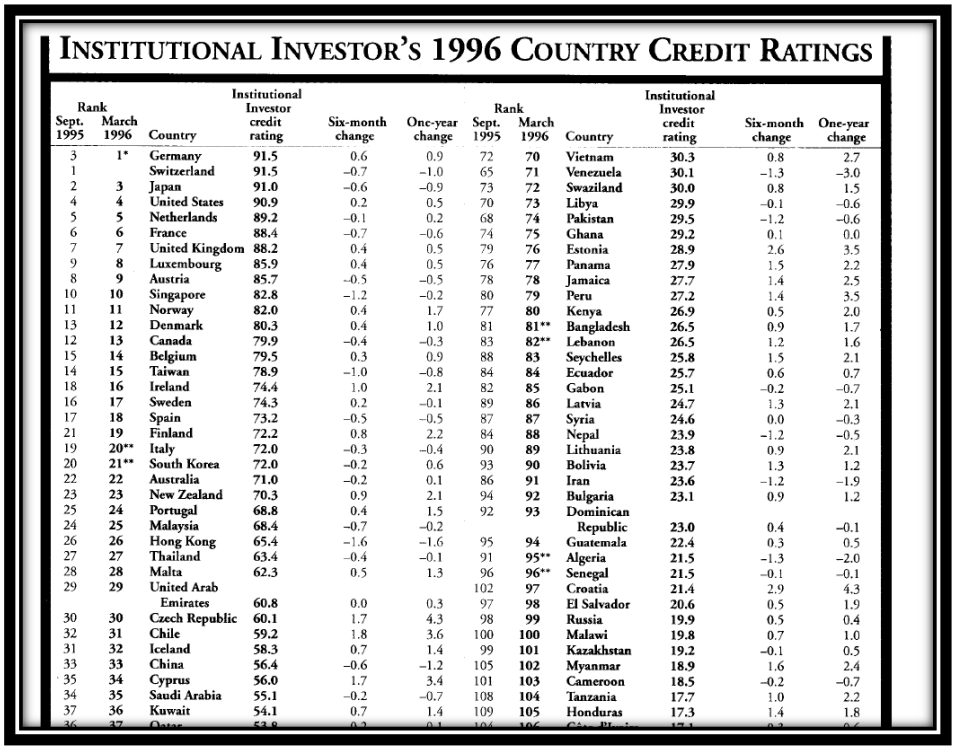
The beat goes on

Germany moves up as global optimism continues to nudge sovereign creditworthiness higher.

By Harvey D. Shapiro

Amid broadly positive reviews from international bankers everywhere, a new leader has emerged in *Institutional Investor*'s exclusive semiannual rating of sovereign creditworthiness. One banker surveyed suggests that "nostalgia for the deutsche mark, a currency that may soon disappear," helped push Germany's rating up slightly just as Switzerland slipped a bit, easing the Federal Republic into a tie for the No. 1 position. Germany goes to the head of the

every financier's favorite part of the world, actually had a small dip in its rating. In fact, there is a good deal of divergence in the views of respondents regarding individual countries, but the consensus is, decidedly, "Onward and upward." The reason is clear, says one British banker: "The economic outlook for the world is reasonably favorable, but the biggest changes are political. A lot of potential theaters of war are being changed by peace processes. This includes southern Africa and the Middle East."



INSTITUTIONAL INVESTOR'S 1996 COUNTRY CREDIT RATINGS

Rank Sept. 1995	Rank March 1996	Country	Institutional Investor credit rating	Six-month change	One-year change
3	1*	Germany	91.5	0.6	0.9
1		Switzerland	91.5	–0.7	–1.0
2	3	Japan	91.0	–0.6	–0.9
4	4	United States	90.9	0.2	0.5
5	5	Netherlands	89.2	–0.1	0.2
6	6	France	88.4	–0.7	–0.6
7	7	United Kingdom	88.2	0.4	0.5
9	8	Luxembourg	85.9	0.4	0.5
8	9	Austria	85.7	–0.5	–0.5
10	10	Singapore	82.8	–1.2	–0.2
11	11	Norway	82.0	0.4	1.7
13	12	Denmark	80.3	0.4	1.0
12	13	Canada	79.9	–0.4	–0.3
15	14	Belgium	79.5	0.3	0.9
14	15	Taiwan	78.9	–1.0	–0.8
18	16	Ireland	74.4	1.0	2.1
16	17	Sweden	74.3	0.2	–0.1
17	18	Spain	73.2	–0.5	–0.5
21	19	Finland	72.2	0.8	2.2
19	20**	Italy	72.0	–0.3	–0.4
20	21**	South Korea	72.0	–0.2	0.6
22	22	Australia	71.0	–0.2	0.1
23	23	New Zealand	70.3	0.9	2.1
25	24	Portugal	68.8	0.4	1.5
24	25	Malaysia	68.4	–0.7	–0.2
26	26	Hong Kong	65.4	–1.6	–1.6
27	27	Thailand	63.4	–0.4	–0.1
28	28	Malta	62.3	0.5	1.3
29	29	United Arab Emirates	60.8	0.0	0.3
30	30	Czech Republic	60.1	1.7	4.3
32	31	Chile	59.2	1.8	3.6
31	32	Iceland	58.3	0.7	1.4
33	33	China	56.4	–0.6	–1.2
35	34	Cyprus	56.0	1.7	3.4
34	35	Saudi Arabia	55.1	–0.2	–0.7
37	36	Kuwait	54.1	0.7	1.4
36	37	Qatar	53.8	0.2	0.1
72	70	Vietnam	30.3	0.8	2.7
65	71	Venezuela	30.1	–1.3	–3.0
73	72	Swaziland	30.0	0.8	1.5
70	73	Libya	29.9	–0.1	–0.6
68	74	Pakistan	29.5	–1.2	–0.6
74	75	Ghana	29.2	0.1	0.0
79	76	Estonia	28.9	2.6	3.5
76	77	Panama	27.9	1.5	2.2
78	78	Jamaica	27.7	1.4	2.5
80	79	Peru	27.2	1.4	3.5
77	80	Kenya	26.9	0.5	2.0
81	81**	Bangladesh	26.5	0.9	1.7
83	82**	Lebanon	26.5	1.2	1.6
88	83	Seychelles	25.8	1.5	2.1
84	84	Ecuador	25.7	0.6	0.7
82	85	Gabon	25.1	–0.2	–0.7
89	86	Latvia	24.7	1.3	2.1
87	87	Syria	24.6	0.0	–0.3
84	88	Nepal	23.9	–1.2	–0.5
90	89	Lithuania	23.8	0.9	2.1
93	90	Bolivia	23.7	1.3	1.2
86	91	Iran	23.6	–1.2	–1.9
94	92	Bulgaria	23.1	0.9	1.2
92	93	Dominican Republic	23.0	0.4	–0.1
95	94	Guatemala	22.4	0.3	0.5
91	95**	Algeria	21.5	–1.3	–2.0
96	96**	Senegal	21.5	–0.1	–0.1
102	97	Croatia	21.4	2.9	4.3
97	98	El Salvador	20.6	0.5	1.9
98	99	Russia	19.9	0.5	0.4
100	100	Malawi	19.8	0.7	1.0
99	101	Kazakhstan	19.2	–0.1	0.5
105	102	Myanmar	18.9	1.6	2.4
101	103	Cameroon	18.5	–0.2	–0.7
108	104	Tanzania	17.7	1.0	2.2
109	105	Honduras	17.3	1.4	1.8
104	106	Côte d'Ivoire	17.1	0.2	0.6

For the newer years, the accessible files look like the following example.

(**) Sept. 2004 to March 2005.

INSTITUTIONAL INVESTOR'S MARCH 2005 COUNTRY CREDIT RATINGS

Legend for Chart:

A - Rank Sept. 2004
B - Rank March 2005
C - Country
D - Institutional Investor credit rating
E - Six-month change
F - One-year change

A	B	C	D	E	F
1	1	Switzerland	94.5	-0.7	-0.7
4	2	Norway	93.7	0.0	-0.3
2	3	Luxembourg	92.8	-1.1	-2.0
11	4(*)	Finland	92.7	0.4	0.4
5	5(*)	U.K.	92.7	-0.9	-1.3
3	6	U.S.	92.4	-1.3	-1.6
8	7	France	92.2	-0.5	-1.1
6	8	Denmark	92.1	-0.9	-0.3
7	9	Netherlands	92.0	-0.9	-1.9

In each year, we use the country assessments as of September. Only in three years we had to revert to using the assessment as of March as the September value was not available. We then import the values into STATA, merge them with country codes and add them to the rest of our data. The ratings range is between 0 and 100, with 100 expressing the highest confidence on behalf of the experts. We divide these values by 5 in order to make their interpretation comparable to the ratings, which range between 1 and 21.

Appendix D: Descriptive Statistics

Table A4 – Descriptive Statistics

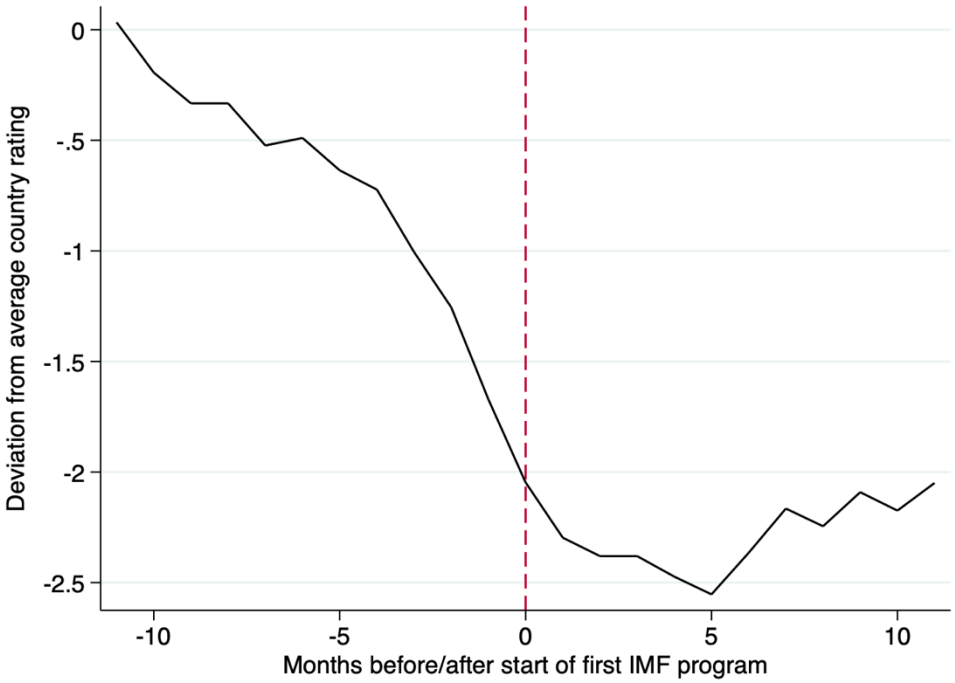
Variable	Mean	SD	Min	Max	Source
Rating S&P	13.17	4.98	1.00	21.00	Fuchs and Gehring (2017)
Rating Moody's	13.71	5.03	1.00	21.00	Fuchs and Gehring (2017)
Rating Fitch	13.70	5.02	1.00	21.00	Fuchs and Gehring (2017)
Institutional Investor	11.53	4.29	2.10	19.28	Institutional Investor
IMF program	0.20	0.40	0.00	1.00	Dreher (2006, updated)
IMF agreement	0.08	0.27	0.00	1.00	Dreher (2006, updated)
IMF probability	0.23	0.23	0.00	0.89	Own calculations
GDP/capita (ln)	9.04	1.29	5.76	11.61	World Development Indicators
GDP growth	31.24	109.78	0.00	3853.42	World Development Indicators
Inflation	0.06	0.07	-0.05	0.95	World Development Indicators
Natural resource rents (% GDP)	7.56	12.35	0.00	64.80	World Development Indicators
Population (ln)	16.62	1.62	13.00	21.02	World Development Indicators
Debt (% GDP)	48.83	30.77	0.00	238.03	World Development Indicators
Change in Government Debt (% GDP)	3.44	9.80	-85.17	102.29	World Development Indicators
Default history (indicator)	0.35	0.48	0.00	1.00	IMF Historical Public Debt Database 2013 (Abbas et al. 2010)
Default in last 5 years (indicator)	0.07	0.25	0.00	1.00	IMF Historical Public Debt Database 2013 (Abbas et al. 2010)
Trade openness	88.08	58.72	14.93	562.06	World Development Indicators
Current Account Balance (% GDP)	-0.36	8.40	-44.21	44.62	World Development Indicators
External Debt (% GDP)	23.53	28.91	0.00	189.48	World Development Indicators
Euro area (indicator)	0.13	0.33	0.00	1.00	Own coding
Law and Order	4.02	1.28	1.00	6.00	International Country Risk Guide
Democracy (Polity IV)	6.02	5.61	-10.00	10.00	Polity IV
Election	0.21	0.41	0.00	1.00	Database of Political Institutions
Honeymoon	5.98	7.20	1.00	46.00	Database of Political Institutions

Left government	0.31	0.46	0.00	1.00	Database of Political Institutions
Absence of Internal Conflict (ICRG)	9.63	1.59	3.42	12.00	ICRG
Absence of External Conflict (ICRG)	10.33	1.19	5.17	12.00	ICRG
Absence of military in politics	4.38	1.44	0.00	6.00	International Country Risk Guide
Investment (% GDP)	23.97	6.65	8.27	58.15	World Development Indicators
Systemic Banking Crisis	0.11	0.31	0.00	1.00	Laeven and Valencia (2018)
Foreign bank exposure	225.04	648.28	0.03	6491.19	Bank for International Settlement
UNGA voting	0.14	0.89	-1.63	2.89	Bailey et al. (2017)
Global GDP growth	0.03	0.02	-0.02	0.04	World Development Indicators
Global total of Systemic Banking Crises	11.25	9.47	0.00	30.00	Laeven and Valencia (2018)
FDI stock (% GDP)	27.90	34.92	0.00	315.53	KOF (2018)
Bond yield spread (relative to US)	260.99	531.85	-3.71	6181.50	Haver Analytics, Bloomberg

Notes: Based on the sample used for specification 6 in Table 1.

Appendix E: Rating Dynamics Around Starts of IMF Programs

Figure A1 – Rating Dynamics Around Starts of IMF Programs (short term)



Notes: The figure plots the unweighted mean across countries of the month-specific deviation from each country's average S&P credit rating in the 1990-2013 period on the y-axis. The number of months around the start of the country's first IMF program of this period is on the x-axis. Sample restricted to countries with at least one IMF program.

Appendix F: Control Variables

As discussed in the main text, we add an extensive set of control variables to the regressions. For this control vector, we follow Fuchs and Gehring (2017) in building on and combining the sets of explanatory variables employed in Cantor and Packer (1996), Archer et al. (2007) and Hill et al. (2010) to control for the country-specific economic and political factors that should capture countries' ability and willingness to repay their debts.

