EUROPEAN CENTRAL BANK
EUROSYSTEM

# Working Paper Series

Andreas Kern, Bernhard Reinsberg,
Matthias Rau-Goehring

## The role of IMF conditionality for central bank independence

No 2464 / August 2020

**Abstract**

This paper studies the role of the International Monetary Fund (IMF) in promoting central bank independence (CBI). While anecdotal evidence suggests that the IMF has been playing a vital role for CBI, the underlying mechanisms of this influence are not well understood. We argue that the IMF has ulterior motives when pressing countries for increased CBI. First, IMF loans are primarily transferred to local monetary authorities. Thus, enhancing CBI aims to insulate central banks from political interference to shield loan disbursements from government abuse. Second, several loan conditionality clauses imply a substantial transfer of political leverage over economic policy making to monetary authorities. As a result, the IMF through pushing for CBI seeks to establish a politically insulated veto player to promote its economic policy reform agenda. We argue that the IMF achieves these aims through targeted lending conditions. We hypothesize that the inclusion of these loan conditions leads to greater CBI. To test our hypothesis, we compile a unique dataset that includes detailed information on CBI reforms and IMF conditionality for up to 124 countries between 1980 and 2014. Our findings indicate that targeted loan conditionality plays a critical role in promoting CBI. These results are robust towards varying modeling assumptions and withstand a battery of robustness checks.

JEL Classification: E52, E58, F5

Keywords: Central bank independence; International Monetary Fund; conditionality; international political economy.

**Nontechnical summary of *The Role of IMF Conditionality for Central Bank Independence***

It is an established result that central bank independence (CBI) produces a number of benefits for the society as a whole. Independent central banks have been able to achieve lower levels of inflation (see e.g. Grilli, Masciandaro and Tabellini, 1991) without sacrificing output or employment (Alesina and Summars, 1993). At the same time, CBI is able to resolve the so-called time 'inconsistency problem' (Kydland and Prescott, 1977) of monetary policy making - an incumbent's inability to publicly commit to a specific course of monetary policy. While these mechanics have been well-understood, the dynamic evolution of central bank independence as well as its underlying determinants has been in the focus only recently (see e.g. Bodea and Hicks 2015, Ainsley 2017, and de Haan et. al 2018). This paper contributes to this growing literature by focusing on the IMF's role as a catalyst for the dynamic evolution of central bank autonomy.

The IMF, through its loan conditionality, has been an advocate of CBI since long and a number of papers have tried to link IMF conditionality with CBI (e.g. Eichengreen and Dincer 2011, Romelli 2014, and Bodea and Hicks 2015). While these papers are able to show a positive association of CBI and IMF conditionality, neither the type of central bank reform nor the type of IMF loan conditionality are assessed. Providing a coherent political-economy framework, this paper reveals the underlying mechanism between IMF conditionality and CBI. Thus, this paper aims to provide answers to the questions why the IMF cares about CBI in the first place and why governments often follow suit with comprehensive monetary policy reform. We focus on four sub-indicators of CBI conditionality to match the respective dimensions of the CBI index, namely measures capturing the independence of the central bank governor, the central bank mandate, day-to-day central bank policy, as well as protecting misuse of IMF resources or central bank funding lines from government entities.

Our empirical analysis covers 124 countries between 1980 and 2012 and uses the composite index of CBI compiled by Bodea and Hicks (2014) as well as the IMF conditionality database (Kentikelenis et al. 2016). Following an instrumental variable approach addressing both potential endogeneity of CBI conditionality as well as non-random selection into IMF programmes, we find a robust positive effect of CBI conditionality in IMF programmes on CBI. These results withstand a whole battery of robustness checks. The paper also shows that IMF CBI conditionality has a stronger effect in countries with many veto players (where the IMF can tip the domestic balance toward the adoption of CBI), small open economies that rely heavily on international capital flows (in which case CBI can serve as

an important signalling device to international investors), and countries experiencing financial crisis episodes (when governments lack credibility of their policy reforms).

Our findings have important policy implications. The IMF's CBI conditionality is effective in promoting CBI. This effect is stronger in countries in which the adoption of CBI conditionality either mitigates costs or enhances the benefits of CBI. Given that central banks around the globe are subject to rising political pressure, we believe that the IMF's role as guardian of politically independent monetary policy-making will increase significantly in the future.

# 1 Introduction

It is well established that central bank independence (CBI) produces all sorts of benign outcomes. CBI is associated with lower inflation, better sovereign credit ratings, enhanced capital inflows, and to a certain degree greater financial stability that ultimately translates into more stable economic output growth (e.g., Bodea and Hicks, 2015). Although most research relies on the implicit assumption that CBI is exogenously given, a lively debate remains around the question why some governments delegate monetary policy to an independent central bank whereas others remain reluctant to do so?

Existing research emphasizes the role of an entire battery of domestic and external economic, political, and social factors that lead to CBI (e.g., de Haan et al., 2018). In this literature, a particularly important role has been assigned to the IMF (Polillo and Guillén, 2005; Eichengreen and Dincer, 2011; Romelli, 2014). At the same time, few attempts have been made to isolate the mechanisms linking IMF conditionality to CBI. For example, Eichengreen and Dincer (2011), Romelli (2014), and Bodea and Hicks (2015) find that IMF program participation is positively associated CBI, but do neither assess the type of central bank reform nor the type of IMF loan condition that would explain this positive association. In fact, the role of IMF loan conditionality in the context of CBI remains largely a 'black box.' In this article, we are trying to unpack critical mechanisms within this black box. Instead of replicating the results of prior research, our aim is to provide a coherent theoretical framework to explain (a) why the IMF cares about CBI and (b) why governments often follow suit with comprehensive monetary policy reform.

Historically, the IMF has pushed several countries towards implementing central bank reform when providing emergency loans. In particular, the Fund has often explicitly spelled out prohibitions of monetary financing and required governments to implement reforms in the conduct of monetary policy when formulating loan conditions (Polillo and Guillén, 2005; Johnson, 2016; Bossu, Hagan and Weenink, 2017). For example, during the Asian Financial Crisis in the 1990s, IMF conditionality played a critical in pushing governments to loosen their grip on monetary authorities (Cargill, 2001; Polillo and Guillén, 2005; Corsetti, Guimaraes and Roubini, 2006). Furthermore, the IMF has been an active advocate for CBI and even threatens to withdraw from loan commitments to block governments' attempts of undermining CBI (e.g., Johnson, 2016). In 2011, the IMF threatened

the Hungarian government to withdraw from its Stand-by Loan Agreement if policymakers were enacting and implementing new central bank legislation aimed at removing CBI (Bodea and Hicks, 2016).

From the IMF's perspective, CBI conditionality is not necessarily an ideological instrument. In fact, there are several practical/pragmatic reasons why the IMF attaches CBI conditions to its loans. First, CBI is a strong signaling device for investors concerning the soundness of future macroeconomic policies (Maxfield, 1997; Polillo and Guillén, 2005; Bodea and Hicks, 2016). Thus, requiring governments to enhance CBI, the IMF envisions to boost confidence among international investors to relief pressure from a country's balance of payments. Second, loans are primarily transferred to local monetary authorities. In this regard, the IMF's due diligence protocol – before disbursing loans – foresees a thorough investigation into the operational and legal proceedings of monetary authorities to safeguard these funds (IMF, 2015). Through enhancing CBI, the IMF aims to insulate central banks from political interference which is essential to minimize the risks of government abuse of disbursed funds. Third, loan conditionality clauses leading to a higher level of CBI imply a substantial transfer of political leverage over economic policy making to monetary authorities (e.g., Bodea and Higashijima, 2017). As a result, the IMF through pushing for CBI seeks to establish a politically insulated veto player within the borrowing country to constrain excess credit creation and promote its economic policy reform agenda (Nelson, 2017).

From a government's perspective, CBI implies substantial economic and political benefits, which come at the expense of losing direct control over a powerful tool to disburse cheap credit and to stimulate the economy. In particular, painful interest rate adjustments, a cutting-off of special funding windows, and the elimination of credit subsidy schemes for key political constituents make it often hard for an incumbent to craft a critical majority for CBI and to credibly commit to monetary reform (e.g., Aklin and Kern, 2019). Thus, governments often neither have incentives to give up control over this economic policy 'basooka' nor sufficient political capital to implement deep seated monetary reform (Bernhard, 1998; Cargill, 2001). In these situations, the IMF entering the domestic policy scene has the potential to swing the domestic balance towards CBI. Especially, when domestic veto players cannot agree on or simply block monetary reforms, CBI loan conditionality can provide governments with an external policy anchor (Eichengreen and Woods, 2016). Besides tipping the

domestic political balance, IMF involvement sends a positive signal to international investors about the viability of CBI and thus enhances the credibility of monetary reform (Beazer and Woo, 2016). As many emerging market and developing economies simply lack qualified personnel, the basic financial infrastructure (e.g., functioning money markets), and overall do not have the institutional and technical prerequisites to successfully implement CBI, the IMF can bridge these gaps through providing targeted technical assistance (Johnson, 2016). Taken together, we hypothesize that CBI conditionality is conducive for monetary reform and leads to greater CBI. We expect this effect to be most pronounced in emerging market economies that heavily rely on international capital inflows.

To test our main hypothesis, we compiled a unique dataset that includes detailed information on IMF conditionality concerning monetary policy and CBI reforms for up to 124 countries between 1980 and 2012. Utilizing these data allows us to draw on detailed information about explicit IMF-mandated policy conditions aimed at enhancing CBI. Our preliminary quantitative findings indicate that targeted loan conditionality play a critical role in promoting CBI. On average, IMF programs with CBI conditionality increase the CBI index (ranging from 0 to 100) by 2.5 index points, compared to IMF programs without CBI conditionality. These results are robust towards varying modeling assumptions and withstand a battery of robustness checks. Given recent debates on the viability of CBI, our findings have important policy implications concerning the role of the IMF in promoting and shielding central bank autonomy.

We contribute to several lines of the literature. First, we complement a fast-growing political economy literature on the dynamic evolution of central bank autonomy and its underlying determinants (Bodea and Hicks, 2015; Ainsley, 2017; de Haan et al., 2018). In particular, we are trying to address the role of the IMF in promoting CBI. Although several authors refer to the prominent role of the IMF in the context of CBI (Polillo and Guillén, 2005; Eichengreen and Dincer, 2011; Romelli, 2014), few attempts have been made to isolate the mechanisms linking IMF conditionality to CBI. In comparison to this earlier work, our approach offers a more fine-grained view on IMF involvement in central bank reform. While previous research long noted the desirability of gaining "*access to the detailed terms of [all] IMF programs*" (Polillo and Guillén, 2005, 1775), such data have become available only recently (Kentikelenis, Stubbs and King, 2016).

Second, we aim to complement a comparably large political economy literature on IMF loan conditionality (Copelovitch, 2010; Breen, 2013; Dreher, Sturm and Vreeland, 2014). In this context, our contribution is most related to research that focuses on structural reform conditions and their effectiveness (Beazer and Woo, 2016; Nelson, 2017). In particular, we aim to exploit the heterogeneity afforded by our dataset to analyze the IMF's role in domestic monetary institution building. In this respect, using a novel dataset on IMF loan agreements allows us to gain we can overcome a significant short-coming in prior research.

Finally, our contribution has important policy implications. As Beazer and Woo (2016) point out, it is often unclear "*when IMF conditionality encourages reform progress and when does it impede reforms?*" Our work shows that the IMF's CBI loan conditionality faces less political obstacles, which makes it more appealing to domestic policymakers and thus a highly potent policy instrument. Given that central banks around the globe are subject to rising political pressure, we believe that the IMF's role as guardian of politically independent monetary policy-making will increase significantly in the future.

## 2 Background: The IMF and CBI Conditionality

In traditional models describing IMF lending relationships, the Fund hands out loans to governments, which are often in desperate need of fresh capital to stabilize their balance-of-payments. Since IMF lending operations started in the 1970s, the IMF has increasingly and to a greatly varying degree attached conditions when it provided a helping hand (Bird, 2007; Breen, 2013; Dreher, Sturm and Vreeland, 2014). Attaching conditions to its loan disbursements, the Fund pursues two complementary goals. First, it aims to effectively reduce mounting pressures on the balance-of-payments and mobilize sufficient funds to pay off (or calm down) creditors (Corsetti, Guimaraes and Roubini, 2006). Second, the IMF wants to ensure repayment of its loans and thus is interested in safeguarding its loan disbursements from government abuse (Hillman, 2004; Dreher, 2009; Breen, 2013).

Built around general balance-of-payments considerations, loan conditionality often aims at pushing governments to implement policies that effectively remove underlying distorting factors that drive the imbalance of the balance-of-payments (e.g., Dreher, 2009). In general, these distortions

arise from ballooning public deficits that are funded through excess money creation (Reinhart and Rogoff, 2008). To put an end to these developments and limit the scope of political agency undermining adjustment programs, the IMF frequently requests governments to implement radical spending cuts, in several instances, alongside significant structural adjustment measures (Nooruddin and Simmons, 2006; Vreeland, 2006; Hamm, King and Stuckler, 2012). Whereas, historically, the IMF requested the implementation of nominal austerity program measures (to target nominal macroeconomic outcomes), structural adjustment programs that directly target a country's institutional core framework were increasingly prescribed since the 1980s (Kentikelenis, Stubbs and King, 2016; Beazer and Woo, 2016; Rickard and Caraway, 2017).

In terms of monetary policy-making, before the 1990s, the IMF regularly attached a standard set of monetary conditions to its loans. These were primarily aimed at containing an exhaustion of international reserves and prevent excesses in domestic credit creation. Requiring governments to adhere to a minimum floor on the amount of the central bank's foreign reserves and enforcing a ceiling on central bank credit/assets, the IMF's goal was to attain "*a sustainable balance-of-payments position*" (Blejer et al., 2002, 440). However, during the 1990s, the IMF expanded its arsenal of loan conditions targeting the institutional configuration of monetary policy-making. Besides its traditional requests, the IMF demanded countries to cut central bank funding for governments, replace central bank governors, prioritize anti-inflationary central bank policies, and, in some cases, even was pushing for full fledged central bank reform.

The recent case of Argentina is a prime example. Facing soaring inflation above 25 per cent and the Peso losing almost one third of its value within less than a year, President Macri, running out of policy options in May 2018, turned to the IMF for a $50 billion Standby Agreement to calm financial markets.[1] As response, in her press briefing on the Argentinian Stand-by Agreement, Christine Lagarde stated that the IMF was "*encouraged by the authorities' commitment to ensure legal independence and operational autonomy for the central bank.*"[2]

Whereas in the late 1970s, the IMF hardly included any CBI conditions, we observe almost 30 loan conditions targeting CBI during the mid 1990s (see, Figure 1). Although more recent

[1] Wall Street Journal. "Argentina Seeks Credit Line From IMF." May 8th, 2018.

[2] *IMF*. "IMF Reaches Staff-Level Agreement with Argentina on a Three-Year, US$50 Billion Stand-By Arrangement." June 7, 2018.

IMF loan conditions feature less CBI conditionality, it has become a standard prescription in the IMF's emergency loan toolbox. Since March 2000, the IMF has even institutionalized a so-called safeguards assessment of central banks, which all loan recipients have to undergo prior to accessing funds.[3] Based on these assessments, the Fund often formulates additional loan conditions, requiring countries to enhance CBI. Besides reflecting a shift in the mainstream view in academic and political circles about the viability of politically insulated monetary policy-making (e.g., Polillo and Guillén, 2005), there were several reasons that led to the adoption of wider CBI conditionality.

First, in crisis situations that arise from monetary excesses, the credibility of monetary policy is severely undermined (Blejer et al., 2002; Reinhart and Rogoff, 2008; Alesina and Stella, 2010). This loss in monetary credibility implies that no matter how hard monetary authorities lean against capital outflow pressures through increasing interest rates, financial investors will likely have doubts about the viability of these policy measures and subsequently place additional rounds of speculative attacks. For example, Thai monetary authorities were aggressively raising interest rates in their attempt to maintain the currency peg, but could not withstand the speculative forces, tearing down the fixed exchange rate peg of the Thai Baht on June 2nd 1997 (Reinhart and Rogoff, 2008). Given that financial crises erode monetary credibility, the IMF recognized the need to strengthen the institutional foundations of monetary policy-making, for which CBI conditionality has become the standard instrument (Blejer et al., 2002).

Second, IMF loans are primarily transferred to local monetary authorities. Thus, political interference in monetary policy-making constitutes a major threat to IMF loan disbursements. Besides, directly funneling funds to the treasury, governments can use their central banks to perform an entire battery of quasi-fiscal operations such as imposing excess minimum reserve requirements forcing private banks to absorb surplus debt positions, providing special lending windows to state-owned banks, and/or directly disbursing subsidized loans or issuing loan guarantees to a government's to key constituents (Buttari, 1995; Maziad, 2009; Menaldo, 2015). For instance, in the run-up to the Jordanian financial crisis in 1989, almost 60 per cent of the government budget was funded with central bank money (Maziad, 2009). As many of these practices allow governments to reroute

[3]It consists of a multi-step process that aims "*to minimize the possibility of misreporting or misuse of Fund resources associated with the Fund's lending activities*" (IMF, 2005, 1). An in-depth review of the institutional and legal independence of monetary authorities constitutes an integral part of this process.

Figure 1: **IMF and CBI in Historical Perspective**.

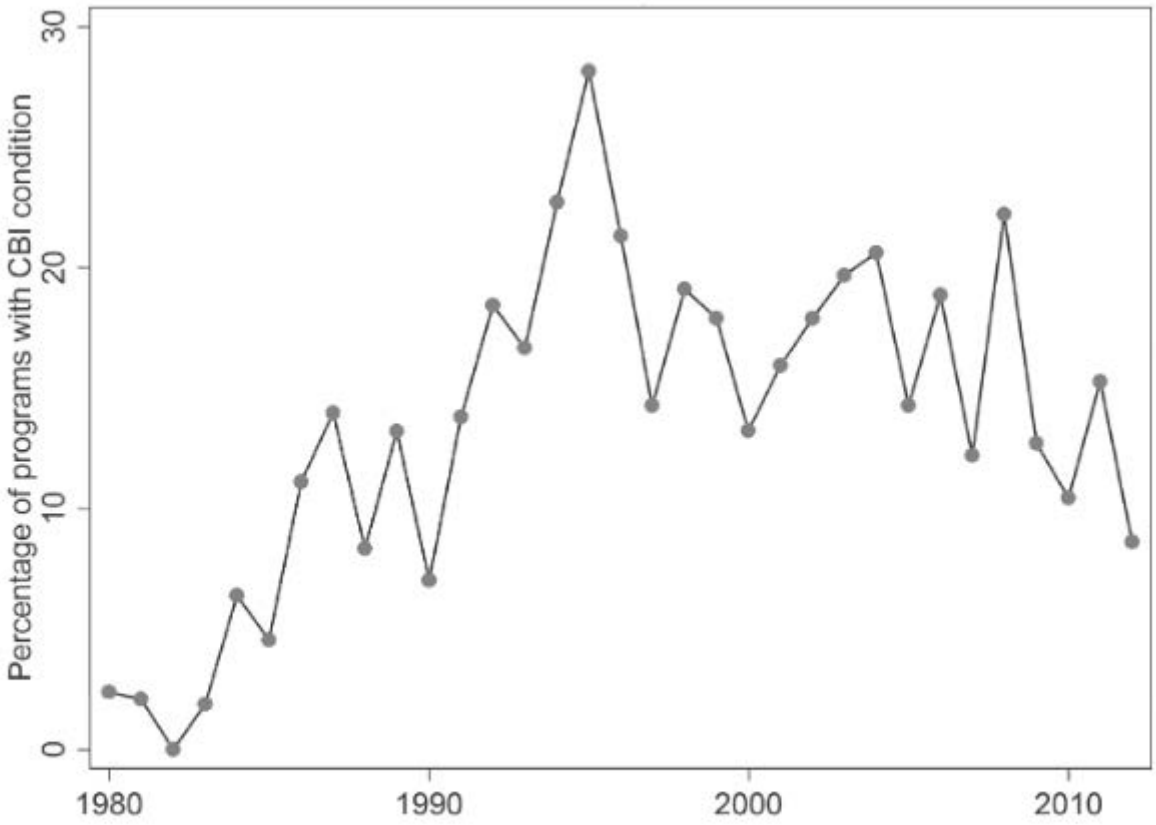


**Fig. 1.** Evolution of CBI conditionality.
*Source*: Own coding based on IMF conditionality database (Kentikelenis et al., 2016)

funds from their central banks, the IMF has often attached institutional CBI loan conditions with a particular focus on cutting the tight cord between monetary authorities and governments to shield its loan disbursements from "*willful override of controls or manipulation of data*"(IMF, 2005, 2).

Finally, loan conditionality clauses leading to a higher level of CBI imply a substantial transfer of political leverage over economic policy-making to monetary authorities (e.g., Bodea and Higashijima, 2017). In particular, the IMF through pushing for CBI seeks to establish a politically insulated ally within the borrowing country to promote its economic policy reform agenda (Johnson and Barnes, 2015; Ban, 2016; Nelson, 2017). The case of Romania is particularly illustrative. Similar to other Eastern European countries, the Fund was a critical driving force behind legal and political independence of the Bank of Romania during the 1990s (Ban, 2016). During this time the BNR became the IMF's "*most sympathetic interlocutor on the domestic policy scene*" (Ban and Garbor, 2009, 10). In this role, the BNR was following suit implementing restrictive monetary policies, cutting off state-owned banks from special funding windows, and advocating for fiscal restraint even in times of economic slack. In fact, locking the BNR into a close alliance became essential for the IMF to effectively nudge the government into painful austerity measures (Ban, 2016). In exchange, the BNR benefited from this arrangement as it could shift blame for any type of financial turbulence and painful austerity measures on the government (Ban and Garbor, 2009).

Against this background, we believe that the IMF has a strong motive to include CBI conditions in loan agreements. Similar to other loan conditionality clauses, the inclusion of CBI conditions will be subject to substantial discretion. In particular, those countries that have close political ties to the IMF's main shareholders are less likely to receive a stringent IMF treatment in comparison to those countries that do not have these ties (Vreeland, 2006; Dreher, 2009). Thus, we expect that these politically important countries are less likely to receive CBI conditionality (Dreher and Jensen, 2007; Stone, 2008).

## 3 Theoretical Considerations

Our starting point is that the IMF's loan conditionality is effective in promoting CBI. Thereby, we do not dismiss the idea that other political and economic factors might play a key role in governments' decision of granting legal and political independence to monetary policy. Take for instance, the

case of Colombia, where a new elected administration granted the Banco de la República Colombia full operational and legal independence in 1991. Enshrining the legal independence of the central bank in the country's new constitution (i.e., Law 9), President Gaviria's move caught even the IMF by surprise (CIA, 1993; IMF, 1995; Edwards, 2001). Similarly, in the UK, New Labour took it on itself to grant independence to the Bank of England, shortly after assuming office in 1997. Again, the IMF was left out and had to assume the role as cheer leader, applauding the incoming Blair administration for their boldness to strengthen the UK's macroeconomic framework. Whereas in Colombia, the independence of monetary authorities was embedded in large-scale institutional reform to end long-standing political upheaval (Edwards and Steiner, 2000; Hudson, 2010), the Blair administration tried to signal its commitment to sound macroeconomic policy-making and break with Labour's inflationary reputation (Hodson and Mabbett, 2009; Dow, 2017). An entire battery of domestic and external political, social, and economic factors come into play when governments decide to grant monetary authorities greater political and legal independence (Bernhard, 1998; Poast, 2015; de Haan et al., 2018). In fact, when governments choose to implement CBI they face a comparably complex trade-off between the benefits and costs of CBI.

On one hand, CBI implies substantial economic and political benefits. CBI is a strong signal to domestic and international investors that a government is deeply invested in restoring monetary credibility (Maxfield, 1997; Polillo and Guillén, 2005; Bodea and Hicks, 2014). For example, in the case of Post-Soviet transition economies, Johnson (2016, 72) argues that the "*choice for central bank independence represented more than a ready-made solution to restore economic order.*" Besides leading to lower inflation, CBI can expected to lead to lower risk premia on public and private borrowing and thus be incremental to attract fresh capital (Alesina and Summers, 1993; Bernoth, von Hagen and Schuknecht, 2004; de Haan et al., 2018). To give an example; Bernoth, von Hagen and Schuknecht (2004) analyzing European sovereign bond markets before and after the introduction of the Euro – which meant a *de facto* transition to CBI for many European countries – show that sovereign spreads declined substantially.

In addition to these anticipated economic dividends, enhancing CBI can also produce political benefits for a sitting government. In particular, an independent central bank can be blamed for adverse consequences of policy measures such as raising interest rates or painful financial consolida-

tions and thus represents a politically valuable scapegoat (de Haan and Eijffinger, 2019; Fernández-Albertos, 2015; Goodman, 1991). For instance, in the case of South Korea, the government's intention for CBI was to deflect from its own failure of dealing with non-performing loans (Cargill, 2001). Upgrading to CBI, an incumbent government can also signal constituents its competence and thus bolster domestic and international legitimacy (McNamara, 2002; Polillo and Guillén, 2005). Furthermore, CBI provides an important institutional pillar to hinder the government to inflate the economy and makes it an attractive option to sway politically opposing parties (Hallerberg, 2002; Bernhard, Broz and Clark, 2002; Lohmann, 1998).[4] In presence of powerful interest groups favoring price or exchange rate stability, central bank reform can represent an important bargaining chip for buying support from important key constituents and thus reduce political resistance (Epstein and Rhodes, 2016; Edwards, 2001; Treisman, 2000; Posen, 1998).

On the other hand, CBI implies that a government has to give up control over a powerful weapon from its economic policy arsenal to inflate the economy and appease key constituents. Monetary policy reform often implies painful interest rate adjustments, a cutting-off of special funding windows, and the elimination of credit subsidy schemes for key political constituents. In fact, in many countries, monetary authorities have effectively been functioning as development banks – disbursing subsidized loans to politically important economic sectors (Maxfield, 1997; Edwards, 2001; Menaldo, 2015). The example of Colombia in the 1990s is a case in point. Before monetary reform in 1991, monetary authorities were responsible to manage and disburse subsidized loans to commodity exporters and politically important economic sectors (Edwards, 2001).

Furthermore, control over monetary policy is essential to control exchange rate dynamics and shield key political constituencies from adverse exchange rate movements. Take for instance the case of Russia. Shortly after coming to power, President Putin reigned in CBI to retain full government control over the management of the Ruble (Johnson, 2016). Similarly, financial players were opposing CBI in Turkey in the late 1990s, as they were benefiting from excessively high real interest rates in sovereign bond markets – which was driven by double digit inflation rates – in addition to preferential access to central bank funding windows (Öniş and Bakir, 2007). Thus, societal groups that have been benefiting from high inflation rates and/or special funding windows, will try to sway

[4] In particular, in federal systems, governments need the buy-in from regional/local authorities.

governments to delay or even walk away from comprehensive monetary reform. Far more importantly, governments are often reluctant to give up control over interest rates on sovereign bonds and hand it to an independent central banker. In his memoirs, Gordon Brown illustrates that many British policymakers were struggling "*to give up the levers of power which the control of interest rates, [...], represented*"(Brown, 2017, 115).

Taken together, governments facing this trade-off often find it difficult to muster sufficient political support to implement far-reaching monetary reform or to give up control over their economic policy 'basooka' (Bernhard, 1998; Cargill, 2001; Bodea and Hicks, 2014). In fact, there are several reasons why CBI conditionality plays a critical role in promoting CBI. Here, we argue that IMF involvement can tip the domestic balance favorably towards the adoption of CBI by (a) enhancing the benefits and (b) mitigating the costs of implementing CBI.

First, many IMF loan recipient countries often do not have the technical and institutional capacity to embark on wide-ranging monetary reforms as they simply lack qualified personnel, the basic financial infrastructure (e.g., functioning money markets), and overall do not have the prerequisites to successfully implement CBI (Johnson, 2016). For instance, a lack of qualified personnel puts severe limits on the overall functioning of monetary policy such as effective forecasting, communication of central bank policies, and thus hinder a central bank's effective functioning. In addition, financial market underdevelopment and particularly underdeveloped domestic bond markets have severe consequences for the operational effectiveness of monetary policy.[5] Thus, agreeing to CBI within the framework of an IMF program has the advantage that a country can draw on these technical resources, which are incremental for an effective promotion of CBI. To provide an example, the Jamaican administration recently signed a technical assistance agreement with the IMF to increase CBI to boost global investor confidence and to attract foreign investors. During the Annual Meetings of the World Bank and IMF, the newly appointed Minister of Finance Nigel Clarke stated that this move towards greater CBI is essential in "*creating an environment that is conducive to*

[5]On the one hand, severe financial frictions hamper the interest rate and thus credit channel of monetary policy to effectively operate. This is problematic as monetary impulses cannot be transmitted effectively into the domestic economy. Put differently, under these circumstances, CBs have little control over monetary outcomes. This lack of control effectively undermines a CB's ability to anchor inflation expectations and subsequently control inflation outcomes. On the other hand, a lack of domestic financial market development makes a government more reliant on direct central bank funding and thus limits its ability to raise funds in bond markets (Hauner, 2009; Menaldo, 2015).

*investment and conducive to growth.*"[6]

Second, during times of financial turbulence, a key pillar for successful crisis resolution derives from a government's ability to restore credibility in its economic policymaking (and (re-)anchor inflation expectations) (Alesina and Summers, 1993; Mosley, 2013; Alesina and Stella, 2010). In this context, CBI is a strong signal to domestic and international investors that a government is deeply invested in restoring monetary credibility (Maxfield, 1997; Polillo and Guillén, 2005; Bodea and Hicks, 2014). For example, in the case of Post-Soviet transition economies, Johnson (2016, 72) argues that the "*choice for central bank independence represented more than a ready-made solution to restore economic order.*" Thus, CBI can be regarded as a powerful signal to boost confidence in the robustness of the economic policy framework (Simmons, 2000). In this respect, IMF involvement is often important to provide governments with an external policy anchor to credibly commit to CBI (i.e., a commitment device) and thus send a positive signal to international investors about the viability of economic policy reforms (Simmons, 2000; Blanton, Blanton and Peksen, 2015). As the former governor of the Central Bank of Indonesia, Joseph Soedradjad Djiwandono outlines "*the original purpose of acquiring IMF support was to restore market confidence [...] as Indonesia faced problems of confidence in the Rupiah*"(Djiwandono, 2000, 62). Thus, anchoring monetary reform with the IMF can produce significant economic benefits for a sitting government.

Finally, if strong domestic opposition against CBI exists or when many veto players have the ability to block policy reform, IMF involvement can favorably tip the domestic political balance towards CBI. In particular, tying her hands to an IMF program, an incumbent can attain sufficient political leverage to implement comprehensive central bank reform (Vreeland, 2006; Blanton, Blanton and Peksen, 2015). The case of South Korea is an illustrative example. Although the government was determined to grant the Bank of Korea (BoK) greater political independence, due to concerns of losing BoK's mandate over financial supervision, Governor Lee Kyungshik formed strong opposition against CBI (Cargill, 2001). Entering the domestic policy scene, the Fund was incremental to swing the domestic balance towards CBI (Eichengreen and Woods, 2016). A key advantage in relying on the Fund is that an incumbent can shift the blame for painful short-term adjustment on the IMF and thus effectively reduce the political costs associated with CBI (Vreeland,

[6] *Latin Finance.* "IMF-World Bank Meetings: Jamaica Plans Central Bank Reforms." April 20, 2018.

2006).

*Hypothesis 1*: CBI conditionality is effective in promoting CBI.

Our theory has some additional observable implications. Building on previous work on the effectiveness of IMF interventions, we would expect CBI conditionality to be more effective in certain institutional settings and under certain economic conditions. Under such conditions, the benefits of CBI would be even greater, whereas the costs of implementing CBI would be comparatively lower. We discuss three such conditions below.

First, we consider CBI conditionality to be more useful for the government if it faces a larger number of veto players because such actors are able to block CBI reform. In particular, when powerful societal groups are benefiting from high inflation rates and/or special funding windows, these will try to mobilize domestic opposition against comprehensive central bank reform. For example, domestic and international financial players were openly opposing CBI in Turkey in the late 1990s. Besides mobilizing support from political elites, financial players were actively lobbying against CBI to maintain excessive profits that they accrued from excessively high real interest rates in sovereign bond markets and preferential access to central bank funding windows (Öniş and Bakir, 2007). In these situations, the IMF can play a pivotal role in absorbing the pressure from these interest groups and thus allow an incumbent to swing the domestic political balance towards CBI (see also, e.g., Vreeland, 2006).

Second, the benefits of CBI are also more pronounced in open economies that rely on international capital inflows (Maxfield, 1997; Bodea and Hicks, 2015). It is well established that small open economies are often too small to withstand the pressure of international investors, which are sensitive to sudden shifts in political risk premia and can hardly weather sudden capital flow reversals once foreign investors expectations turn sour (Rey, 2015; Ahlquist, 2006; Mosley, 2013). Take, for instance, the recent case of Turkey. Since President Erdogan's labeling of interest rates as "*the mother of all evil*" and threatening to reign in CBI, the Turkish Lira lost almost 20% of its value, whereby interest rates on government bonds – standing at 16.5% – are moving the Turkish government onto the brink of default.[7] In this respect, CBI constitutes an important signaling device in

[7] *Foreign Policy*. "Erdogan Is Failing Economics 101." May 25, 2018.

international financial markets and can have a first order dampening effect on risk premia investors charge on asset positions. Thus, economies with substantial international capital exposure are more likely to benefit from CBI and thus have an incentive to follow through with CBI conditionality (Maxfield, 1997).

Third, the need for CBI is also paramount during financial crises. In particular, financial crisis lead to a loss in monetary credibility, which implies that monetary authorities have hardly any leverage to contain speculative attacks and rampant inflation. Under such circumstances, countries need to quickly restore confidence among investors. For example, in the case of Turkey, the Bank of Turkey had to raise interest rates by 4000 basis in its attempt to contain speculative attacks on the Turkish Lira in 2000, triggering the most severe financial crisis in Turkish history (Arpac and Bird, 2009). Whereas in the short-run radical interest rate policy maneuvers are inevitable to lean in against forceful speculative attacks, in the medium terms policymakers need to rebuild the credibility of monetary policy-making. In this respect, CBI can be a powerful instrument to restore monetary credibility (Blinder, 2000). From a political perspective, financial crisis often open a window of opportunity for governments to implement central bank reforms because powerful lobbies against CBI may themselves be weakened by economic downturn (Grilli, Masciandaro and Tabellini, 1991; Rodrik, 2006; Romelli, 2014). Thus, we expect countries during periods of financial turmoil to be receptive towards CBI conditionality.

# 4 Research Design and Empirical Analysis

Our hypothesis is that CBI conditionality leads to greater CBI. To test this hypothesis, we build a dataset consisting of 124 countries from 1980 to 2012. As our theoretical argument claims universal applicability, we include all countries in the analysis for which data are available. Due to missing data, our panel is unbalanced, with more observations available for later sample years. We first assess the effectiveness of IMF programs and CBI conditionality in particular with respect to promoting CBI. We then test the comparative statics implied by our argument through split-sample analyses. Finally, we perform a battery of robustness tests to reduce concerns that potential selection effects or third unobserved variables are driving our results, which would render an observed correlation spurious. We include the descriptive statistics and data sources for all variables in our dataset in a

supplementary appendix.

### 4.1 Data and Empirical Model

Our dependent variable is CBI. We use the latest available version of the composite index of CBI compiled by Bodea and Hicks (2014). Given its wide country and time coverage – capturing 124 countries in the time span between 1970 and 2012 – this index is one of the most comprehensive CBI indicators available. Following the coding procedures in (Cukierman, Web and Neyapti, 1992), the index ranges from 0 to 1, whereby higher values indicate a greater degree of CBI. To save decimal points in our output tables, we multiply the CBI index by one-hundred. A distinct advantage using this index over alternative measures is that this CBI index covers multiple dimensions of monetary independence. In particular, it provides information on four dimensions of CBI: the selection of central bank governors, the legal mandate of monetary authorities, the degree of policy autonomy, and rules concerning quasi-fiscal operations (Bodea and Hicks, 2014; Cukierman, Miller and Neyapti, 2002). This feature is particularly relevant in our context, as it provides guideposts to map IMF conditions according to their relevance for CBI. To verify the robustness of our findings, we use an alternative CBI index (Garriga, 2016), which is based on the same coding protocol but provides a slightly different country-year coverage and coding of individual country cases.

To construct our key predictor (CBI conditionality), we proceeded in two steps. First, we conducted a computer-assisted search for keywords related to central banks in the substantive content of all IMF conditions in all IMF programs from 1980 to 2012. The full text of IMF conditions is available through the IMF conditionality database (Kentikelenis, Stubbs and King, 2016). Second, we validated the matches of this search through manual coding. We also constructed four sub-indicators of CBI conditionality to match the respective dimensions of the CBI index. For example, the first sub-indicator captures measures on the central bank governor, such as appointment procedures, term tenures, provisions for dismissal, prohibition of multiple terms, or the replacement of an incumbent governor. The second sub-indicator captures mandated changes to the central bank mandate, for instance toward legal independence. The third dimension concerns day-to-day central bank policy, while the fourth refers to measures aimed at limiting advances to government and securitized lending. As baseline specification, we chose to code CBI conditionality as a dichotomous

variable. It takes the value of 1 whenever at least one CBI condition in a country-year observation is present and 0 otherwise. Our descriptive statistics suggest that CBI conditionality is not a rare event. More than one out of four IMF program included at least one CBI condition during in the mid-1990s (see, Figure 1).

Following best-available advice, we proceed w ith a general auto-regressive distributed lag model, using the equivalent Error Correction Model (ECM) formulation. ECMs may be applied to a wide range of time-series data, without the need for a co-integration relationship (De Boef and Keele, 2008). Our specification tests indicate that the parameter restrictions implying simpler models do not hold, and using such simpler models would introduce bias due to non-stationarity and auto-correlated errors (e.g., Keele and Kelly, 2006). