Do IMF Programs Increase Creditworthiness?

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Abstract: We examine whether IMF programs help countries to regain their creditworthiness. In a sample of 100 countries (1988-2013) our identification strategy is based on an instrumental variable that combines cross-sectional variation with plausibly exogenous temporal variation in the IMF's liquidity. The preliminary results suggest that IMF programs on average have no unconditional effect on creditworthiness when accounting for endogeneity. For countries with similar macroeconomic fundamentals, however, credit rating agencies assign better ratings to those under IMF programs. We show that this difference can be explained by differentiating a positive signaling effect from a negative implementation effect. IMF programs in the short-run can have contractionary economic effects that would affect creditworthiness negatively if the program did not function as a "seal of approval" that credit rating agencies interpret as a positive signal.

Keywords: International Monetary Fund (IMF), Sovereign Debt, Credit Ratings

1. Introduction

The 2008 international financial crisis and the ensuing sovereign debt crises reestablished the crucial role the International Monetary Fund (IMF or Fund) plays for the global economy. In the early years of the new millennium the use of Fund resources had dropped drastically, leading many to consider the IMF to be in decline (e.g, Dieter 2006). Yet in the aftermath of the crises, the Fund's loans to countries facing balance of payment problems were again in high demand. Since the 1970s *almost all* developing countries around the world have participated in IMF loan programs,[1] and in recent years several developed economies have turned to the IMF as well. In 2010, IMF commitments as a share of world GDP reached an all-time high (Reinhart and Trebesch 2015).

In the scholarly literature, the IMF's so-called "arrangements", which attach policy conditions to loans, are subject to much skepticism. In addition to being criticized for a variety of adverse social and political consequences (e.g., Stiglitz 2002), the programs have, for instance, often been blamed for reducing economic growth (Barro and Lee 2005; Dreher 2006; Przeworkski and Vreeland 2000; Atoyan and Conway 2006)[2], As the international lender of last resort, however, the IMF's primary objective – at least in the short run – should be to end the program country's dependence on external financial assistance. Enabling countries to refinance themselves on international capital markets by restoring their creditworthiness is thus a central target of IMF programs. In this regard, the existing evidence is scarce and inconclusive.

Given the recent resurgence of the IMF's lending activities, it is crucial to know whether the IMF's loan programs actually help countries in crises to get back on their own feet by improving their creditworthiness. We test this empirically and argue that sovereign credit ratings are a suitable measure to assess the ability of countries to refinance themselves, which exhibits several advantages over those that have been used in the existing literature. They are directly related to changes in government bond spreads (Afonso, Furceri, and Gomes 2012), predict defaults (Reinhart 2002) and serve as a de-facto ceiling for the rating of private companies from the respective country (Borensztein, Cowan, and Valenzuela 2013).

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[1] In Latin America, for instance, the only exceptions are Cuba and Puerto Rico. In South Asia the only country that never received an IMF program is Bhutan.

[2] Bas and Stone (2014) find the contrary.

In addition to finding a suitable proxy-variable for creditworthiness, the existing literature has struggled to overcome endogeneity problems and to estimate a causal effect. Countries that enter into IMF arrangements are typically experiencing economic crises and their growth and development paths are thus likely to differ systematically from countries without IMF programs. These differences are directly related to differences in creditworthiness and may not be fully captured by observables. Besides omitted variables, reverse causality cannot be ruled out as deteriorating credit ratings limit a country's access to financial markets. We thus employ an identification strategy that, unlike previous research in this area, exploits plausibly exogenous variation. Our instrumental variable (IV) combines temporal variation in the IMF's liquidity with cross-sectional variation in a country's probability to participate in an IMF program via an interaction term (Lang 2016). Conditional on the level effects the interaction term induces exogenous variation, similar to a difference-in-difference design. As we describe in more detail below, this approach also allows us to differentiate between an *implementation* effect, which operates through immediate economic adjustments under IMF programs, and a *signaling* effect, which operates through the IMF affecting the expectations about the country's future policy path.

Using annual panel data for a maximum of 121 countries over the 1987-2013 period we find the correlation of IMF programs with sovereign ratings to be negative. As one would expect in the presence of a downward omitted variable bias, the OLS coefficient moves closer to zero when conditioning on macroeconomic and political indicators prior to the program. When using our IV approach, we show that the unconditional causal effect of IMF programs on sovereign credit ratings is statistically indistinguishable from zero. When further conditioning on immediate macroeconomic adjustments, which we term the *implementation* effect, we find evidence for a conditionally positive *signaling* effect. We interpret these results as follows: While IMF programs do neither improve nor deteriorate a country's perceived creditworthiness, they function as a signal that creates positive expectations about the future policy path of the respective program country. Even though after tough direct adjustments immediate macroeconomic fundamentals would suggest weakening creditworthiness, this positive signaling effect balances the total effect to zero.

While our main specification focuses on rating issued by Standard & Poor's, the results hold when instead using Moody's or Fitch ratings instead. Still, it is possible that this positive *signaling* effect related to improved expectations is restricted to US agencies.

Thus, we augment our analysis by incorporating sovereign ratings from other agencies originating in Asia, Europe and Canada. We find the exact same pattern for Asian and the non-US agencies in general. An unconditional null-effect, and a positive *signaling* effect when conditioning on *implementation* via immediate macroeconomic adjustments. Further tests confirm the robustness of the results.

In the remainder of this paper we first review the extant literature to deduce theoretical expectations regarding potential mechanisms and the direction of their effects (section 2). In section 3 we present our identification strategy and data. We report and discuss our empirical results in section 4. Section 5 concludes.

2. Potential Channels and Existing Literature

To increase creditworthiness IMF programs need to convince investors of the ability and willingness of the crisis country to repay its debt (Panizza, Sturzenegger, and Zettelmeyer 2009; Tomz and Wright 2007). Such assessment of creditworthiness is based on multiple factors. As the previous literature has also shown that IMF programs have many different effects, IMF programs can be linked to creditworthiness through various channels. For that reason, we review and combine the literature on both the determinants of sovereign ratings and on the effects of IMF programs in order to derive potential channels. In doing so, we hypothesize that it is conceptually important to differentiate between an *implementation* and a *signaling* effect.

Implementation

Consider the *implementation* effect first. Credit ratings express an agency's "opinion about the ability and willingness of an issuer […] to meet its financial obligations in full and on time" (Standard & Poor's 2016). It is uncontroversial that a sovereign's creditworthiness as measured by such credit ratings is heavily influenced by the country's economic fundamentals. In the empirical literature on the determinants of ratings gross domestic product (GDP) per capita, GDP growth, inflation, external debt are found to be robust predictors (Cantor and Packer 1996; Afonso 2003; Hill, Brooks, and Faff 2010; Fuchs and Gehring 2016). Several political indicators like the political regime type, partisanship, and in particular the rule of law have also been found to correlate with rating outcomes (Archer, Biglaiser, and DeRouen 2007).

Having identified the most important determinants of sovereign ratings, we are interested whether these are affected by IMF programs. We thus turn to the literature that examines these variables as potential consequences of IMF programs.

Initially we look at the mechanisms *how* IMF programs affect economic and political outcomes in program countries (for an overview see Dreher, 2009). The most obvious one is conditionality. As the Fund's disbursement of loans is conditional on the implementation of specific policy reforms, changes in economic fundamentals could simply result from reforms governments implement because they aim to get the next tranche of the loan. As conditions typically focus on economic policies (Kentikelenis, Stubbs, and King 2016), they affect economic fundamentals more directly than political variables. Beyond conditionality, IMF programs arguably can also fulfill a "scapegoat" function (Vreeland 1999). Governments can blame the IMF for unpopular policy reforms in order to avoid electoral harm. More generally, IMF programs can tip the domestic balance of power in favor of reformers within the government (Nooruddin and Simmons 2006; Caraway, Rickard, and Anner 2012; Bird and Willett 2004). What is more, it has also been suggested that the IMF may induce moral hazard with debtor governments (Dreher and Vaubel 2004; Jorra 2012). The insurance provided by the Fund might lead the government to be less cautious and sustainable in the choice of its policies.

The resulting effects of IMF programs have been subject to a large number of studies (for an overview see Steinwand and Stone, 2008). In terms of economic fundamentals, the focus has been on growth effects. While the most recent study by Bas and Stone (2014) reports a positive growth effect of IMF programs, the majority of empirical studies suggest economically contractionary effects (Przeworkski and Vreeland 2000; Dreher 2006; Barro and Lee 2005; Vreeland 2003; Butkiewicz and Yanikkaya 2005; Easterly 2005). Atoyan and Conway (2006) find little evidence for a contemporaneous growth effect, but some for rising economic growth in the years following program participation. Beyond growth, containing and reducing external debt is a key goal of IMF programs. Kentikelenis et al. (2016) show that the largest share of conditions included in IMF programs addresses debt management and external arrears. Conditions dedicated to reforms of the financial sector and monetary policy come second, followed by fiscal issues. Prior evidence suggests that IMF programs indeed reduce inflation, monetary growth, and the risk of currency crises (Dreher and Walter 2010; Dreher and Vaubel 2004; Steinwand and Stone 2008). What is more, Papi et al. (2015) indicate that IMF

programs tend to reduce the likelihood of banking crises. Lau and McInish (2003) find that they seem to improve the market performance of banks in program countries.

IMF programs have also been related to a number of political outcomes. Several scholars link them to political instability and suggest that they lead to heightened risk of civil war onset (Hartzell et al. 2010), coup d'etats (Casper 2015), and government crises (Dreher and Gassebener 2012) as well as to rises in human rights violations (Abouharb and Cingranelli 2009). Democracy scores, however, were shown to moderately increase (Nelson and Wallace 2016). Bureaucratic quality also appears to be affected; the Fund's quantitative conditions increase it while structural conditions decrease it (Reinsberg et al. 2016).

In sum, the existing evidence suggests that IMF programs affect country-specific, observable variables that the rating literature considers as indicators of a country's creditworthiness. While so far no study has examined this mechanism directly, our review of the related literature does neither unequivocally suggest positive nor negative effects of IMF programs on creditworthiness through changes in economic and political fundamentals. E.g., while monetary stabilization and rising democracy levels could improve creditworthiness, temporarily lower levels of economic growth and political instability could have the opposite effect. It is thus an empirical question whether the immediate implementation of adjustment policies and the long-run expectations of changes in program countries' policies as a consequence of IMF interventions improve or worsen creditworthiness.

Signaling

While the *implementation* channel relates to immediate reform measures, it is important to differentiate it from the *signaling* channel through which IMF programs could also affect creditworthiness assessments. Since sovereign credit ratings are a measure of the probability of future default, expectations play a key role. These expectations are grounded not only in a country's current economic and political performance but also in signals that give some indication of a country's future policy path. IMF programs can serve as such a signal.

On the one hand, IMF program can function as a "seal of approval" (Bird 1978; Polak 1991). To the extent that the IMF agrees to arrangements only if it approves of the country's policy agenda the engagement of the IMF might signal the quality of implemented and planned policy reforms (Marchesi and Thomas 1999; Dreher 2009).

What is more, IMF programs can function as a commitment device to overcome problems of time consistency (Dreher 2009). They can thus signal not only the quality but also the credibility of announced policy reforms and thus affect the degree to which these reforms are expected to enhance debt sustainability and general macroeconomic performance (Edwards 2006; Stone 2002; Mody and Saravia 2006). In Stone's (2002) influential model one of the key functions of IMF programs is to "lend credibility" to stabilization policies. International capital markets could interpret this as a positive sign regarding the country's ability and willingness to repay its debt (Morris and Shin 2006; Corsetti, Guimares, and Roubini 2006).[3]

Other studies, however, suggest that IMF programs may not uniformly confer a seal of approval and commitment but can also convey negative information (Bas and Stone 2014). The IMF (2014) itself, for instance, is worried that countries under its loan programs carry a "stigma" (see also Reinhart and Trebesch 2015). From this perspective IMF programs could have negative signaling effects to the extent that they indicate that a government has more solvency problems than its macroeconomic fundamentals and political indicators suggest. In this regard it is helpful to recall that economic indicators like GDP and inflation are also only imperfect proxies for the underlying concepts, which makes it rational for investors to use other signals to infer information about potential mismeasurement and adapt their assessment.[4]

Empirically, the literature has approached the question as to whether IMF programs affect the creditworthiness of the borrowing government through signaling in a variety of ways. Several studies have examined how IMF programs affect the inflow of different kinds of capital. The evidence is inconclusive. Some find that IMF programs lead to capital outflows (Jensen 2004; Bird and Rowlands 2009; Edwards 2006). Others find evidence for a conditionally positive effect on FDI inflows depending on the extent of conditionality (Woo 2013) and on whether a country is democratic (Bauer, Cruz, and

[3] This conjecture is in line the literature on the effects of membership in international organizations more broadly (see Dreher and Lang 2016 for an overview). Gray (2009; 2013), for instance, argues that membership in international organizations (IOs) sends signals to investors and thus affects sovereigns' borrowing costs; countries joining IOs with relatively low-risk members improve their borrowing conditions. Others argue that IO membership in general enhances the degree to which governments are perceived to be credible (Dreher and Voigt 2011; Baccini and Urpelainen 2014) and increases foreign direct investment (FDI) inflows (Dreher, Mikosch, and Voigt 2015).

[4] An additional signaling effect of IMF programs discussed in the literature is the creditor moral hazard problem. The IMF could lead creditors to increase investments in government bonds of program countries because they anticipate IMF bailouts in case the government's solvency deteriorates. In his survey of the literature Dreher (2004, 20) concludes that there is "considerable evidence in favor of the hypothesis that the safety net provided by the IMF creates significant moral hazard with investors". As ratings agencies "consider the potential for support from multilateral institutions" (Standard and Poor's 2011, 7), they could thus – like spreads – react to the Fund's signals regarding potential bailouts. We are not specifically examining this aspect, as we are only interested in whether the IMF overall helps countries to restore creditworthiness, one way or the other.

Graham 2012). While these studies interpret their findings as evidence for the signals IMF programs sends to international investors, their empirical evidence focuses on the IMF's catalytic effects – primarily on foreign direct investment (FDI) – rather than on direct changes in the borrowing government's creditworthiness.

Several other studies proxy for creditworthiness with government bond spreads. Drawing on a 1991-1999 sample of quarterly bond spreads, Eichengreen and Mody (2001) find that IMF programs correlate with reduced costs of borrowing in countries with initially average creditworthiness and increased costs for countries with initially high creditworthiness. They note that these results can be interpreted as evidence for both a catalytic effect of IMF programs and for the existence of creditor moral hazard, but suggest that the heterogeneity "is not easily reconciled with the moral hazard view" (Eichengreen and Mody 2001, 172). Further evidence supports a heterogeneous effect on spreads conditional on the state in which the country enters into the program (Eichengreen, Kletzer, and Mody 2006, Mody and Saravia 2006).[5]

Government bond spreads, however, do not necessarily capture changes in creditworthiness. Changes in spreads are driven by supply and demand factors, and are also to a larger extent driven by speculation about creditor moral hazard. To the extent that governments within IMF programs also adjust the supply of government bonds, the spreads only convey a biased and inaccurate picture of how investors perceive the creditworthiness of a country. This is supported by Mina and Martinez-Vasquez (2002) and Martinez-Vasquez and Mina (2003), who show that IMF programs alter the maturity structure of a country's loans and reduce the share of short-term debt flows. An alternative outcome variable is proposed by Jorra (2012), who empirically investigates whether IMF programs increase the likelihood of sovereign default, defined as a binary outcome. While he finds that the probability of sovereign default increases by up to 2 percentage points as a consequence of IMF lending, the obvious limitation for inferences regarding the effect on creditworthiness is that more nuanced variations than the most extreme cases are not captured. As we argue, using sovereign credit ratings, which are issued by independent private agencies and function as a signal for investors, avoids these problems and serves as a direct and more nuanced measure of creditworthiness. In

[5] A related series of studies has looked at how government bond spreads react to IMF signals regarding the likelihood of bailouts. Dell'Ariccia et al. (2002; 2006) find that the IMF's decision to not bailout Russia in 1998 increased bond spreads and interpret these findings as evidence for the existence of creditor moral hazard caused by the IMF. This result has later been supported in similar settings by Zoli (2004) and Lee and Shin (2008). Other empirical studies do not support the moral hazard argument (Noy 2008; Zhang 1999; Kamin 2004; Lane and Phillips 2000). Brealey and Kaplanis (2004) find that announcements concerning future IMF programs have little effects on the value of assets such as sovereign debt but also equities, currencies, bank stocks.

the political science literature, one study by Cho (2014) uses credit ratings in that context, but her study focuses on the effect of partisanship on how investors evaluate the creditworthiness of countries. She argues that IMF programs can act as a "seal of approval" for left-wing governments, which generally receive worse ratings.

A second shortcoming in the existing literature is that none of the studies is able to establish causality. While it is evident that selection into IMF programs is not independent of creditworthiness, controlling for a range of observed variables is unlikely to account for the entire endogeneity bias. Yet none of the discussed studies that link IMF programs to creditworthiness, goes beyond controlling for selection-on-observables.[6] Instead, even the most cited study in this field states that "explicit consideration of the selection bias problem is not undertaken" (Mody and Saravia 2006, 852). Therefore, unobserved variables and reverse causality could drive previous results. The astonishing differences in empirical results are potentially attributable to the lack of plausible identification strategies.

Third, the approaches employed in existing studies are not able to differentiate between the *implementation* and *signaling* channels discussed above. As their identification strategies require them to control for economic fundamentals, the results only indicate the signaling effect of IMF programs. Whether the IMF affects creditworthiness by leading to improvements or deteriorations of economic fundamentals remains obscure. The empirical approach we present in the following aims to augment the literature in all three respects.

3. Data and Identification

3.1 An Instrumental Variable Approach

Our identification strategy is based on an instrumental variable (IV). For the reason given above, we expect selection bias to be substantial. It is highly likely that variables that indicate economic crises and thus increase a country's likelihood to be under an IMF program are also correlated with lower credit ratings and therefore introduce a downward bias. We doubt that an approach solely based on observable variables captures such channels adequately. Furthermore, we cannot rule out reverse causality.

[6] An exception is Jorra (2012), who relies on the assumption that voting patterns in the United Nations General Assembly (UNGA) fulfill the exclusion restriction in his setting. This approach is only valid if political preferences expressed in the UNGA are unrelated to the state of the domestic economy, which we think is unlikely (see Lang 2016). Furthermore, his empirical strategy does not account for unobserved country-specific heterogeneity as no country fixed effects are included.

Worsening credit ratings might deteriorate market access and thus increase the likelihood that a country turns to the Fund for external assistance.

Our approach to circumvent this potential endogeneity bias builds on Lang (2016). The IV we employ is an interaction term, which combines cross-sectional and temporal variation:

$$\mathbf{IV}_{it} = \ln(\mathbf{IMF\ Liquidity}_t) \times \mathbf{IMF\ Probability}_{it}$$

where $\mathbf{IMF\ Liquidity}_t$ denotes the IMF's time varying liquidity ratio and $\mathbf{IMF\ Probability}_{it}$ is a country's probability of participating in an IMF program, defined as the share of past years that a country participated in IMF programs.

The previous literature has often confirmed that the latter variable is a strong predictor of IMF programs; because of "recidivism" and path dependency countries that have a longer history with the IMF are more likely to also receive programs in the present (Bird, Hussain, and Joyce 2004). While this variable is not assumed to exogenous, the IMF's liquidity ratio introduces exogenous variation in the interaction term because of an institutional rule in the IMF's Articles of Agreement that requires the Fund to review the quota subscriptions of its members every five years.[7] The IV exploits the fact that this exogenous temporal variation in the IMF's liquidity ratio, affects the degree to which past IMF participation influences present participation: In years in which the IMF's liquidity is high, the Fund is more likely to give loans to countries that would otherwise not get an IMF program (for further details see Lang 2016).

The strategy thus follows a difference-in-difference logic similar to the approach first proposed by Werker et al. (2009) and applied in a modified way by Nunn and Qian (2014). As we will control for the levels of the interaction term, we only have to assume that the interaction term is exogenous conditional on the level of its constituent terms. Assume, for instance, that there are unobserved variables correlated with both the Fund's liquidity and changes in credit ratings. This would only violate the exclusion restriction if this relationship was further depending on the country-specific probability. Put differently, the interaction term is exogenous to sovereign ratings to the extent that there are no unobserved variables correlated with the IMF's liquidity which also affect sovereign ratings differently conditional on how often the country received IMF

[7] See Lang (2016) for details. Like Lang we also run regressions in which we substitute the liquidity ratio with the amount of liquid resources in a robustness test.

programs in the past. The likelihood of such a complex relationship affecting the consistency of our estimates seems rather low, and we cannot think of plausible factors that fulfil these requirements.

In addition to limiting the risk of biased results, this identification strategy has another key advantage. It does not require us to control for variables that explain creditworthiness and could at the same time be the consequence of IMF programs, because the excludability of the IV is not conditional on these observables. We thus do not have to close these potential channels. All empirical strategies employed so far rely on conditioning on key determinants of creditworthiness because they are also correlated with the presence of IMF programs. However, these variables – mostly economic fundamentals and political indicators – can be "bad controls" because they could themselves be the outcomes of having an IMF program or not (Angrist and Pischke 2008). Controlling for them cancels out all the *implementation* effects IMF programs have on creditworthiness through changes in economic fundamentals and political indicators. This is why the literature was so far constrained to only examine the mere *signaling* effect of the IMF. Our theoretical considerations, however, suggests that IMF programs could have substantial effects on creditworthiness through implemented and observed changes in economic fundamentals and political indicators. As our approach allows us to add and remove controls, one can differentiate between the channels.

3.2 Dependent Variable: Sovereign Credit Ratings

Our main proxy to capture the creditworthiness of a country is its sovereign's long-term foreign-currency rating provided by the credit rating agency Standard & Poor's. While the literature does not fully agree on the general additional informational value that ratings convey, they possess features that make them more suitable than governments bond spreads to assess changes in creditworthiness. They are unaffected by program countries adjusting the bond supply, and affect the refinancing costs of the governments which essentially determine whether they can tap into international capital markets. In summary, we use ratings as they are prospective assessments of a country's future ability and willingness to meet its sovereign bond obligations. In contrast to government bond spreads they are independent of the country's current issuance volume and do not require us to arbitrarily choose specific bond maturities. They are usually also observed when temporarily less or no bonds are outstanding or issued, which is an important issue as we are dealing with countries in crises. In addition, ratings are not directly influenced

by changes in 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). They are also easily comparable across countries as they proxy for the same latent variable in each case.

Previous studies have related rating directly to changes in government bond spreads (Afonso, Furceri, and Gomes 2012), shown that they predict defaults (Reinhart 2002) and serve as a de-facto ceiling for the rating of private companies from the respective country (Borensztein, Cowan, and Valenzuela 2013). Moreover, many investment funds, in particular pension funds, are bound by internal rules or regulations to only invest in investment-grade bonds. In addition to the information effect that bonds assessments convey to other investors, this hard-wiring is another channel how ratings influence the refinancing costs of governments.

The criteria applied to assess sovereign bonds are broadly comparable across the agencies. Hence, our main estimations rely on ratings from S&P, which has the broadest coverage over the longest time period. In addition, we use ratings from Moody's and Fitch to show that the existing differences across agencies do no drive the results. As Fuchs and Gehring (2016) have shown that the cultural distance between an agency and a sovereign influences the rating it receives, we also look at rating agencies outside the US: **Ratings(Asia)** is the average of the ratings issued by the Japanese agencies Japan Credit Rating Agency (JCR) and Rating and Investment Information (R&I). **Ratings(No-US)** is the average of all Non-US agencies, including also the German agency Feri, the Canadian Dominion Bond Rating Services (DBRS) and Capital Intelligence (CI) from Cyprus.

We retrieve daily information on sovereign ratings by most agencies via Bloomberg (see Online Appendix B1 for details). The information on ratings published by Feri and Fitch was obtained directly from the agencies. To be able to assess the effects of an IMF program during the year on the assessment at the end, we use the ratings assigned at the year end. For our empirical analysis, all ratings have been translated to a 21-point scale in accordance with the literature (see Hill et al. 2010 for a similar approach). This means that we assign the highest value of 21 for an "AAA" rating. "C" and "D" in turn are translated into a value of one.

3.3. Treatment Variable

The treatment **IMF Program**$_{it}$, our variable of interest, 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** (Dreher 2006). In alternative specifications we also use the variable **IMF Approval**$_{it}$ which indicates the year in which an IMF program started. To further corroborate and specify our results we use an alternative monthly dataset in which we exploit information on the exact month an IMF program was approved; we coded these data based on the IMF's Monitoring of Fund Arrangements (MONA) database (IMF 2016).

3.4 Control Variables

We build on and combine the sets of explanatory variables employed in Cantor and Packer (1996), Archer et al. (2007) and Hill et al. (2010) to control for those country-specific economic and political factors that should capture the countries' ability and willingness to repay their debt.

To capture the sovereign's domestic economic performance, we employ the country's logged GDP per capita (in constant 2000 US dollars), GDP growth rate (also including a squared term), inflation rate (based on consumer prices), as well as natural resources measured as total natural resource rents as a percentage of GDP. To account for a sovereign's financial stability and fiscal performance, we control for a country's gross government debt-to-GDP ratio (government debt), its change over time (change in government debt), and two binary variables that account for reputational costs incurred from past defaults (default). We add the sum of the rated country's exports and imports (trade openness), current account balance, and debt owed to nonresidents (external debt) to account for a sovereign's external performance (all as a share of GDP).

We also control for eight measures of a sovereign's political and institutional performance: a sovereign's level of democracy (polity 2), a binary indicator of elections held during the last 12 months, the number of years the chief executive has been in office (years in office), a binary variable for executive ideology (left government), and indices for a country's rule of law, absence of internal conflict, absence of external conflict, and absence of military in politics. Finally, we also include logged population size and a binary variable whether a country is a member of the Eurozone.

These variables are drawn from the World Bank's World Development Indicators (WDI), the IMF (Abbas et al. 2010; Laeven and Valencia 2012), the Database of Political Institutions (Beck et al. 2001), the Polity IV Project (Marshall et al. 2013), and the

International Country Risk Guide (ICRG). All time-varying control variables enter as lagged moving averages over one or three years. Details and descriptive statistics about the control variable can be found in the Online Appendix, a justification and theoretical foundation for their inclusion is given in Fuchs and Gehring (2016). In addition, we include variables that the literature identified as typical correlates of IMF programs (Sturm, Berger, and de Haan 2005; Moser and Sturm 2011).

In sum, we run 2SLS panel regressions over a sample of 100 countries and the 1988 to 2013 period. As our identification strategy only requires us to assume the interaction term as an exogenous instrument, we control for *IMF Probability* in both stages. Year fixed effects control absorb the level effect of *IMF Liquidity*, and all our specifications include country fixed effects to control for time-invariant omitted factors. The Vector X' contains the control variables described above.

First stage (I):

$$IMFprogram_{i,t} = \alpha\, ln(IMFliquidity)_t * IMFprobability_{i,t} * \rho + \vartheta IMFprobability_{i,t} + \gamma X'_{i,t} + e_i + \tau_t + \varepsilon_{i,t}$$

Second Stage (II):

$$Rating_{i,t} = \beta \widehat{IMFprogram}_{i,t} + \theta IMF\ Probability_{i,t} + \delta X'_{i,t} + \alpha_i + \tau_t + \varepsilon_{i,t}$$

3.5 Descriptives

Variable	Observations	Mean	Standard Deviation	Min	Max
Rating S&P End	1286	13.72	5.02	1	21
Rating Moody's End	1081	14.28	4.98	2	21
Rating Fitch End	1019	14.3	4.99	1	21
rat1E_NOUS	782	15.57	4.29	4	21
IMF program	1286	0.21	0.41	0	1
IMF Agreement (binary)	1286	0.09	0.28	0	1
GDP p.c.	1286	8.82	1.37	5.69	11.38
GDP growth	1286	3.96	3.78	-17.95	17.51
Inflation	1286	0.06	0.07	-0.05	0.95
Debt/GDP	1286	48.3	30.05	0	230.31
worldGDPgrXIMFprob	1286	0.01	0.01	-0.02	0.04
Fraction of years under IMF	1286	0.21	0.23	0	0.89

4. Results

4.1 Baseline

We begin by looking at the simple correlation between the treatment variable, **IMF program**, and the S&P rating. Column 1 in Table 1 shows that the correlation is clearly negative with a large coefficient of -6.285. As we argued extensively above, it is intuitive to expect a large downward bias in the coefficient when not accounting for the endogenous relationship of the two variables. The subsequent specifications support this conjecture. When conditioning on country and time fixed effects in column 2, the point estimate decreases in absolute terms to -1.346, being still significant at the 1%-level. This shows that the naïve correlation in column 1 largely picks up time-invariant country characteristics and global time trends instead of estimating a causal effect. In column 3 we additionally augment the specification with the economic and political controls, all lagged by one year. The controls aim to condition on the initial state in which countries enter into IMF programs while the counterfactual countries do not. In other words, adding these controls should further diminish selection bias. Indeed, the coefficient of interest further moves towards zero and becomes -0.289 with a p-value of 0.065. Thus, when tackling endogeneity solely via conditioning on observables, we would conclude that IMF programs have an economically small, yet statistically significant, negative effect on the program country's attempts to regain creditworthiness.

The crucial question is now whether any significant remaining bias remains and in which direction it moves the estimated treatment effect. Column 4 shows the results of 2SLS regressions based on our interacted instrument. The bottom part of the table reports the first stage. The instrument easily passes all common tests. The underidentification test is passed with a p-value of 0.000, and the Kleibergen-Paap F-statistic testing for weak identification is way above the rule of thumb of 10 as well as above the more conservative threshold of 16.66 proposed by Staiger and Stock (2005). The importance of instrumenting even with a large set of controls can be seen when looking at the causal effect the 2SLS regression arguably estimates. It becomes positive at 0.404, and is statistically indistinguishable from zero. Thus, we can conclude that on average IMF programs neither harm nor help countries to directly restore their creditworthiness.

Table 1

Dependent Variable	Coefficient/ SE/ P-Value				
S&P Credit Rating	(1)	(2)	(3)	(4)	(5)
IMF program	-6.285	-1.346	-0.289	0.404	2.843
	[0.525]	[0.298]	[0.155]	[0.885]	[0.947]
	{0.000}	{0.000}	{0.065}	{0.648}	{0.003}
Country fixed effects	No	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	Yes	Yes
Economics Controls	No	No	Yes	No	Yes
Political Controls	No	No	Yes	No	Yes
Number of Observations	2047	2047	1287	2047	2047
Adjusted R-squared	0.209	0.107	0.536		
First Stage					
Fraction of IMF years				3.719	3.757
				[0.579]	[0.517]
				{0.000}	{0.000}
LQR X IMFprob				-0.458	-0.376
				[0.077]	[0.071]
				{0.000}	{0.000}
Kleibergen-Paap underidentification LM				16.043	13.637
K-P underidentification p-value				0.000	0.000
K-P weak identification F-statistic				35.800	28.356

As hypothesized above, we expect that IMF interventions affect creditworthiness in two ways. First, the implementation of immediately realized adjustments, which can include drastic reforms with potentially contractionary consequences. Second, the expectations about the future policy path of the country that the IMF's presence gives rise to. To isolate this signaling effect, we augment the specification with economic and political variables that rating agencies observe when they assign their credit ratings. They should thus capture these immediate adjustments. We discover that this conditional effect of IMF programs is positive with a point estimate of 2.843 and a p-value of 0.004 (column 5). Thus, the IMF leads to significant improvements in the perceived creditworthiness of the program country when conditioning on indicators rating agencies also observe. This effect corresponds to a change of about three notches, corresponding, for instance, to a change from BBB to A. Besides being statistically significant, the effect is thus also economically substantial. The most straightforward interpretation of this finding is that when comparing countries with similar macroeconomic and political fundamentals credit agencies assign better ratings to countries that are currently under an IMF program.

4.2 Channels

It is important to understand the exact implications of these findings and the econometric approach in detail. In column 4, we have identified the causal unconditional effect of having an IMF program. The reason is that the IV captures exogenous variation without conditioning on control variables. This enables us to disentangle the signaling effect from the implementation effect. Given that the signaling effect is positive, the immediate adjustment measures themselves should contribute negatively to the overall treatment effect. This suggests that IMF program countries implement harsher reform measures which in the short term can lead to deteriorations in certain outcome measures. Now we are interested in which reform measures can explain this difference between the unconditional effect and the pure signaling effect.

Table 2 hence adds economic variables step by step. We focus on those factors that the literature identified as the most robust determinants of creditworthiness: GDP p.c., GDP growth, inflation and the debt over GDP ratio. Credit rating agencies observe these variables and take them into account when assigning their rating. Column 2 to 5 show that each variable individually increases the coefficient from its initial value of 0.404. The smallest p-value for the conditional signaling effect is 0.139, thus smaller than before but still above conventional levels of significance. When conditioning on all four indicators, however, the coefficient already increases up to 2.646. In other words, when accounting for the effect of IMF reforms on GDP and its change, the inflation rate and the debt ratio alone is sufficient to see that conditional on these adjustments the IMF can really be seen as a "seal of approval".

Table 2

Dependent Variable						
S&P Credit Rating	(1)	(2)	(3)	(4)	(5)	(7)
IMF program	0.404	1.133	0.694	0.982	1.181	2.646
	[0.885]	[0.766]	[0.892]	[0.858]	[0.865]	[0.875]
	{0.648}	{0.139}	{0.436}	{0.253}	{0.172}	{0.003}
GDP p.c.		7.041				6.010
		[1.239]				[1.080]
		{0.000}				{0.000}
GDP growth			0.127			0.090
			[0.026]			[0.027]
			{0.000}			{0.001}
Inflation				-7.753		-6.057
				[1.923]		[1.477]
				{0.000}		{0.000}
Debt/ GDP					-0.047	-0.039
					[0.008]	[0.008]
					{0.000}	{0.000}
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Economics Controls	No	No	No	No	No	No
Political Controls	No	No	No	No	No	No
Number of Observations	2047	1885	1899	1796	1848	1753
Kleibergen-Paap underidentification LM	16.043	16.169	16.872	14.483	14.996	14.196
K-P underidentification p-value	0.000	0.000	0.000	0.000	0.000	0.000
K-P weak identification F-statistic	35.800	41.782	37.908	32.053	34.627	33.384

4.3 Other Agencies

In a next step, we examine whether these results are solely an artefact of using Standard & Poor's ratings, or whether we have discovered a more general pattern. For that purpose, we replicate the prior results from Table 1, column 4 and 5, for **Rating(Moody's)**, **Rating(Fitch)**, **Rating(No-US)** and **Rating(Asia).** Columns 1-4 show that comparable to the results for S&P, the unconditional causal effect of an IMF program is statistically indistinguishable from zero. The coefficient estimates are all positive, except for the average of the Asian agencies.

When conditioning on the immediate economic and political adjustments, we again observe that the effect becomes more positive, with coefficient estimates ranging from 2.120 to 5.776. The estimates have p-values ranging from 0.002 to 0.026. This increases our confidence that there really is a distinction between the implementation effect of immediate reforms, and the positive way in which the IMF's presence serves as a signal that improves the rating agencies' expectations about the countries future development.

One note on the size of the coefficients. Arguably, they are rather high, and might even seem surprisingly high for those familiar with the sovereign credit rating literature. However, remember that we are in this study mostly concerned with countries in severe crisis, often close to default prior to the IMF's involvement. Also note the often immense amounts involved in these programs and the severity of the reforms that are often implemented. At the lower end of the rating distribution, whether these reforms (are expected to) succeed can make a huge difference, which helps to put the coefficient estimates into perspective.

One of the most important reasons why this extension is so valuable is that it demonstrates that the positive signaling effect is not solely an artefact or driven by a certain US world view. The other agencies also agree in their assessments that the IMF will help to shift the balance within the country favorably towards reforms that will improve their ability to repay their debt. There is one caveat, however. We cannot fully rule out that expectations about future bail-outs are partly responsible for this positive outlook. This hypothesis should further be examined in future research, along with the exact time structure and the way IMF programs affect counties over time during the course of the program. For our purpose, we conclude that the program helps to restore the country's creditworthiness via an improved outlook on its future economic policies.

Dependent Variable: Rating from	Moody	Fitch	NOUS	Asia	Moody	Fitch	NOUS	Asia
	Coefficient/ SE/ P-Value							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IMF program	1.610	0.179	0.714	-0.486	4.963	5.776	2.120	3.617
	[1.292]	[1.262]	[0.931]	[2.056]	[2.082]	[2.588]	[1.158]	[1.967]
	{0.213}	{0.887}	{0.443}	{0.813}	{0.017}	{0.026}	{0.067}	{0.066}
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economics Controls	No	No	No	No	Yes	Yes	Yes	Yes
Political Controls	No	No	No	No	Yes	Yes	Yes	Yes
Number of Observations	1836	1570	1050	825	1156	1073	795	610
Kleibergen-Paap underidentification LM	11.125	14.376	13.500	5.888	7.875	4.938	9.657	7.872
K-P underidentification p-value	0.001	0.000	0.000	0.015	0.005	0.026	0.002	0.005
K-P weak identification F-statistic	23.957	27.565	36.535	12.229	14.680	6.412	20.008	11.539

4.4 Robustness

To test for the robustness of our results, we run several additional tests. First, we follow Lang (2016) and apply an alternative measure of the Fund's liquidity (the amount of liquid resources). As can be seen in columns 1 and 2 we get the same result when doing so. Column 3 and 4 show that the results also hold when using a binary variable that indicates only the year in which an agreement with the IMF was reached, and not in subsequent program years. The results are very similar. Moreover, controlling for the lagged depended variable could account for possibly unobserved confounders, and further assure that we only compare initially comparable countries. Results stay also similar when we exclude observations related to the European debt crisis. Lastly, the results are not confounded by holding the sample constant across specifications.

Dependent Variable S&P Credit Rating Coefficient/ SE/ P-Value

	IV2	IV2	Agreement	Agreement	Lagged Dep	Lagged Dep	W/o crisis	W/o crisis	Sample Const
	(1)	(2)	(3)	(4)	(5)				
IMF program	-0.850	3.921			-0.483	1.108	0.505	2.423	0.171
	[1.191]	[1.518]			[0.281]	[0.424]	[0.743]	[0.736]	[0.889]
	{0.475}	{0.010}			{0.085}	{0.009}	{0.497}	{0.001}	{0.847}
IMF agreement			0.792	5.770					
			[1.728]	[1.901]					
			{0.647}	{0.002}					
Lagged Dependent variables					0.810	0.625			
					[0.028]	[0.057]			
					{0.000}	{0.000}			
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Economics Controls	No	Yes	No	Yes	No	Yes	Yes	No	Yes
Political Controls	No	Yes	No	Yes	No	Yes	Yes	No	Yes
Number of Observations	2045	1287	2045	2045	1920	1222	1441	1016	1287
Kleibergen-Paap underidentification LM	14.038	8.569	18.674	12.810	13.973	14.937	21.108	15.567	20.015
K-P underidentification p-value	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
K-P weak identification F-statistic	22.903	14.301	44.059	21.248	34.747	35.483	46.792	34.349	55.974
First Stage									
fraction of IMF years	7.167	6.813							
	[1.290]	[1.192]							
LR X IMFprob	-0.531	-0.448							
	[0.111]	[0.119]							

5. Conclusion

As the international lender of last resort the IMF's task is to provide countries with external financial assistance for periods during which they have no access to alternative source of funding. This is why it should arguably be a key goal of the IMF's programs to help these countries to regain access to international financial markets. Accordingly, we examined whether the IMF succeeds in improving the creditworthiness of its programs countries.

Our preliminary results suggest that IMF programs on average have no unconditional effect on creditworthiness. For countries with similar macroeconomic fundamentals, however, credit rating agencies appear to assign better ratings to those under IMF programs. This difference can be explained by differentiating a positive *signaling* effect from a negative *implementation* effect: IMF programs in the short-run often have contractionary economic effects that would affect creditworthiness negatively, if the IMF program would not function as a "seal of approval" that credit rating agencies interpret as a positive signal for the countries anticipated policy path regarding creditworthiness.

In our view, the inconsistency of extant empirical evidence is, on the one hand, likely to be due to the fact that these different channels have not been differentiated. On the other hand, we also argue that the empirical focus on sovereign credit ratings circumvents several problems the existing literature struggles with. Our results also show how crucial it is to account for endogeneity. With regards to the literature on IMF programs at large, our results can help to shed light on so-called "recidivism" (Bird, Hussain, and Joyce 2004). The unconditional null effect contributes to explaining why so many countries keep on falling back into IMF programs – a well-established finding in the literature (Moser and Sturm 2011; Sturm, Berger, and de Haan 2005).

Future research should focus on the role played by moral hazard. It is not yet clear how much of the effects we and others find is attributable to creditor and debtor moral hazard. Secondly, conditionality in IMF programs and its relation to creditworthiness should be investigated. Identifying heterogeneous effects on creditworthiness depending on the conditions attached to IMF loans could further help to differentiate harmful conditions from beneficial ones. That way, the IMF could improve on helping countries to get back on their own feet by regaining access to international capital markets.

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