We therefore add the following variables: the natural logarithm of GDP per capita, the annual GDP growth rate and its square, the inflation rate, the rents from natural resources (over GDP), the log of population, the debt to GDP ratio, the annual change in government debt (over GDP), trade (over GDP), the current account balance (over GDP), external debt (over GDP), the two variables indicating whether the country defaulted ever or within the previous five years, the quality of the rule of law, the degree of democracy (Polity IV), whether an election took place, the number of the government's years in office, the ruling party's political ideology, whether the country was affected by an internal or an external conflict, whether the military played an active role in politics, and an indicator for membership in the Eurozone (see also Fuchs and Gehring 2017).

We also include variables that the literature identified as correlates of IMF programs. Some of them are part of the above list. The variables we include in addition are the occurrence of a systemic banking crisis, the exposure of foreign banks to the country, investment (over GDP), and the similarity of voting with the United States in the United Nations General Assembly (Copelovitch 2010; Moser and Sturm 2011; Sturm, Berger, and de Haan 2005). These variables are taken from the World Bank's World Development Indicators (WDI), the IMF (Laeven and Valencia 2012), the Database of Political Institutions (Beck et al. 2001), the Polity IV Project (Marshall, Jaggers, and Gurr 2011), and the International Country Risk Guide (ICRG), the IMF Historical Public Debt Database 2013 (Abbas et al. 2010), the Bank for International Settlements (BIS), and Bailey et al. (2017).

Descriptive statistics of these control variables can be found in Appendix D.

Table A5: Coefficients on Control Variables (Full results of Table 1, Column 4)

IMF program	-0.990
	[0.244]
GDP/capita (ln)	1.321
	[0.914]
GDP growth	0.051
	[0.018]
Inflation	-0.963
	[1.438]
Natural resource rents (% GDP)	-0.013
	[0.017]
Population (ln)	-4.715
	[1.905]
Debt (% GDP)	-0.010
	[0.005]
Change in Government Debt (% GDP)	0.001
	[0.003]
Default history (indicator)	1.662
	[1.939]
Default in last 5 years (indicator)	0.267
	[0.276]
Trade openness	0.005
	[0.002]
Current Account Balance (% GDP)	0.072
	[0.017]
External Debt (% GDP)	-0.007
	[0.008]
Euro area (indicator)	-1.836
	[0.563]
Law and Order	-0.213
	[0.198]
Democracy (Polity IV)	-0.027
	[0.054]
Election	-0.034
	[0.082]
Honeymoon	-0.012
	[0.012]
Left government	-0.149
	[0.210]
Absence of Internal Conflict (ICRG)	0.065
	[0.101]
Absence of External Conflict (ICRG)	-0.044
	[0.084]
Absence of military in politics	-0.244
	[0.153]
Investment (% GDP)	0.042
	[0.018]
Systemic Banking Crisis	-0.424
	[0.263]
Foreign bank exposure	-0.000
	[0.000]
UNGA voting	0.431
	[0.476]
Country FE	Yes
Year FE	Yes
Observations	1343
Adjusted R-squared	0.311

Notes: The dependent variable is the country's long-term foreign-currency rating by Standard and Poor's. Standard errors clustered at the country level are displayed in brackets.

Appendix G: Robustness

This appendix describes the robustness results summarized in the main text in section 4.5 in more detail.

- First, it describes the robustness tests whose results are plotted in Figure 10 in the main text.
- Second, it presents the full regression output of these robustness test.
- Third, it presents the figures and tables of additional robustness tests that were only described in the main text due to space constraints.

The first three specifications of Figure 10 re-define the **treatment variable**. Specification 1 defines countries as receiving IMF programs as soon as they spend at least one month under a program in year t (rather than five months as in the baseline, the standard in the literature on IMF program effects (Dreher 2006)). Results hold. Specification 2 excludes all IMF programs that are organized under the Poverty Reduction and Growth Facility. These programs are longer-term forms of financial assistance for poorer countries and could thus be less stigmatizing than other programs. Results hold. To further address the potential concern that atypical cases could drive the results, specification 3 excludes all countries that were members of the **Eurozone** in year *t*. Arguably, IMF programs that were implemented in Eurozone countries in the aftermath of the global financial crisis were atypical. First, the IMF designed them jointly with European Union (EU) institutions. Second, default risks in Eurozone countries are potentially assessed differently than in other countries because signals from EU institutions and other EU member states will be considered. As specification 3 shows, this restriction to our sample do not significantly affect our results. The coefficient on *IMFprogram* is again positive and statistically insignificant.

Then, we want to address potential concerns regarding the **two constituent terms** forming our interaction instrument. With regard to the first component of the instrumental variable, *IMFprobability*, we take as an alternative a time-invariant, country-specific measure instead of the cumulative, time-variant probability. This makes *IMFprobability* multicollinear with the country fixed effects. Taking all observations in the sample period into account considers also observations from periods t+1, t+2,…, to compute the probability in t, and thus uses information from the future to explain the present (see Nunn and Qian 2014). Although we regard this as conceptually inferior, specification 4 shows that the estimates are not strongly

affected by this modification. The interaction term in the first stage is of almost the exact same size, showing that the relationship we exploit for identification does not depend on how a country's probability of participating in IMF programs is defined. The significance of the IV, the K-P F-statistic, and the second stage point estimate are also very similar, as compared to the baseline.

Regarding the second component of the instrument, some readers might, as discussed above, question the independence of the IMF's liquidity ratio from developments in individual country-years. Even though individual countries are, in general, unable to significantly influence the IMF's liquidity, a few countries in the sample received and repaid extraordinarily large tranches of extraordinarily large IMF loans in some years. While the transaction schedule of Fund resources is usually developed years in advance, we still want to exclude the possibility that such events could lead to a correlation between the liquidity and country-year specific economic fundamentals unrelated to the presence of an IMF program. While this would only threaten the exclusion restriction if this relationship depended on the country's level of *IMFprobability* we still want to be cautious and exclude the country-year observations that could significantly influence the IMF's liquidity. Specification 5 excludes the top five percent of country-year observations with the largest purchases and repurchases of IMF loans. Neither of these regressions yields substantially different results, indicating that such individual transactions do not threaten the exclusion restriction.

Table A6: Various Robustness Tests: Full Regression Output of Figure 10 (S&P)

	(1) IMF programs one month active	(2) IMF programs other than PRGF	(3) excluding Eurozone	(4) constant IMF probability	(5) excluding large repurchases
IMF program	2.536	3.511	2.334	1.813	1.916
	[1.188]	[1.870]	[1.037]	[0.849]	[1.028]
	{0.033}	{0.060}	{0.024}	{0.033}	{0.062}
Observations	1343	1343	1170	1343	1304
KP underid. (p)	0.000	0.001	0.000	0.000	0.000
KP weak id. (F)	27.027	13.620	23.069	30.438	26.213
First Stage:					
IMFprobability	3.311	2.807	3.288		3.402
	[0.492]	[0.572]	[0.574]		[0.592]
	{0.000}	{0.000}	{0.000}		{0.000}
IMFprobability X	-0.351	-0.254	-0.401		-0.423
IMFliquiditity	[0.068]	[0.069]	[0.083]		[0.083]
	{0.000}	{0.000}	{0.000}		{0.000}
IMFprobability				-0.451	
(constant) X				[0.082]	
IMFliquiditity				{0.000}	

Notes: The dependent variable is a country rating from S&P measured on a 21-point scale. Standard errors clustered at the country level are displayed in brackets, p-values in curly brackets. All regressions include country and year FE, as well as the controls in t-4, corresponding to our main specification in Table 1, column 6.

Table A7 – Excluding Outliers

	(1)	(2)	(3)	(4)	(5)
IMF program	2.334	2.761	2.609	2.627	2.327
	[1.110]	[1.119]	[1.161]	[1.096]	[0.843]
	{0.036}	{0.014}	{0.025}	{0.017}	{0.006}
N	1343	1315	1207	1315	1207
KP underid. (p)	0.000	0.000	0.000	0.000	0.000
KP weak id. (F)	22.136	29.302	46.214	19.826	21.785
Outliers excluded for values of DFBETA in the top and bottom:		1 %	5 %	1 %	5 %
Outliers in		2nd stage	2nd stage	1st stage	1st stage

Notes: Column 1 reports the same regression as column 6 of Table 1. The remaining columns exclude outlying observations, as specified in the two bottom rows and described in the main text.

Table A8: Alternative Coding of Credit Ratings

	(1)	(2)	(3)	(4)	(5)
IMFprogram	2.334	1.198	0.653	0.360	0.169
	[1.110]	[0.584]	[0.332]	[0.181]	[0.092]
	{0.036}	{0.040}	{0.049}	{0.047}	{0.067}
Observations	1343	1343	1343	1343	1343
Year FE	Yes	Yes	Yes	Yes	Yes
Controls(t-4)	Yes	Yes	Yes	Yes	Yes
KP underid. p-value	0.000	0.000	0.000	0.000	0.000
KP weak id. F-stat	22.136	22.136	22.136	22.136	22.136
Coding of Credit Ratings	21 categories (baseline)	10 categories	7 categories	Binary; threshold BBB and above	Binary: threshold A and above

Notes: The specification is the same as in our main specification in Table 1, column 6. It is standard in the literature on credit ratings to translate those ratings to a numerical scale, usually 21 notches, as explained in Table A1. This table investigates whether the number of categories affects our results. Column one shows our baseline estimate. Column two and three use a smaller number of categories. Column four and five use a binary dependent variable, taking on the value 1 is a rating is above the specified threshold. Due to the different scaling, the point estimates differ in every column. Nonetheless, the results are all positive and maintain a similar level of statistical significance throughout. This suggests that this choice is not decisive, and the 21 categories approach that is most commonly used yields reliable estimates.

Table A9: Placebo IVs

	(1)	(2)	(3)	(4)
First Stage Results:				
KP underid. p-value	0.000	0.222	0.424	0.365
KP weak id. F-stat	**22.459**	**1.529**	**0.571**	**0.759**
First-stage coefficients of excluded IV:				
IMF liquidity x IMF probability	-0.370			
	[0.078]			
	{0.000}			
Global growth x IMF probability		2.945		
		[2.382]		
		{0.217}		
Global crises x IMF probability			0.005	
			[0.006]	
			{0.450}	
FDI flows x IMF probability				0.010
				[0.012]
				{0.384}
Observations	1343	1343	1343	1343

Notes: The dependent variable is a country rating from S&P measured on a 21-point scale. Standard errors clustered at the country level are displayed in brackets, p-values in curly brackets. All regressions include country and year FE, as well as the controls in t-4, corresponding to our main specification in Table 1, column 6.

Specification 1 is the baseline specification without controlling for the three global-cycles-times-liquidity interactions. Specifications 2-4 use these global-cycles-times-liquidity interactions as placebo IVs. Analogous to the baseline specification, these specifications control for IMF liquidity x IMF probability.

Interpretation: As can be seen, the three placebo IVs produce very weak first stages with very low K-P F-statistics. This suggests that the variation in IMF liquidity, rather than in global cycles drives the first-stage effect.

Table A10: Heterogeneity analysis

	(1)	(2)	(3)	(4)
IMFprogram	2.912	1.313	4.368	1.828
	[1.994]	[1.689]	[1.861]	[1.652]
	{0.144}	{0.437}	{0.019}	{0.269}
Observations	496	846	629	714
KP underid. (p)	0.037	0.006	0.009	0.004
KP weak id. (F)	5.251	8.191	8.979	20.529
Sample	bond price not available	bond price available	GDP pc < sample median	GDP pc > sample median

Notes: The dependent variable is the country's long-term foreign-currency rating on a 21-point scale by Standard and Poor's at the end of the year. Standard errors clustered at the country level are displayed in brackets, p-values in curly brackets. Details on the bond spreads data and their availability can be found in Appendix J. GDP per capita below or above median is computed based on the same variable we also use as a control.

Figure A2: Trends in Global GDP Growth and IMF Liquidity

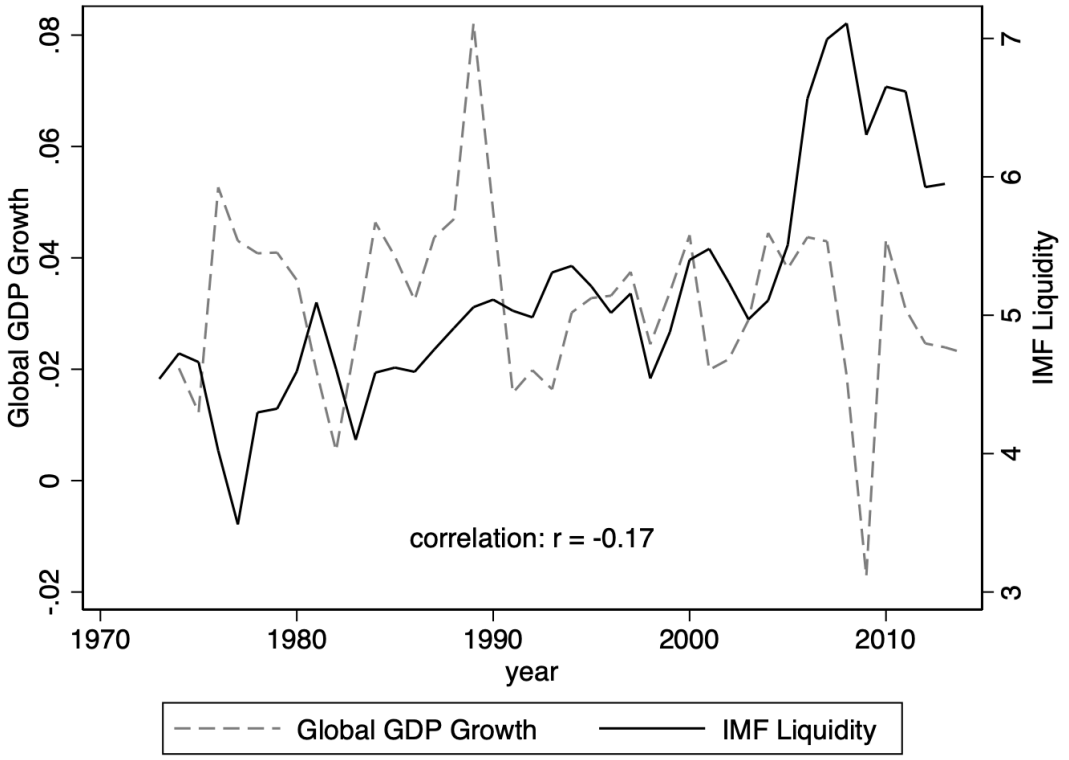


Figure A3: Trends in Global GDO Growth and IMF Liquidity (Scatter)

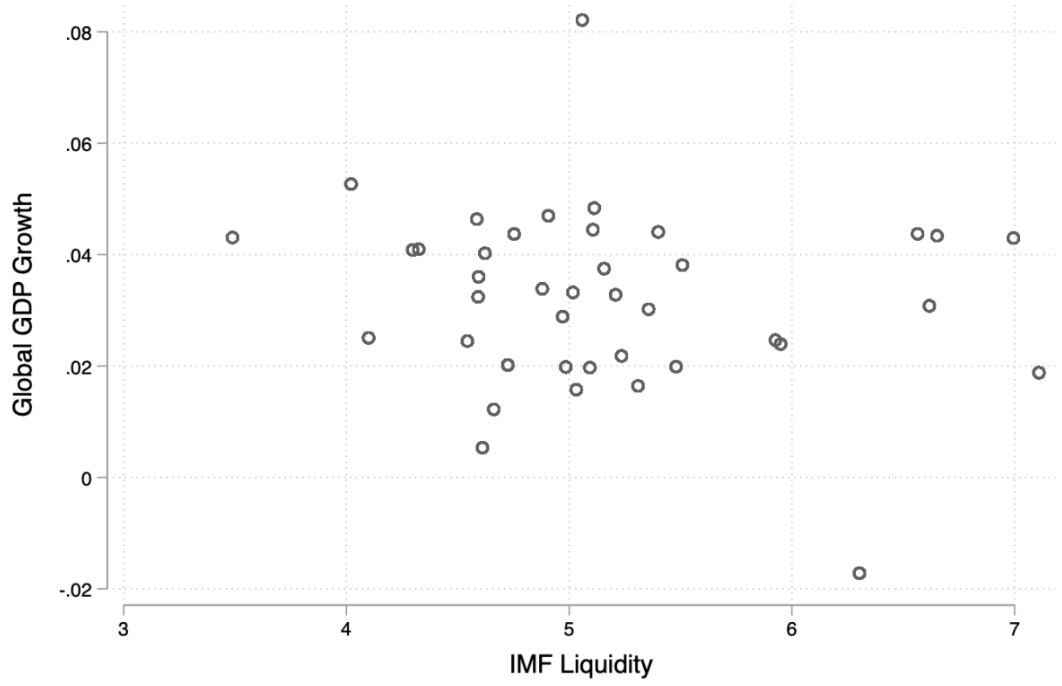


Figure A4: Systemic Banking Crises and IMF Liquidity, trends

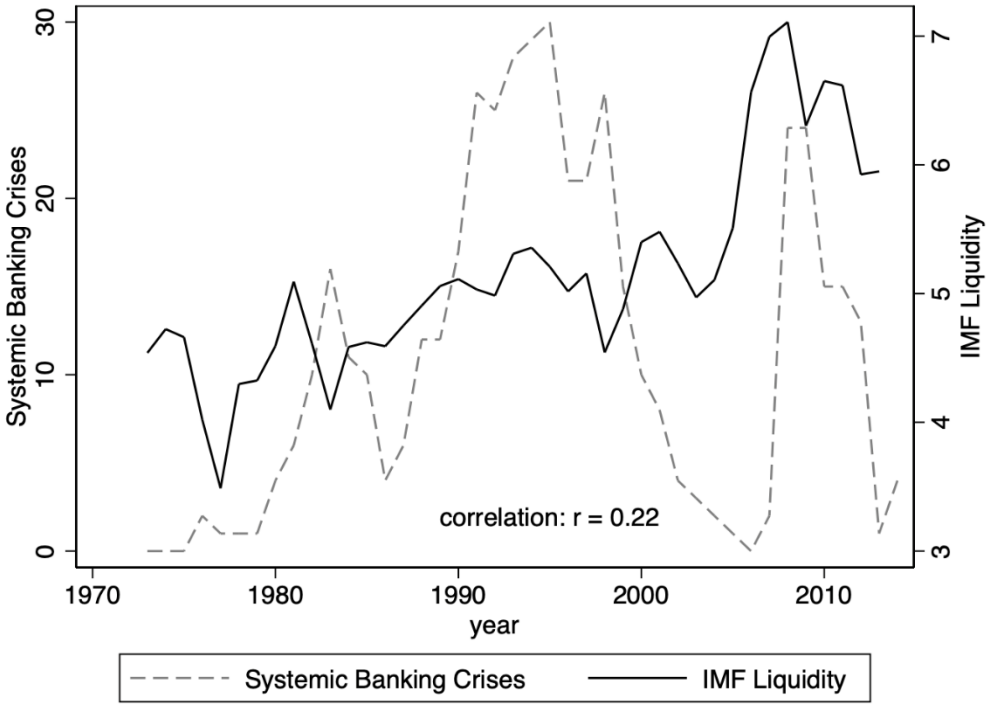


Figure A5: Systemic Banking Crises and IMF Liquidity, scatter

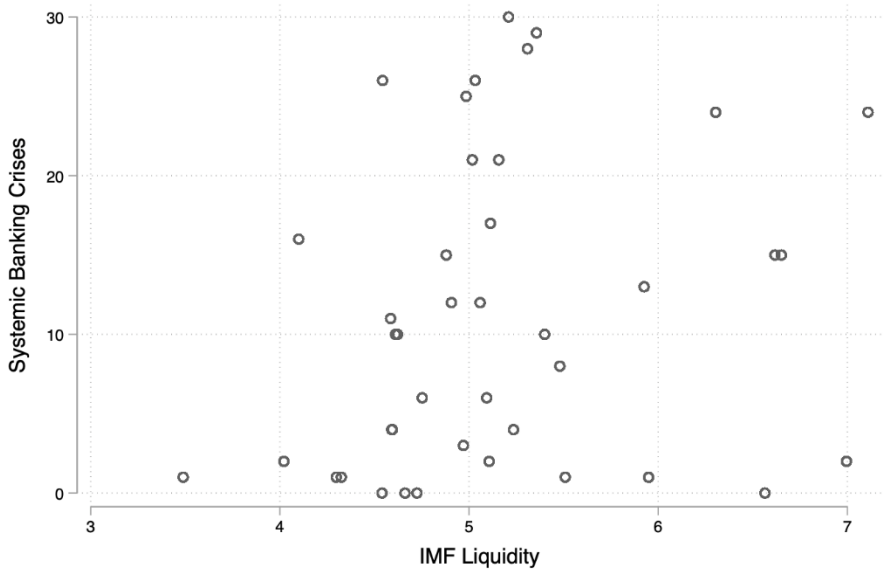


Figure A6: FDI Flows and IMF Liquidity, trends

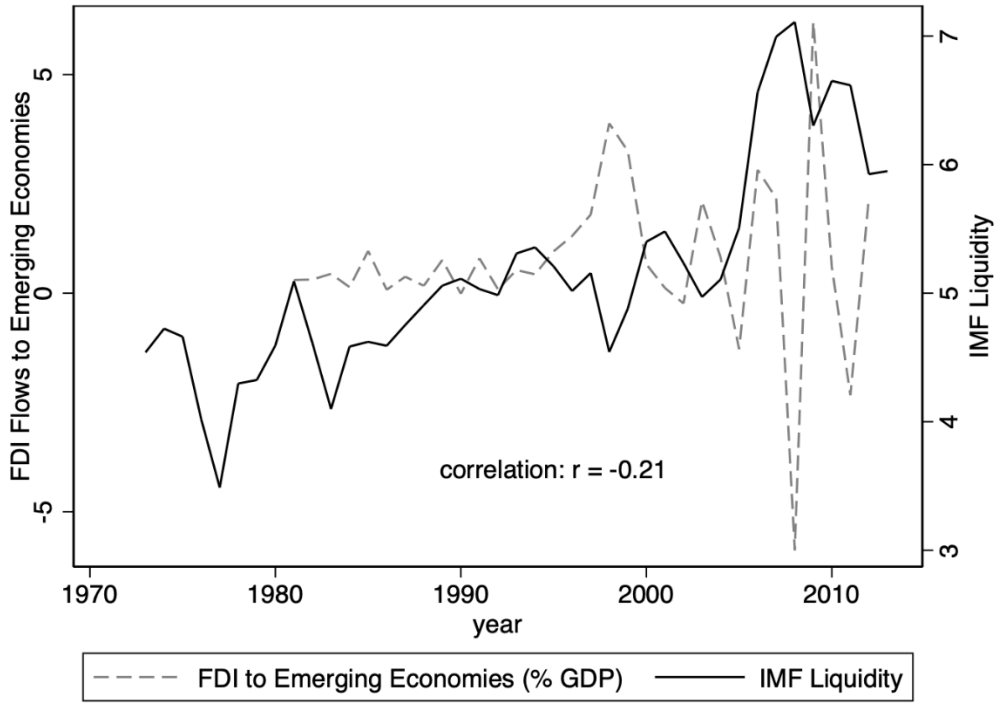


Figure A7: FDI Flows and IMF Liquidity, scatter

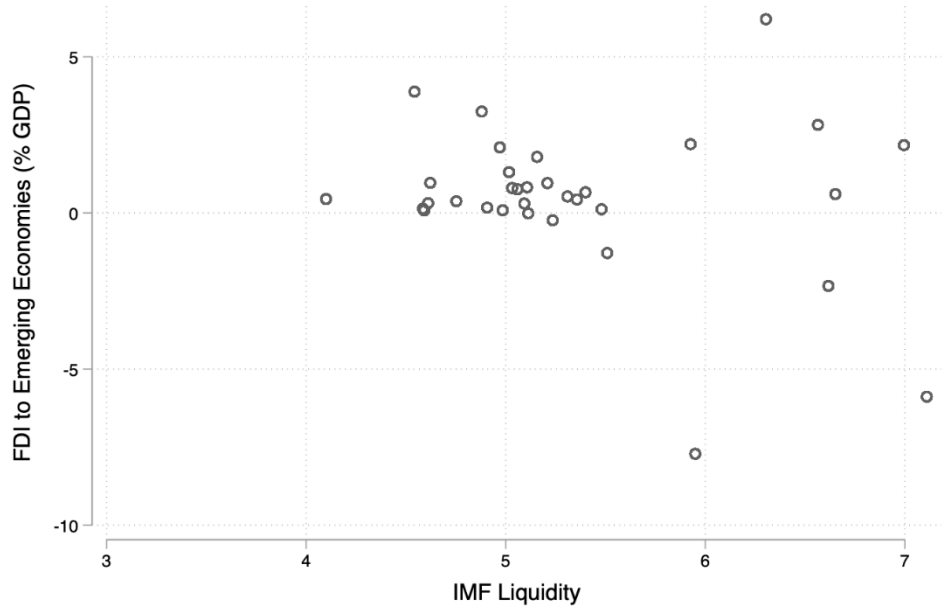


Figure A8: Randomizing Liquidity

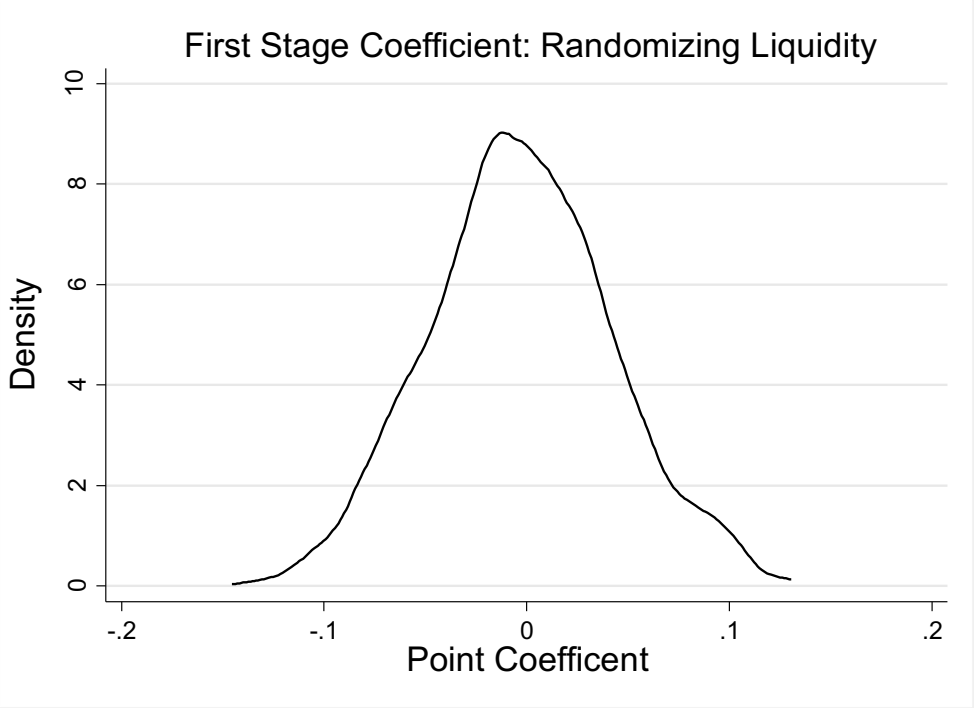
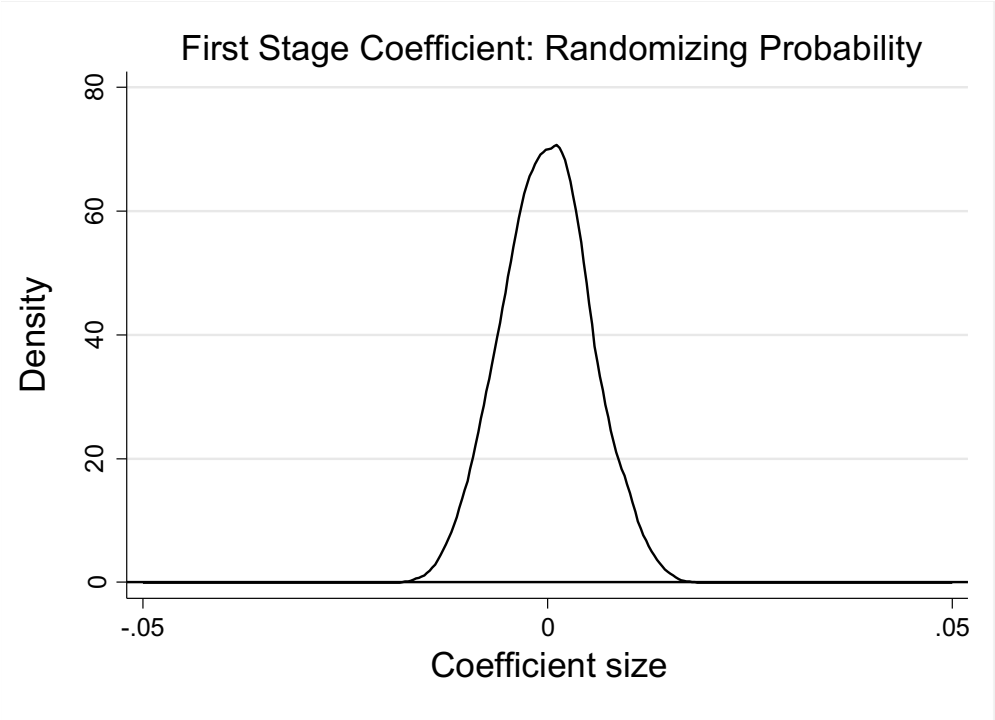


Figure A9: Randomizing Probability



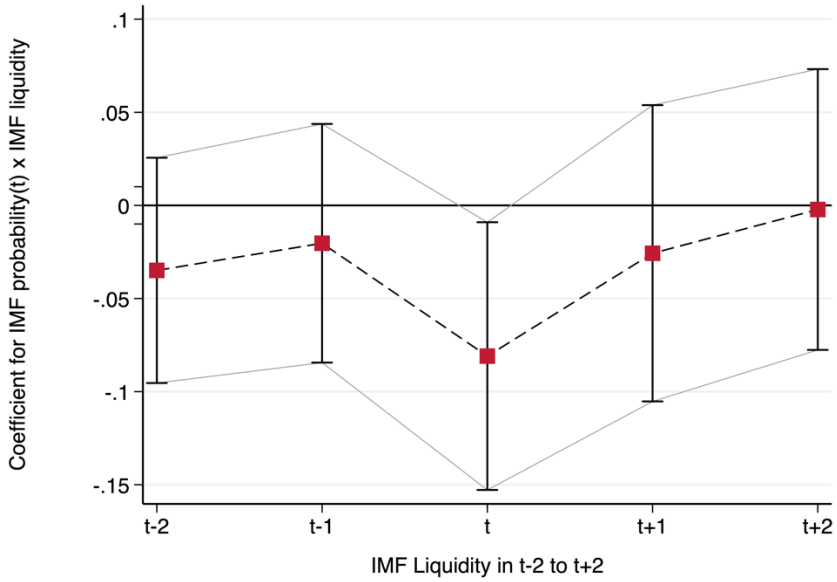
Notes: These graphs plot the distribution of 1000 coefficients that result from 1000 first-stage placebo regressions. In these regressions we randomize the two constituent terms of the IV by

a) attributing values of *IMFliquidity* to random years and

b) values of *IMFprobability* to random countries.

As can be seen, these coefficients are approximately normally distributed around zero and are far from the value that the actual first-stage regression yields.

Figure A10 – Effect of Probability (t) with Leads and Lags of IMF Liquidity on IMF program



Notes: The dependent variable is whether country *i* had an IMF program in *t*. The figure plots first-stage coefficients (along with 95% confidence intervals) of the interaction of *IMFprobability* in *t* with *IMFliquidity* in *t-2, t-1, t, t+1,* t+2. We would not expect a significant effect if the first stage is driven by the long-term trend in *IMFliquidity* instead of by year-on-year variation.

Appendix H: Monthly Analysis: Regression Results

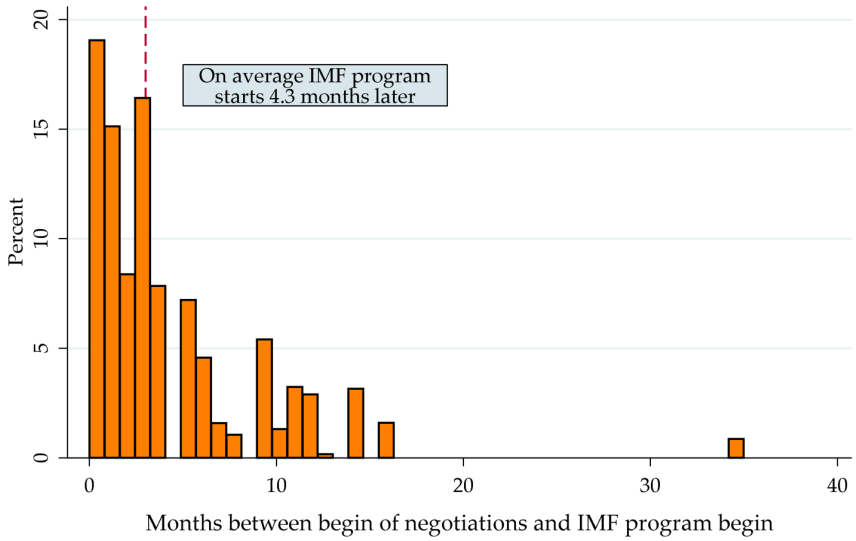
Table A11 – Regression Results for Figure 6

	(1)
IMF start (t+11)	0.019
IMF start (t+10)	-0.014
IMF start (t+9)	0.010
IMF start (t+8)	-0.006
IMF start (t+7)	-0.047
IMF start (t+6)	-0.079
IMF start (t+5)	-0.078
IMF start (t+4)	-0.001
IMF start (t+3)	-0.166*
IMF start (t+2)	-0.216**
IMF start (t+1)	-0.369***
IMF start	-0.447***
IMF start (t-1)	-0.395***
IMF start (t-2)	-0.268***
IMF start (t-3)	-0.311***
IMF start (t-4)	-0.322***
IMF start (t-5)	-0.255***
IMF start (t-6)	-0.264***
IMF start (t-7)	-0.163**
IMF start (t-8)	-0.099
IMF start (t-9)	0.008
IMF start (t-10)	-0.014
IMF start (t-11)	-0.004
Constant	
Country FE	Yes
Year FE	Yes
Country x Year FE	Yes
Month FE	Yes
Observations	25574
Adjusted R-squared	0.995

Notes: OLS-FE regressions. The dependent variable is the S&P rating at the end of month *t*; standard errors not shown. Figure 7 is based on the regression in column 4. Significance levels * p < .10, ** p < .05, *** p < 0.01.

Appendix I: Negotiations

Figure A11 – Duration of countries' negotiations with the IMF



Coding of Negotiations

We searched for and coded negotiation year and month in the following way.

1. Export the date of all IMF agreements that we use in our monthly regressions.
2. Two student research assistants independently of each other begin searching for the corresponding negotiation date. They use the following approach.
   a. Begin research using the following three sources: Lexis Nexis, the International Monetary Fund (IMF) websites, and if that does not yield any information use Google advanced and google translate to search for information in a country's official language. Lexis Nexis is used as the main source since it contains comprehensive news worldwide as the world's largest electronic database for legal and public-records related information.
   b. Define negotiation date the following way: Take the earliest date a possible negotiation of a specific program of a country with the IMF is mentioned. In case Lexis Nexis and the IMF website do not yield useful information, use google advanced. If additional research does not yield a date after 45 minutes of research, stop and code as missing.

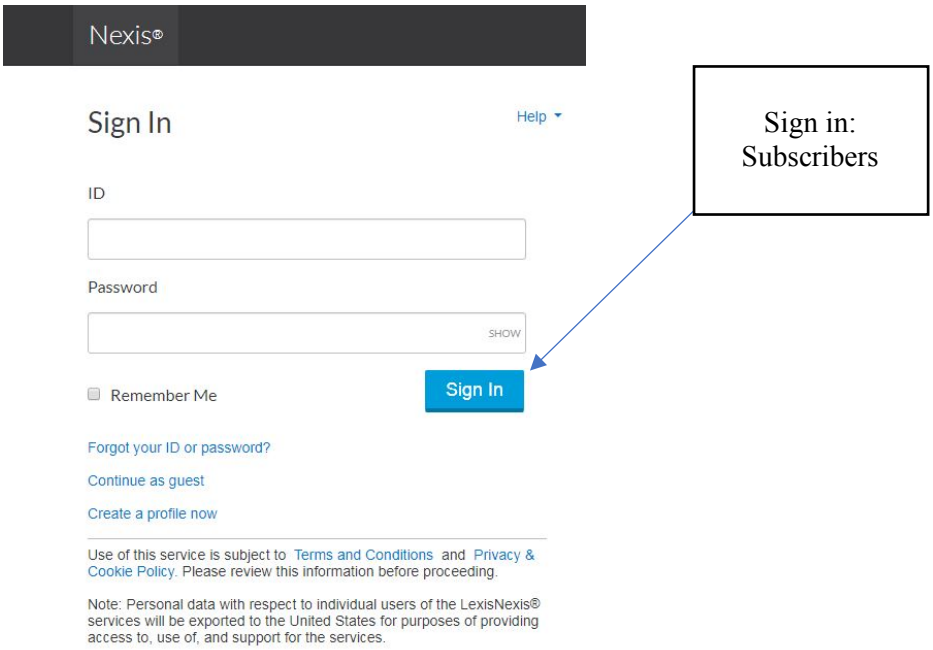
Detailed instruction what counts as information about negotiations.

1.) Specific mentioning about talks or negotiations about a program, mentioning country and IMF name. Take the date that is mentioned in article, if that is not available, take the date the article or statement was published.
2.) If there is no clear information about a specific program, but an IMF meeting which involves discussions about potential programs for the country, take the time of the meeting as a negotiation date if there is a specific press release or discussion about it mentioning both the country and the IMF.
3.) Otherwise, code cases as missing.

Details about coding process for a potential replication.

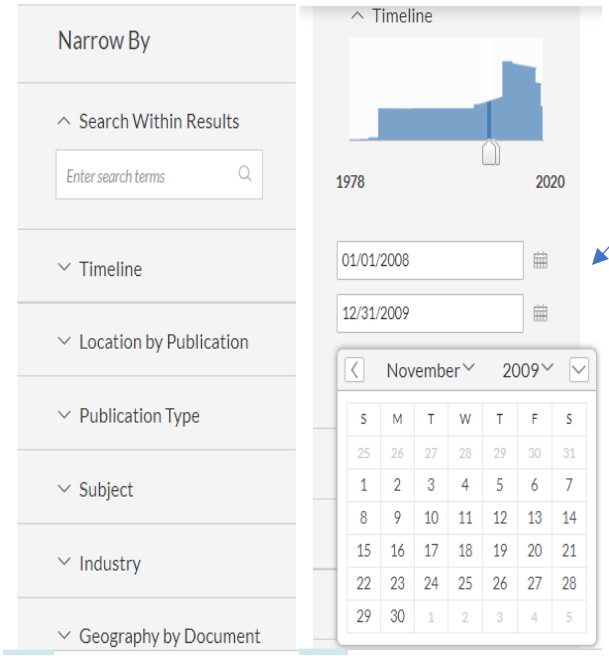
Lexis Nexis:
Go to website: https://www.nexis.com/

I. Open the site, sign in as subscriber (or try guest account with less features)



II. Login and search keywords: "Name of respective country" AND "IMF", i.e. "Dominican Republic" and "International Monetary Fund" / "IMF".

III. Screen and narrow the timeline:

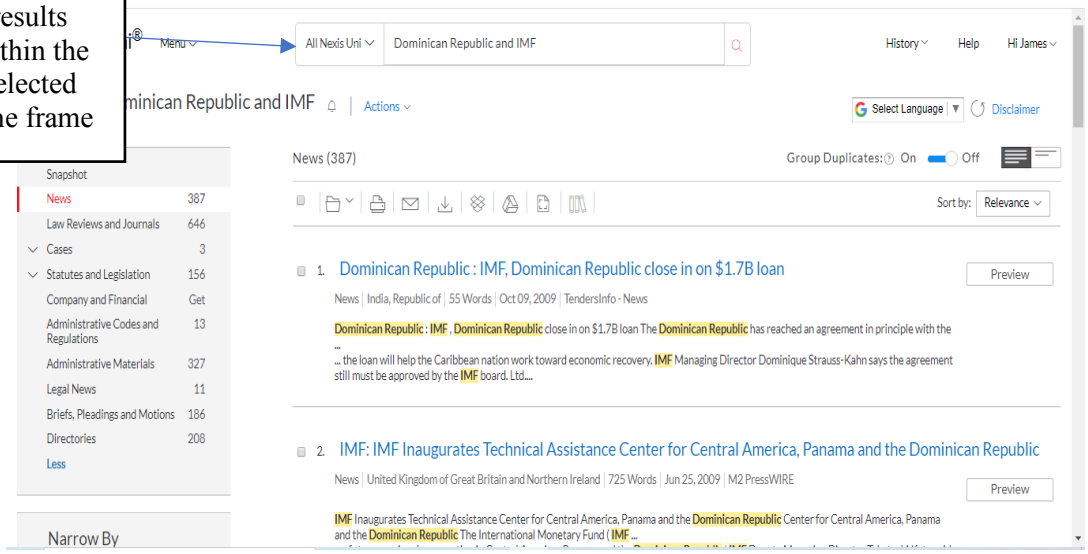


Set according to the approved time of a country's economic program with the IMF: i.e. Dominican Republic has an approved economic program with the IMF in November 2009. Then the setting of timeline will be as follows, November 1, 2008 to November 1, 2009.

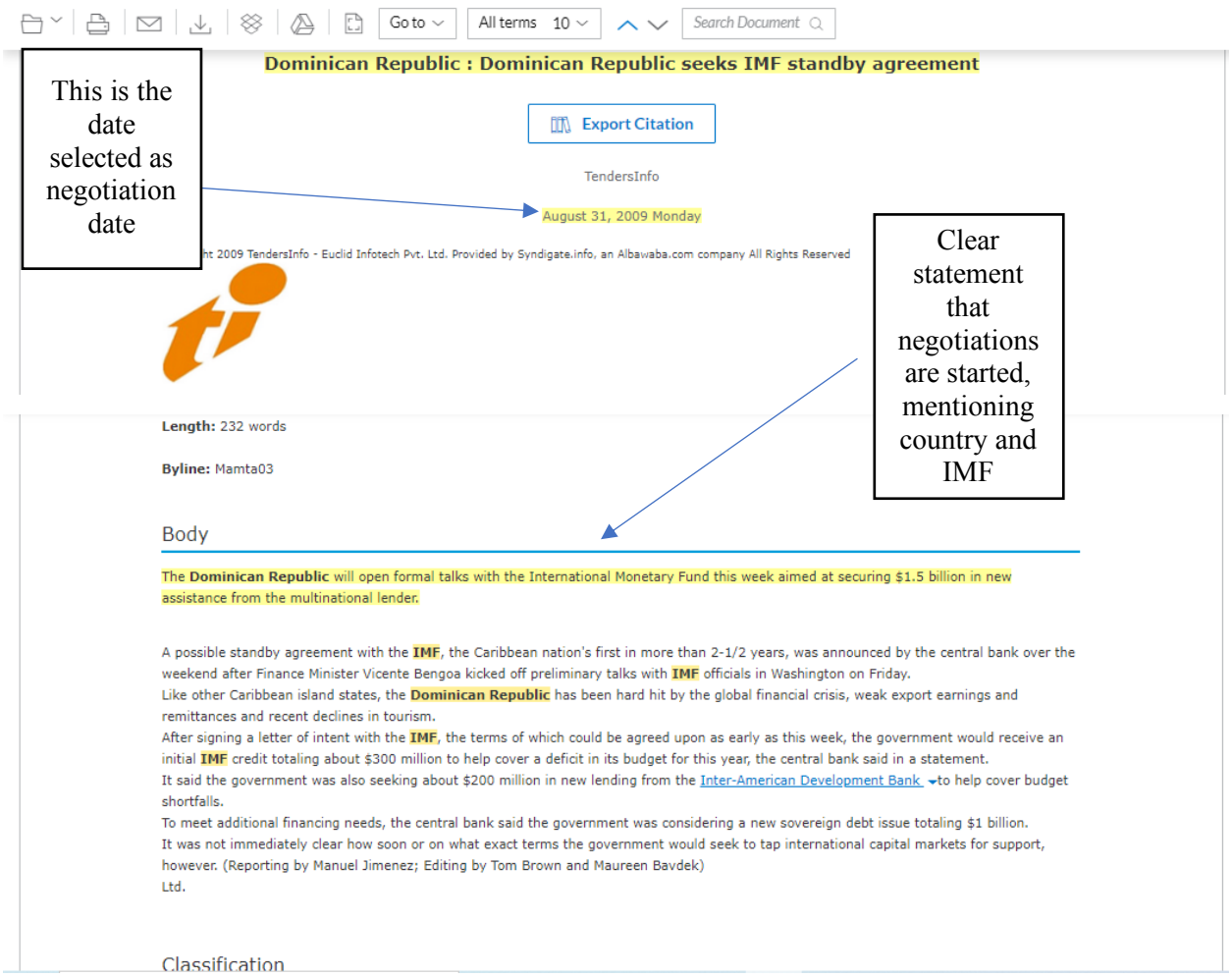
Notice: Most of the economic programs with IMF are negotiated within one year, hence we first customize the search date within the range of one year. If there is no information or news about the program within the one-year-set, extend the searching date to more one year.

IV. Skim over news result and select the news that matches our criteria.

Refined results within the selected time frame



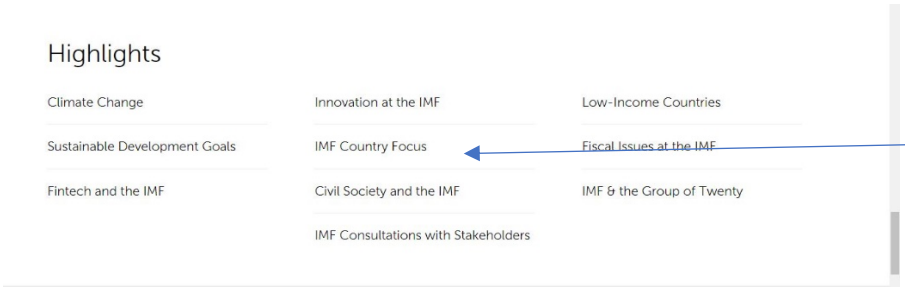
V. Apply the criteria and coding scheme. The example below does not state a specific negotiation date in the text. Hence, we take the date, that the information was published and code the begin of negotiations as of August 2009.



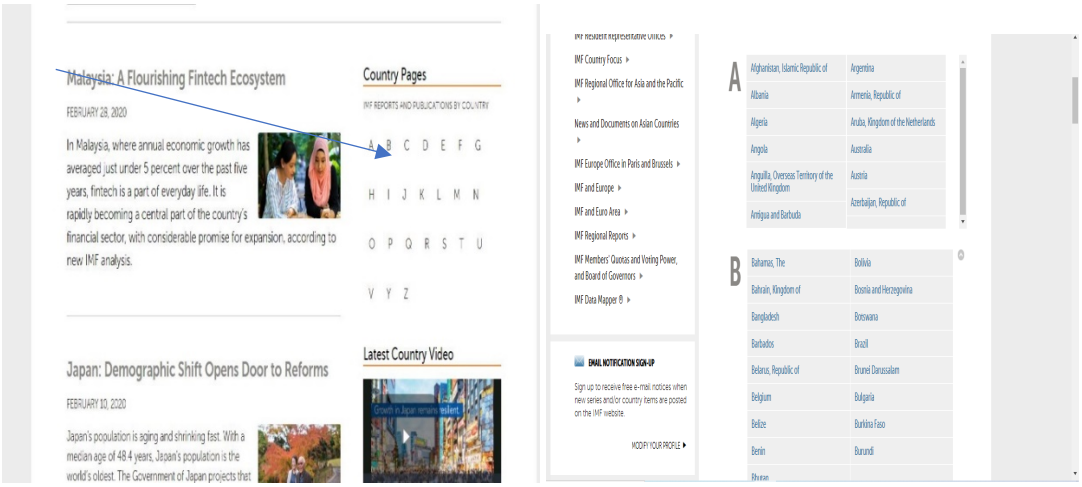
a) International Monetary Fund (IMF):

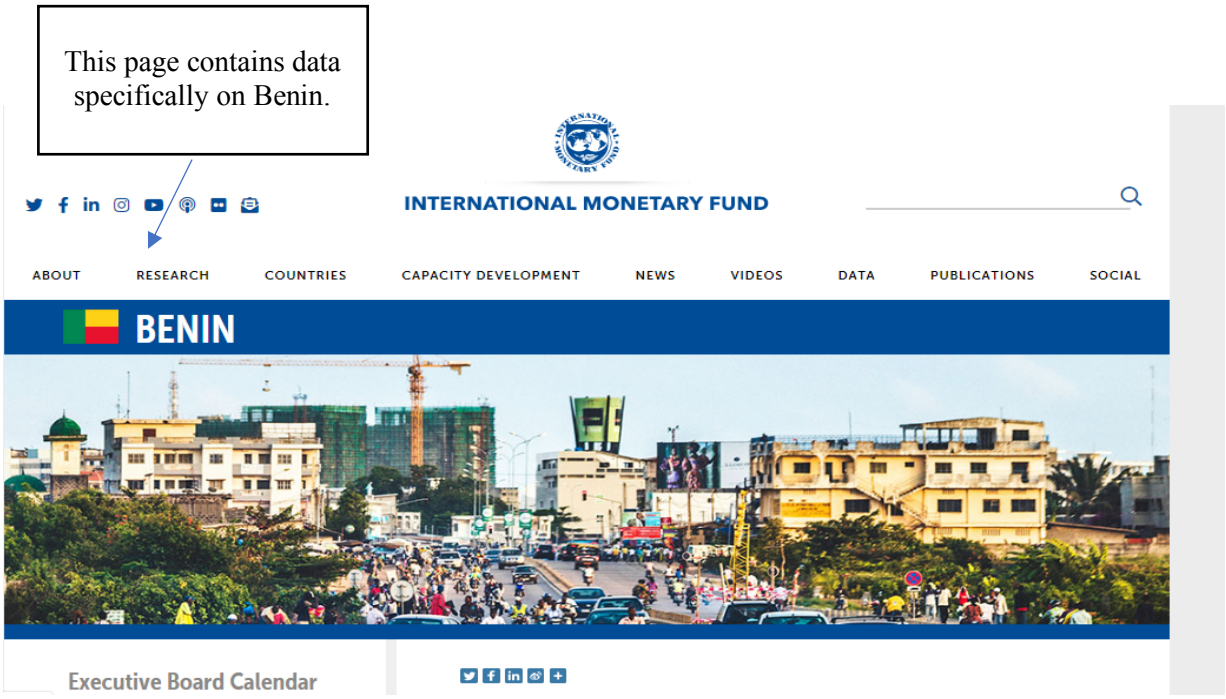
The IMF website can be accessed via the link https://www.imf.org/external/index.htm.

I.IMF page:

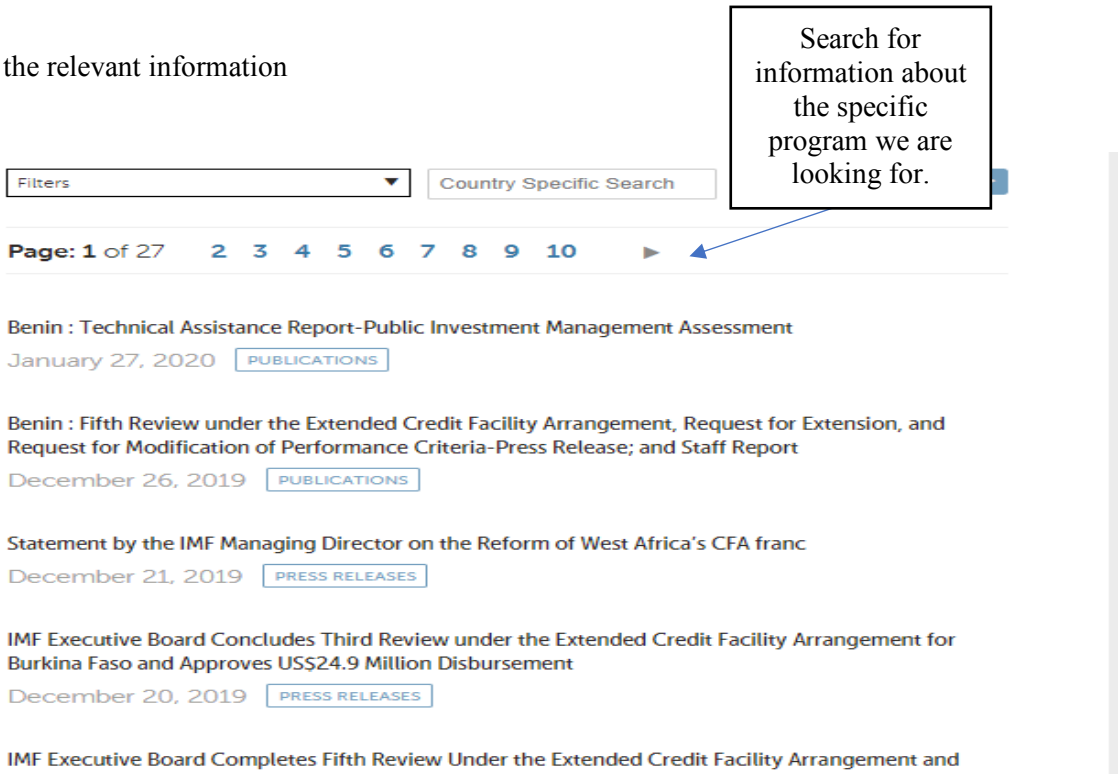


II.Select the specific country we are looking for , i.e. Benin

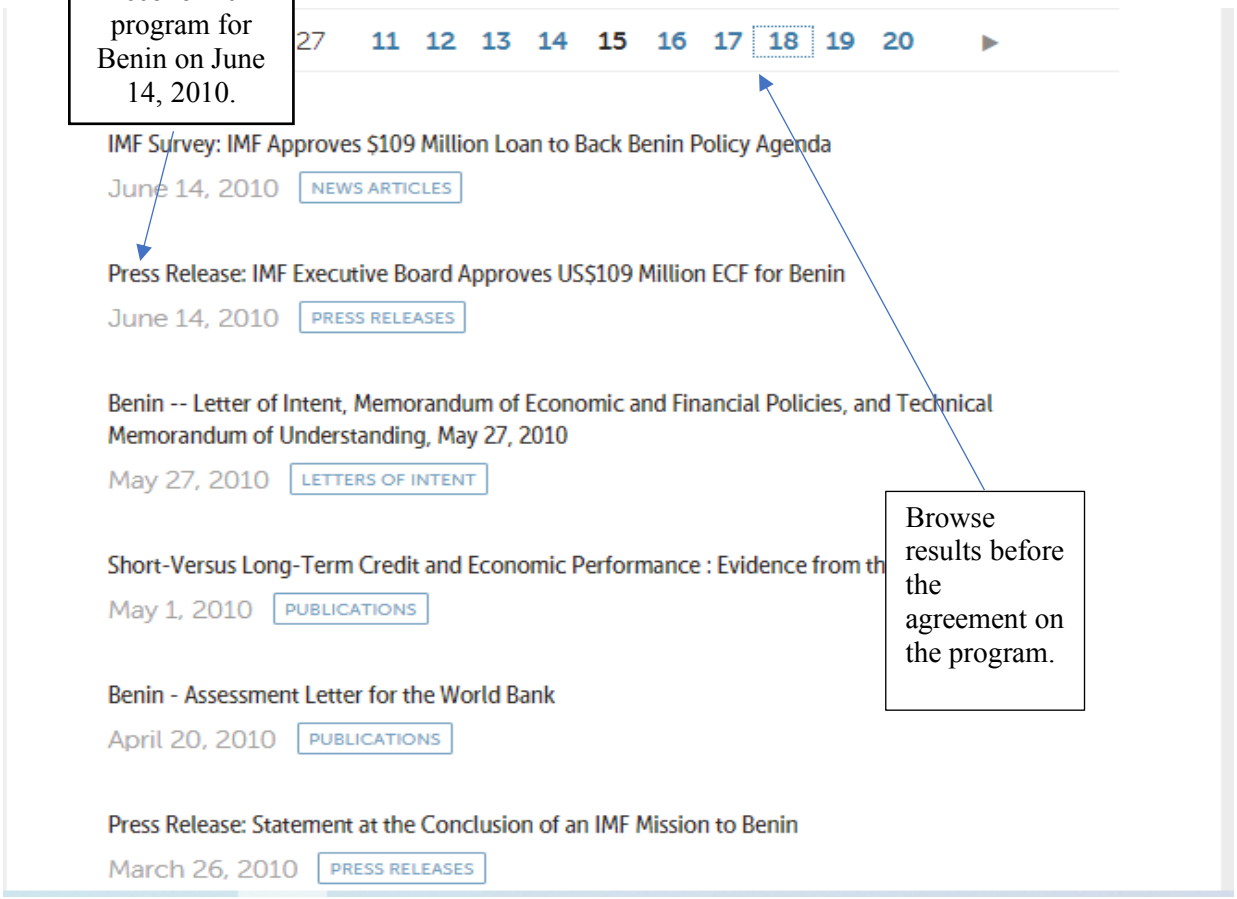




III.Search the relevant information

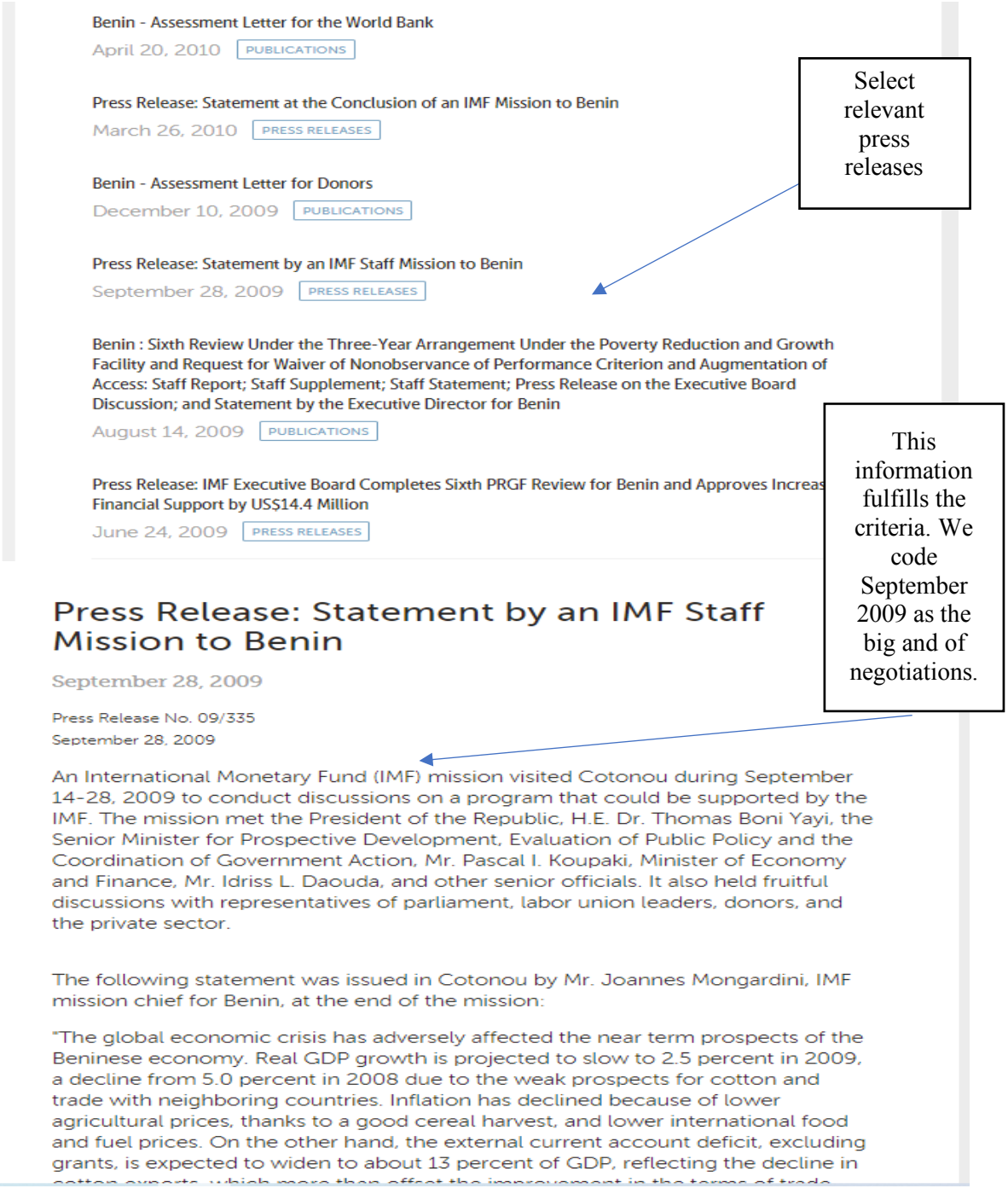


This is the approved economic program for Benin on June 14, 2010.



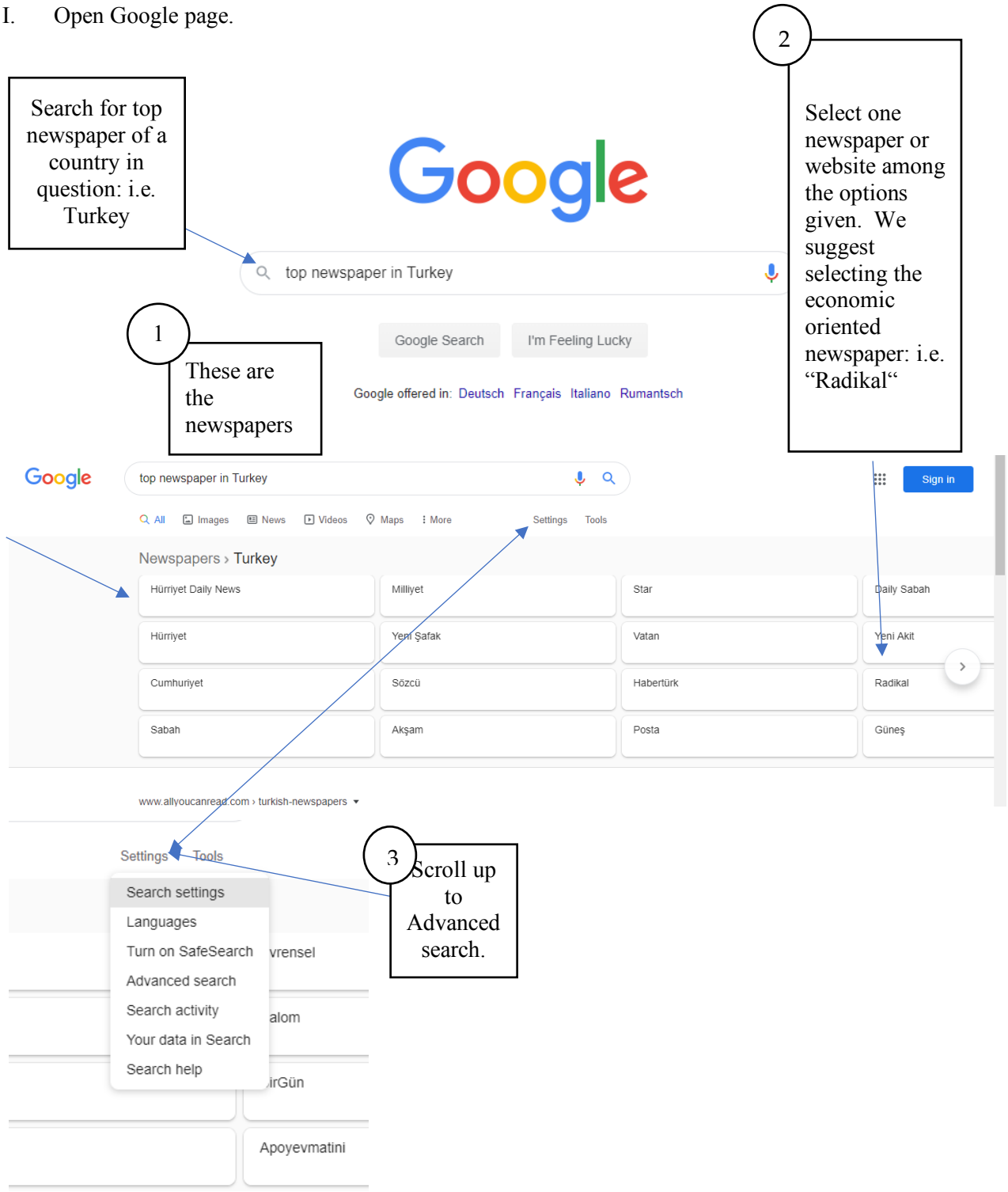
Browse results before the agreement on the program.

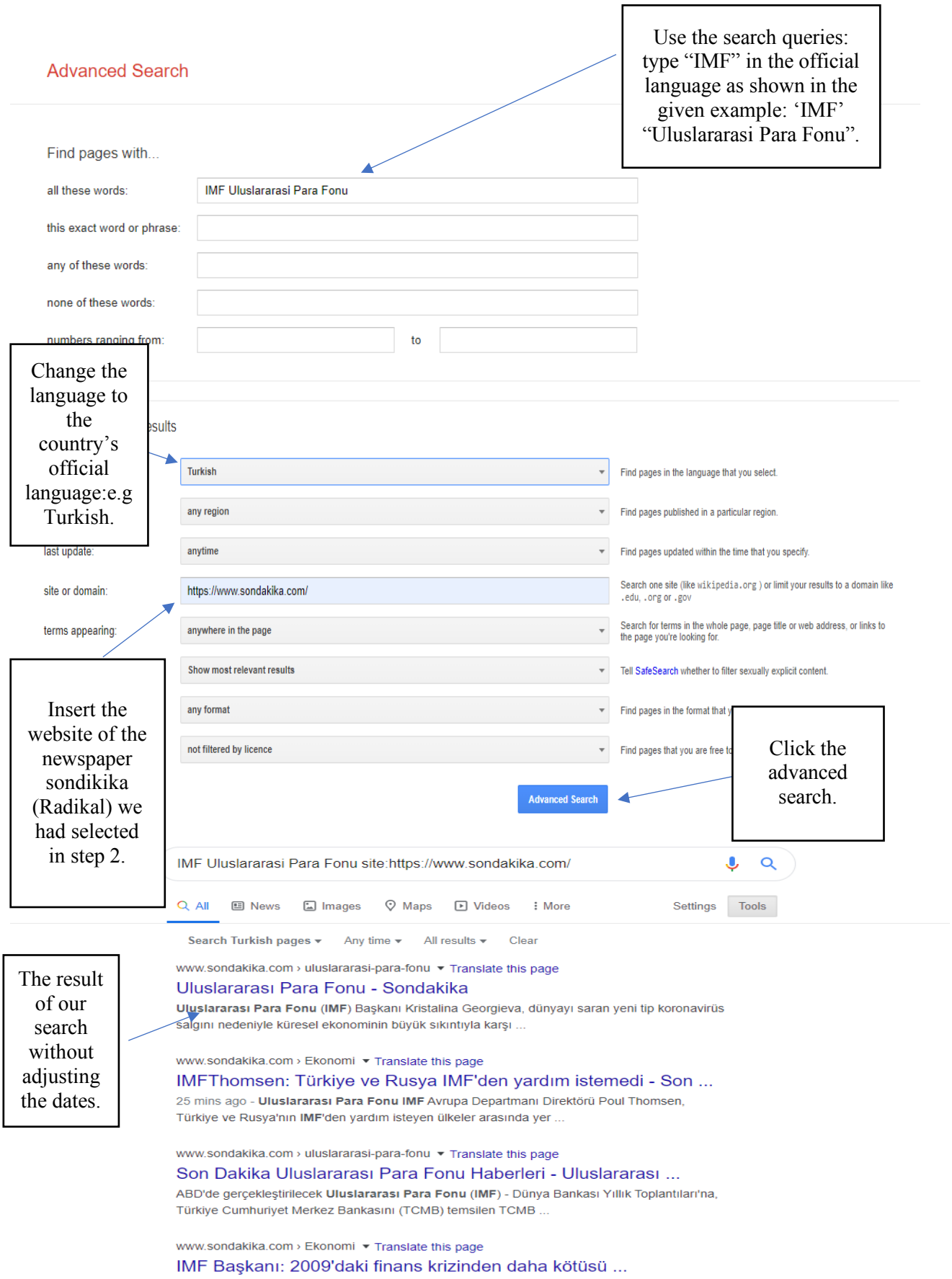
IV. Selection of the negotiation date: we skim throughout the texts and select the relevant statement of the economic program.

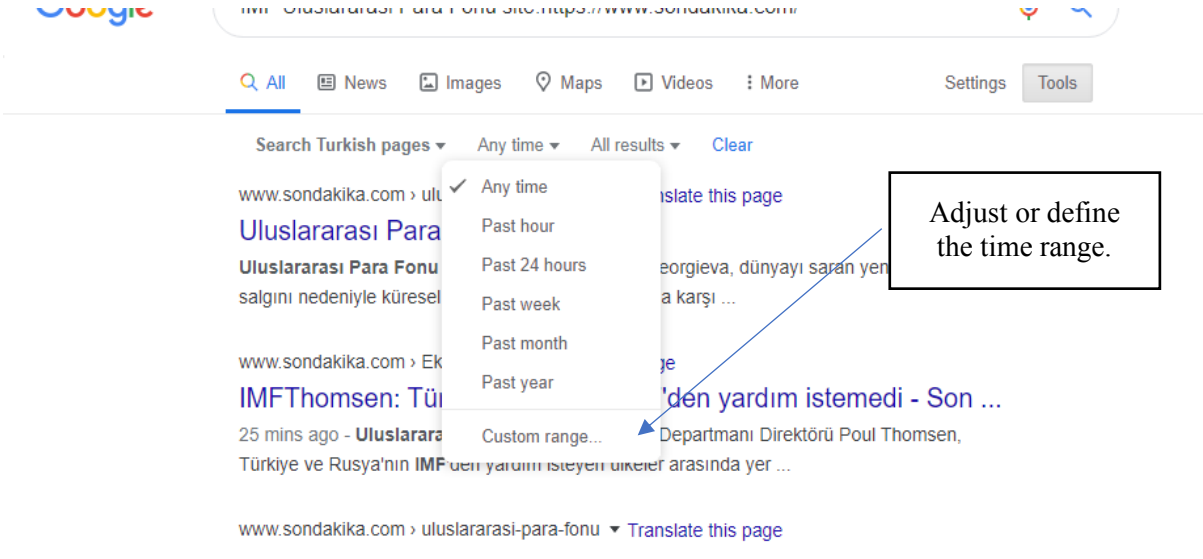


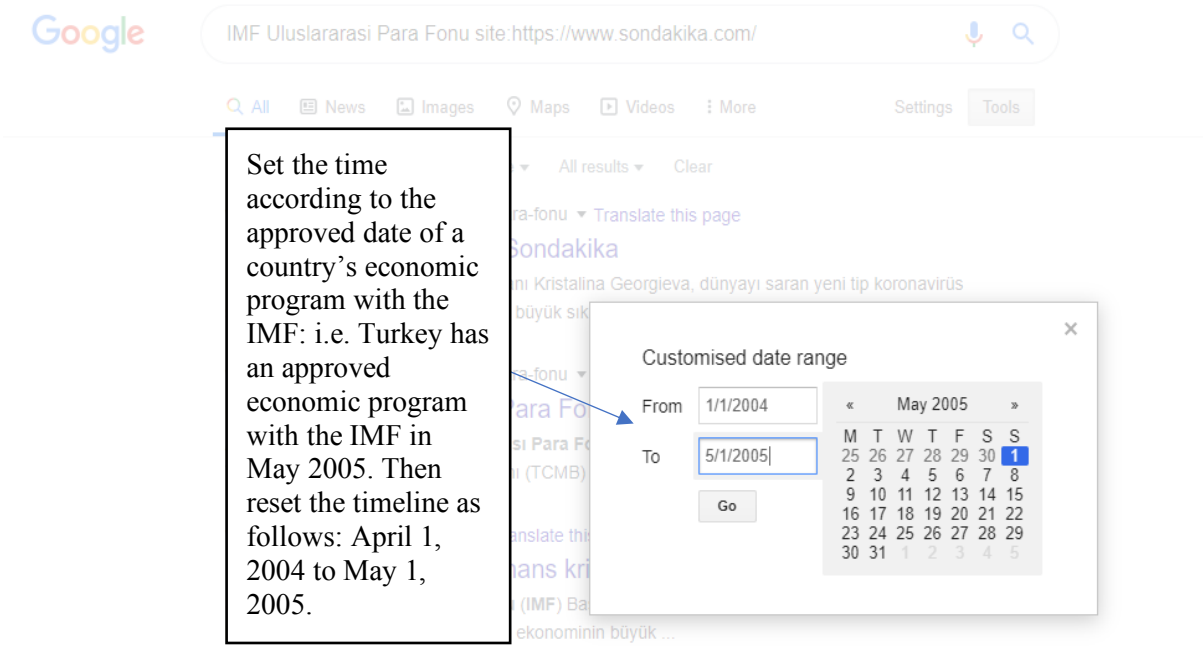
3.3. Google Advanced Search:

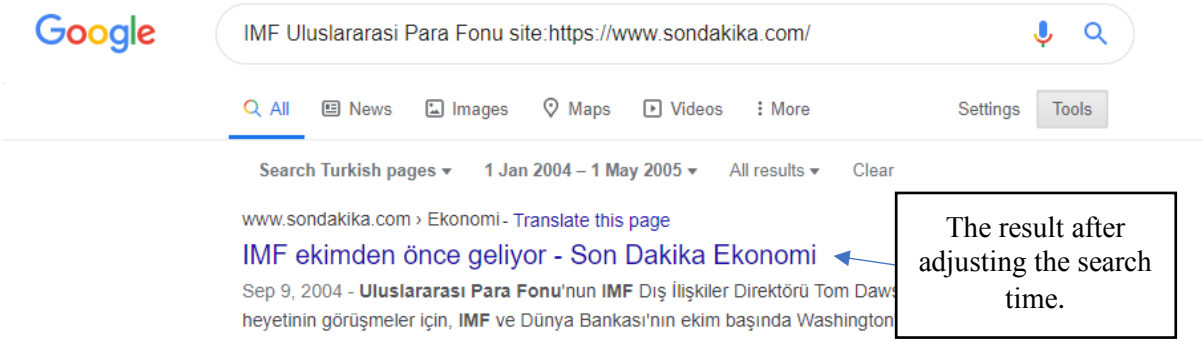
I. Open Google page.




Use the search queries: type “IMF” in the official language as shown in the given example: ‘IMF’ “Uluslararasi Para Fonu”.
Advanced Search
Find pages with...
all these words: IMF Uluslararasi Para Fonu
this exact word or phrase:
any of these words:
none of these words:
numbers ranging from:
to
Change the language to the country’s official language:e.g Turkish.
Turkish
Find pages in the language that you select.
any region
Find pages published in a particular region.
last update:
anytime
Find pages updated within the time that you specify.
site or domain:
https://www.sondakika.com/
Search one site (like wikipedia.org) or limit your results to a domain like .edu, .org or .gov
terms appearing:
anywhere in the page
Search for terms in the whole page, page title or web address, or links to the page you're looking for.
Insert the website of the newspaper sondikika (Radikal) we had selected in step 2.
Show most relevant results
Tell SafeSearch whether to filter sexually explicit content.
any format
not filtered by licence
Advanced Search
Click the advanced search.
IMF Uluslararasi Para Fonu site:https://www.sondakika.com/
All
News
Images
Maps
Videos
More
Settings
Tools
Search Turkish pages
Any time
All results
Clear
The result of our search without adjusting the dates.
www.sondakika.com › uluslararasi-para-fonu Translate this page
Uluslararası Para Fonu - Sondakika
Uluslararası Para Fonu (IMF) Başkanı Kristalina Georgieva, dünyayı saran yeni tip koronavirüs salgını nedeniyle küresel ekonominin büyük sıkıntıyla karşı ...
www.sondakika.com › Ekonomi Translate this page
IMFThomsen: Türkiye ve Rusya IMF'den yardım istemedi - Son ...
25 mins ago - Uluslararası Para Fonu IMF Avrupa Departmanı Direktörü Poul Thomsen, Türkiye ve Rusya'nın IMF'den yardım isteyen ülkeler arasında yer ...
www.sondakika.com › uluslararasi-para-fonu Translate this page
Son Dakika Uluslararası Para Fonu Haberleri - Uluslararası ...
ABD'de gerçekleştirilecek Uluslararası Para Fonu (IMF) - Dünya Bankası Yıllık Toplantıları'na, Türkiye Cumhuriyet Merkez Bankasını (TCMB) temsilen TCMB ...
www.sondakika.com › Ekonomi Translate this page
IMF Başkanı: 2009'daki finans krizinden daha kötüsü ...







Notice: Most of the economic programs with IMF are negotiated within one year, for this, it is suggested to first customize the searching date within the range of one year. If there is no information or news about the started date of program within the one-year-set, extend the searching date to more one year.

Open the news and use Google translation to English.

Google translation version. Although Google translation does not translate accurately, it generally conveys the main idea of a text.

We skim the text and understand the main idea of it. This article indicates that the first information about the beginning of negotiations became public in September 2009 when this article was published, even though the official negotiations were only supposed to start in October. We code the begin of negotiations thus as September 2009.

Appendix J: Bond spreads

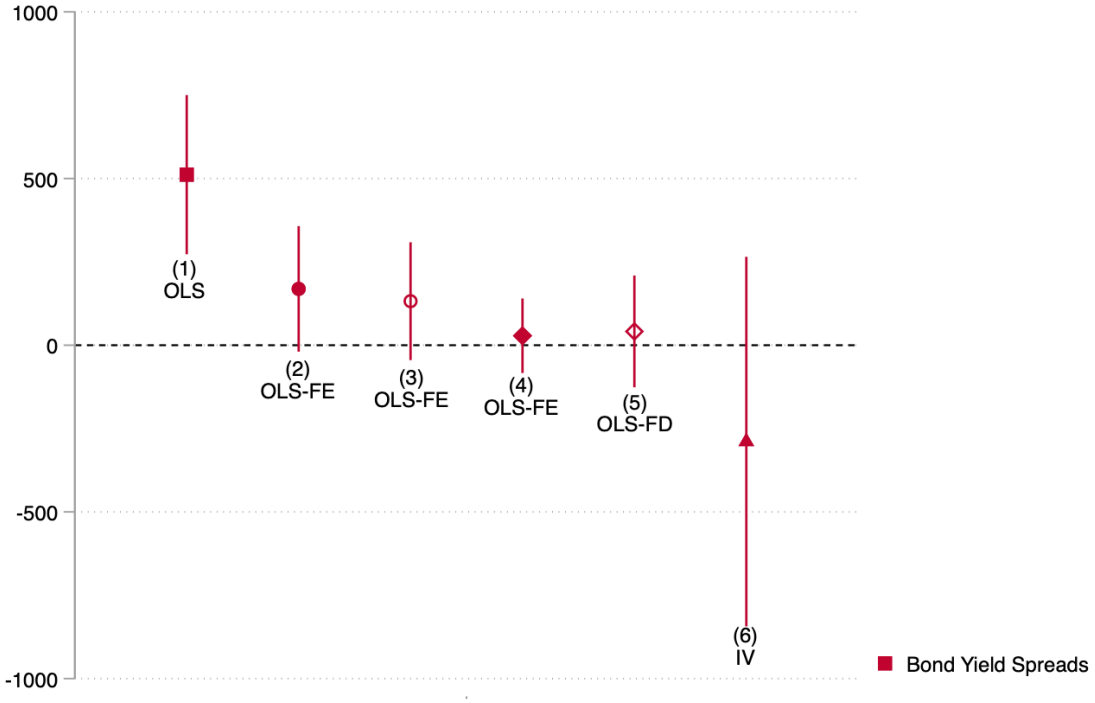
Table A12 – Baseline Results, Bond Spreads

Estimation Method	OLS	OLS-FE	OLS-FE	OLS-FE	OLS-FD	IV
	(1)	(2)	(3)	(4)	(5)	(6)
IMF program	511.543	168.916	132.090	28.398	41.358	-289.120
	[143.144]	[112.842]	[106.001]	[68.004]	[100.461]	[337.027]
	{0.001}	{0.139}	{0.217}	{0.676}	{0.682}	{0.391}
Observations	857	857	857	855	807	855
Adjusted R-squared	0.104	0.015	0.114	0.227	0.207	0.269
Country FE	No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Controls (t-4)	No	No	No	Yes	Yes	Yes
First Stage Results						
IMFprobability X IMFliquiditity						-0.327
						[0.094]
						{0.001}
IMFprobability						2.986
						[0.722]
						{0.000}
KP underid. p						0.002
KP weak id. (F)						12.061

Notes: The dependent variable is the spread of a country's government bonds over those of the United States, with 100 points equivalent to 1% in interest rates. Standard errors clustered at the country level are displayed in brackets, p-values in curly brackets. Appendix D provides a comprehensive list of all economic and political controls added in column 4.

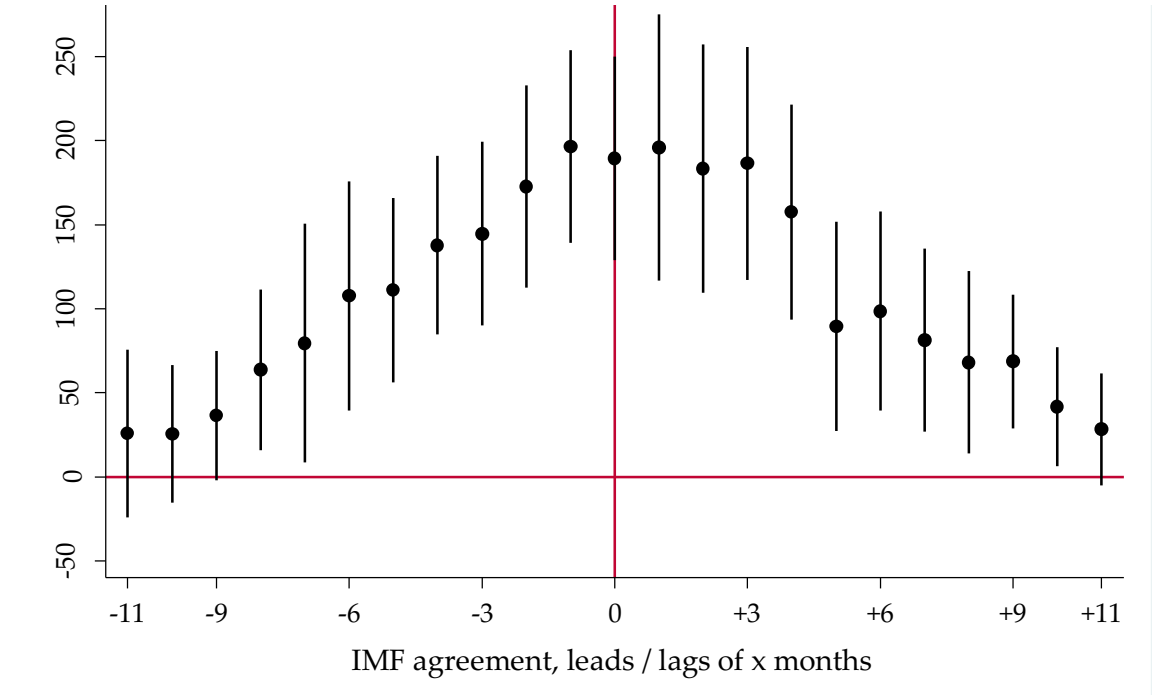
Interpretation: The pattern of point estimates closely resembles those using credit ratings. However, the estimates are less precisely estimated due to the lower availability of bond spread data. Note the lower number of observations.

Figure A12 – Baseline Results, Bond Spreads



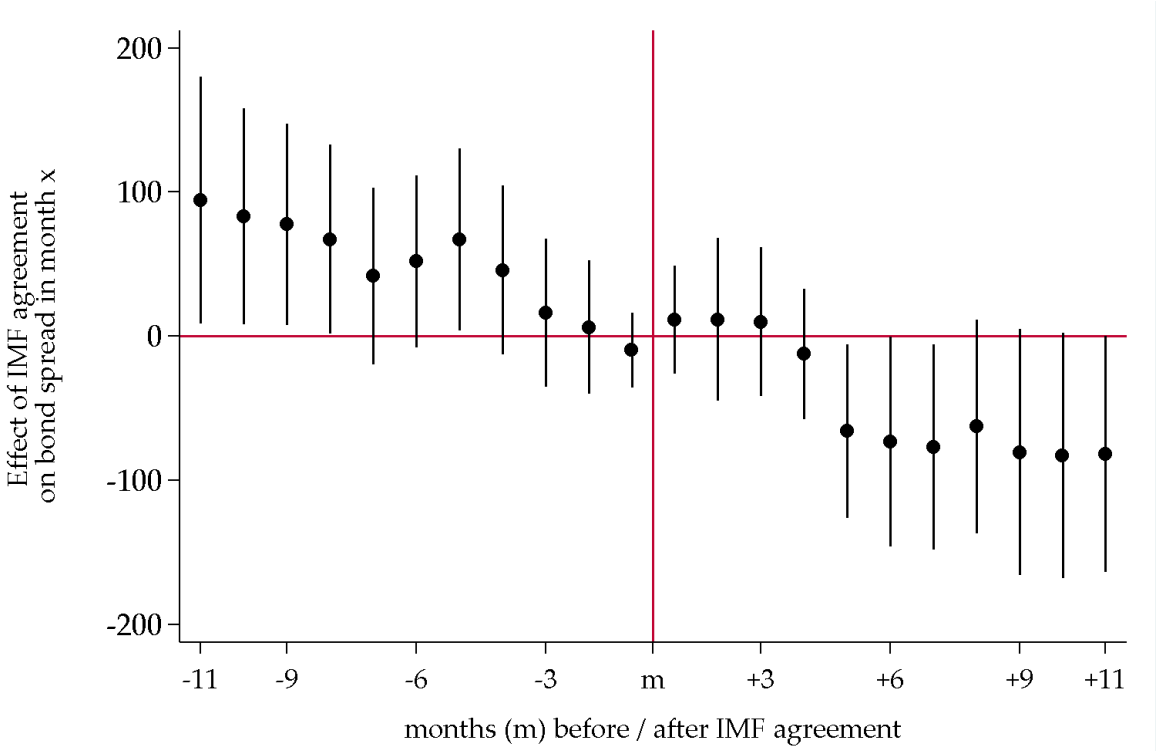
Notes: The dependent variable is the spread of a country's government bonds over those of the United States, with 100 base points equivalent to 1% in interest rates. Coefficient estimates are shown with 90%-confidence internals, based on standard errors are clustered at the country level.

Figure A13– Event-based Identification: Bond Spreads around Program Start within Country-Year



Notes: The figure plots the coefficients and 90 percent confidence intervals of different lags and leads from a regression of bond spreads at the end of a month on *IMF agreement*. Estimated using regression equation 6.

Figure A14 – Event-based Identification: Bond Spread Changes around Program Start within Country-Year



Notes: The figure plots the coefficients from individual regressions of changes in bond spreads at the end of a month on *IMF agreement*. Each spread change is computed as spread(m+x) – spread(m). Estimated using equation 7.

Appendix K: Exploratory Analysis of Statements by Rating Agencies

In a first step, we conduct an exploratory analysis about the availability of statements on *Factiva*, a commercial database for press articles as well as corporate and business information owned by Dow Jones & Company, and the LexisNexis search engine. We searched for articles containing statements of rating agencies concerning the up- or downgrading of sovereigns based on the (potential) interference of the IMF, using the following search terms independently or in combination with each other: *IMF, Sovereign, Rating Agency, Rating, Development*. The statements listed below contain decisions of the three major rating agencies *Standard & Poor's, Moody's,* and *Fitch*. Overall, the exploratory search process yielded statements for 14 different countries (in Africa, Asia and Eastern Europe) in the years between 1999 and 2016. In the following, we list statements starting with decisions from Standard & Poor's, the agency of primary interest, followed by the ones from Moody's and those from Fitch. Countries are ordered alphabetically and ascending in years.

Based on this exploratory analysis, which makes no claim of being exhaustive, we designed our systematic text analysis described in more detail after the following statements.

Standard and Poor's:

Albania, 2014

"We revised the outlook to stable because we think that the recently concluded *International Monetary Fund programme* will serve as *a policy anchor for fiscal consolidation* and support the sustainability of Albania's high government debt," S&P's said."

Source: Balkan Insights, http://www.balkaninsight.com/en/article/standard-and-poor-s-upgrade-albania-s-rating

Angola, 2011

"Standard & Poor's (S&P) has raised Angola's sovereign risk rating to BB-, citing […] the *IMF-recommended fiscal and monetary reforms*, which are expected to help mitigate the downside risks to over-dependence on the hydrocarbon sector."

Source: IHS Global Insight Daily Analysis, accessed via Factiva, 08.06.2017

Bosnia and Herzegovina, 2016

"The *IMF arrangement* will also provide the *fiscal space for needed reforms and infrastructure investments.* […] it will *anchor fiscal discipline* for the authorities and aim to improve revenue collection and the efficiency of government spending."

Source: S&P, http://www.standardandpoors.com/en_US/web/guest/article/-/view/type/HTML/id/1707896

Ghana, 2015

"We think *the new International Monetary Fund (IMF) program [….] will help in addressing fiscal and external imbalances* […]"

Source: S&P according to African Markets, https://www.african-markets.com/en/news/west-africa/ghana/s-p-ghana-b-b-ratings-affirmed-on-new-imf-program-outlook-remains-stable

Sri Lanka, 2009

"[…] (S&P) revised the outlook on its "B" long-term foreign currency rating for Sri Lanka to positive yesterday. The move reflects the country's improved external liquidity position owing to the new International Monetary Fund (IMF) standby loan agreement of US$2.6 billion. […]. The *stringent macro-economic consolidation conditions attached to the programme should force the government to reduce its fiscal deficit* […]. The *central bank's commitment under the programme to a strict monetary policy including a reduction of advances to the government and a flexible exchange rate should also have a positive effect* on Sri Lanka's medium-term sovereign risk."

Source: IHS Global Insight Daily Analysis, accessed via Factiva, 08.06.2017

Ukraine, 2015

"We view the risk of another default in the next two to three years as diminished due to the *Ukrainian authorities' commitment to the reforms set out in the International Monetary Fund (IMF) program*," S&P analysts including Frank Gill said in the report."

Source: Bloomberg, https://www.bloomberg.com/news/articles/2015-10-19/ukraine-rating-raised-to-b-by-s-p-on-debt-exchange-reform-plan

Moody's:

Indonesia, 2002

"Moody's Investors Service changed the outlook […] to positive from stable. The rating agency cited Indonesia's recent Paris Club memorandum of understanding and the country's *improved relationships with other foreign creditors, including the IMF, as bettering the country's liquidity position* in the coming two years. […] Going forward, upward movement in the ratings will depend on, among other things, continued political stability, progress in disposing of IBRA assets, fiscal performance, and *the ability of the government to continue to meet the targets under its IMF program* and maintain good relations with foreign creditors generally. Moody's said that the positive outlook reflects progress made so far, but that *continued reforms were necessary to lift Indonesia's economic performance and improve investor confidence*."

Source: Moody's Investor Service Press Release, accessed via Factiva, 08.06.2017

Pakistan, 2015

"Credit rating agency Moody's has changed the outlook on Pakistan's sovereign rating to Positive from Stable, affirming the rating itself at Caa1 […]. The decision to change the outlook was prompted by Pakistan's improving liquidity position, the *government's continued efforts towards fiscal consolidation, and the steady progress with structural reforms under the International Monetary Fund (IMF)'s programme*. Pakistan's external liquidity position has improved substantially in the past 12 months […], supported by the narrowing current-account deficit, ongoing disbursements from the IMF, […]. Meanwhile, fiscal discipline has also improved, as budget deficit and the government domestic borrowing have been gradually reduced. *On the structural reforms front, the agency pointed to the country's successful completion of a number of IMF structural benchmarks, including those on the fiscal and debt management front and energy sector reforms*."

Source: IHS Global Insight Daily Analysis, accessed via Factiva, 08.06.2017

Egypt, 2016

"Importantly, the rating agency views the staff-level agreement with the IMF which was announced on 11 August 2016 as credit-positive, because it will help alleviate some of Egypt's external liquidity pressures. Under the Extended Fund Facility (EFF) Egypt would gain access to about $12 billion of external funding through the IMF. The agreement is subject to approval by the IMF's Executive Board, which Moody's expects within 6-8 weeks. In Moody's view, the agreement reached with the IMF is also important because it will unlock external funding from other multilateral and bilateral sources, and support the implementation of fiscal and economic reforms. These include the long-delayed introduction of a value-added tax and moves to a more flexible exchange rate regime."

Source: Moody's, https://www.moodys.com/research/Moodys-affirms-Egypts-B3-rating-outlook-stable--PR_352656

Rwanda, 2016

"Moody's assigned Rwanda first-time local and foreign-currency issuer ratings of B2 last week, and gave the country a Stable outlook. […] In Moody's view, a Stable outlook for Rwanda's sovereign credit is justified given access to USD204 million from the *International Monetary Fund (IMF) under the country's 18-month Standard Credit Facility (SCF) arrangement*. Additionally, it sees the government's policy implementation track record as strong, and *expects improvements in both its fiscal and external positions* to materialise over the medium term."
Source: IHS Global Insight Daily Analysis, accessed via Factiva, 08.06.2017

Sri Lanka, 2016

"Therefore, in Moody's view, while the *IMF program* will alleviate Sri Lanka's external liquidity pressures, a more durable improvement in the macro-economic and balance of payments pressures will depend on the extent to which authorities can durably reverse the ongoing fiscal deterioration while improving Sri Lanka's international competitiveness and attractiveness to foreign investors. The study underpins *Moody's view that effective policy implementation determines the extent to which a country reaps the benefits of an IMF program.*"
Source: Moody's, https://www.moodys.com/research/Moodys-Sri-Lankas-benefits-from-its-IMF-program-depend-on--PR_350166

Ukraine, 2015

"The decision to upgrade the sovereign rating of Ukraine's government to Caa3 is based on the following key drivers: […] 2. *Progress in political and economic reform under the auspices of the IMF-led programme, supporting a rebalancing of the economy and a meaningful reduction in public and external financial deficits*."
Source: Moody's, https://www.moodys.com/research/Moodys-upgrades-Ukraines-sovereign-rating-to-Caa3-outlook-stable--PR_336283

Fitch:

Benin, 2004

"Fitch stated that successive *IMF reform programmes have led to macro-economic stabilisation, including a reduction in the budget deficit and a stabilisation of the government's debt burden through tight fiscal policies*."

Source: World Markets Research Centre Daily Analysis, accessed via Factiva, 08.06.2017

Ghana, 2005

"Fitch Ratings has upgraded Ghana's long-term foreign and local currency rating […] The *International Monetary Fund (IMF*)/World Bank supported *Poverty Reduction Strategy* will be supported with higher aid funding, which should improve public investment, counteract a projected current-account deterioration and improve international reserves."

Source: World Markets Research Centre Daily Analysis, accessed via Factiva, 08.06.2017

Appendix L: Systematic Analysis of Statements by Rating Agencies

Based on the exploratory analysis, we selected FACTIVA as the more suitable database for a systematic analysis. In particular the feature to select an industry class improved the matching rate between search terms and statements significantly. Our final systematic approach was to

1.) Open the database and login (library access or account is required).
2.) Issue search queries:
    - "program" within three words distance to "IMF or International Monetary Fund", Industry: Rating Agency, Language: English or German
    - "liquidity" within three words distance to "IMF or International Monetary Fund", Industry: Rating Agency, Language: English or German
    - "reform" within three words distance to "IMF or International Monetary Fund", Industry: Rating Agency, Language: English or German
    - "program," "IMF or International Monetary Fund" and "rating" within a ten word corridor, Industry: All, Language: English or German
3.) Manually skim over all statements and delete obviously false matches.
4.) Pool all remaining text in one text file.
5.) Relevant text is often embedded in larger bodies of text irrelevant to our purpose. Thus, we run a python script (see below) that searches the text for "IMF" or "International Monetary Fund" and extracts ten lines of text buffer prior and subsequent to a hit. Moreover, we used regularities in text structure to extract the according publisher and date. Selecting the size of the buffer one faces a trade-off between reducing the volume of text and cutting potentially relevant information. A ten line buffer is a conservative choice towards minimizing the loss of information.
6.) Because these are still relatively large chunks of texts, we **manually read the remaining texts and delete irrelevant relevant parts**, and then copy the rest of the text and additional information (name of rating agency and country) to excel. If duplicates appear they are deleted. This left us with 126 statements.

We then developed the following codebook. Two student assistants were equipped with this codebook and went through all statements. In case of deviations in opinion, we always choose the choice biasing against our priors, i.e. the effects we hypothesize. Accordingly, in case of deviating opinions statements are grouped as "liquidity and reforms" instead of "reforms only" and are grouped as "mixed/neutral/negative" based on the more negative of two assessments.

Positive-Negative Dimension:

Positive = 1 iff the statement in question includes remarks which **indicate** that the IMF is seen in a positive light by the rating agency. Assumes background knowledge about basic economic processes and implications of measures for economy.

- Indicators for IMF being seen in positive light by rating agency:
  - Citing **actual** or **possible** implementation or continuation of an IMF program or measure or **actual** or **possible** positive developments due to an IMF program or measure as a reason for an **actual** or **possible** positive rating. Conversely, citing **actual** or **possible** lack of implementation or discontinuation of an IMF program or measure as a reason for an **actual** or **possible** negative rating.
    - ➔ **Example for actual continuation of program as reason for actual positive rating:** ID5: "The ratings firm cited the country's improved performance under the European Union-International Monetary Fund program, falling near-term liquidity risk and a better fiscal track record for its upgrade"
    - ➔ **Example for possible discontinuation of/ compliance problems with program as reason for possible negative rating:** ID10: "Greece's ratings could also be lowered for reasons unrelated to the proposed ESM, if the Greek government's ability to comply with the program is undermined by domestic political opposition or materially weakens for other reasons, increasing the likelihood of failure to fully comply with the IMF/EU program."
    - ➔ **Example for possible discontinuation of program as reason for actual negative rating:** ID69: "The outlook is negative, reflecting what we view as ongoing social and political risks associated with deleveraging efforts by Portugal's highly indebted private and public sectors, as well as financing uncertainties related to Portugal's exit from the EU/IMF program, expected in May 2014. We believe this is symptomatic of diminishing political backing for further fiscal and structural reforms. The Constitutional Court's deliberations over further fiscal measures could coincide with Portugal's planned EU/IMF program exit in the second quarter of 2014."
    - ➔ **Example for actual implementation of program as reason for possible positive rating:** ID20: "Turkey's economy has been improving and a continuation of the current positive trend could lead to higher credit ratings for the country, according to the general manager of Moody's Interbank Credit Service's regional Middle East office. [...] "We see lower inflation, the fiscal deficit relatively under control and the International Monetary Fund (IMF) targets seem to be achievable," he said. The IMF is helping Turkey through a stabilization package that sets macroeconomic targets and provides aid in return. [...] In Turkey, programs have been suggested by the IMF that are aimed at lifting its economy out of the debt trap and making it into a debt paying machine. "The IMF provides financing to Turkey through a macro-economic stabilization program. The program calls for the government to take certain actions to correct the macro-economic imbalances. These imbalances include various fiscal and economic reforms that would lead to improvement in the macro-economic conditions."
  - Citing **actual** or **possible** implementation or continuation of an IMF program or measure as a factor for **actual** or **possible** positive economic developments in the country. Conversely, citing **actual** or **possible** lack of implementation or discontinuation of an IMF program or measure as a factor for **actual** or **possible** negative economic developments the country.
    - ➔ **Example for actual implementation/ compliance with program as factor for actual positive developments:** ID121: "As a result of the Chuan's cabinet's decisive policy to comply with the IMF program together with the disbursement of US$10.282 billion as of March 30, 1998 out of the IMF rescue package for US$17.2 billion, the present market situation is relatively stable and the market confidence seems to be recovered to some extent. (…)"
  - Use of terms such as "successful completion" when talking about an IMF-program or measure.
    - ➔ **Example**: ID79: "Such political developments allowed to strengthen the fiscal management stability. The Latvian government also in late 2011 successfully completed the international assistance program with the European Commission and the International Monetary Fund (IMF), said the agency."

Negative = 1 iff the statement in question includes remarks which **indicate** that the IMF is seen in a negative light by the rating agency. Assumes background knowledge about basic economic processes and implications of measures for economy

- Indicators for IMF being seen in negative light by rating agency:
    - Citing application for or implementation of IMF program or measures as a reason for an actual or possible downgrading
        - ➔ No examples
    - Citing application or implementation of IMF program or measures as a reason to keep outlook at negative
        - ➔ **Example:** ID74 "Moody's Investors Service has today confirmed Egypt's B2 government bond ratings and maintained the rating outlook at negative. […] The key drivers of today's confirmation of Egypt's B2 sovereign rating and negative outlook are: [...]4) The formal request by the new Egyptian government for IMF support"

Positive =0 and *Negative* =0 iff the statement in question neither includes remarks which indicate that the IMF is seen in a positive nor remarks which indicate that the IMF is seen in a negative light by the rating agency, or status of remark (positive/negative) is unclear.

- Purely descriptive statements about IMF without evaluative content
    - ➔ **Example**: ID59 "Pakistan is also moving forward on structural reforms under its program with the International Monetary Fund (IMF). These reforms focus primarily on fiscal consolidation, debt management, and addressing structural constraints in the energy sector."
- Statements with not enough context to conclude status (e.g. because it is unclear if rating has changed in any way)
    - ➔ **Example** ID93: ""However, policy adjustments and financial support under an 18-month IMF program agreed in April 2009 support a stable rating outlook," says Byrne."

Liquidity-Reform Dimension:

Liquidity Only = 1 iff the only feature addressed by the rating agency in their remarks in connection with the IMF is the liquidity of the country that is being rated (regardless of whether IMF is seen as donor or whether there might be consequences for liquidity resulting from e.g. implementation of IMF-program).[21]

- Verbal indicators taken to address liquidity in statements about IMF:
    - "financial assistance"
    - "program to relieve the financial burden"
    - "(future) disbursements"
    - "financial support from the IMF", etc.
        - ➔ **Example:** ID8 "(…) In our view, such improvements could be brought about by a positive conclusion to the negotiations with Gazprom on Ukraine's gas contract and/or a resumption of disbursements under Ukraine's IMF program," the press release reads."

Reform Only = 1 iff the only feature addressed by the rating agency in their remarks in connection with the IMF are reforms for the country that is being rated (regardless of whether IMF is seen as the one demanding reforms or the source of further IMF-unrelated reforms)[22].

- Verbal indicators taken to address reform in statements about IMF:
    - "technical assistance"
    - "(…) bolstering its institutional framework"
    - "policy measures"
    - "IMF assisted economic reform program", etc.
        - ➔ **Example:** ID3 "(…) Moody's report explains that the Solomon Islands successfully graduated from an IMF program in 2016, with progress in bolstering its institutional framework."

Reform and Liquidity = 1 iff the rating agency addresses both reforms and liquidity in their remarks in connection with the IMF (regardless of whether IMF is seen as the one demanding the reforms or the source of further IMF-unrelated reforms and regardless of whether IMF is seen as donor or whether there might be consequences for liquidity resulting from e.g. implementation of IMF-program).

- ➔ **Example**: ID2 "(…) The new IMF credit facilities (an Extended Credit Facility and an Extended Fund Facility (ECF/EFF)) approved in November unleashed official lending that had been withheld for more than a year. The second driver for stabilizing the outlook relates to the adoption of key structural reforms both in connection with the IMF program and in technical consultation with the IMF and other multilateral lenders and donors. (…)"

Liquidity Only= 0, *Reform Only* = 0 and *Reform and Liquidity* = 0 iff either the rating agency neither addresses liquidity, nor reform nor both in their remarks about the IMF, or status of statement is unclear.

- Use of the expressions "IMF program" or "IMF agreements" (or synonymous expressions) with no further specification with regard to what the program or agreement is about
    - ➔ **Example:** ID13 "(…) Under this scenario, the government can get the International Monetary Fund's program "back on track" and there is a strong prospect of positive ratings action, said Edward Parker, a senior Fitch analyst."

[21] If there are consequences resulting from IMF-related liquidity, then statement is coded as 1. However, if statement only addresses circumstances or conditions which led to IMF-measures with regard to liquidity, statement is coded as 0.

[22] If there are consequences resulting from IMF-related reforms, then statement is coded as 1. However, if statement only addresses circumstances or conditions which led to IMF-measures with regard to reform, statement is coded as 0.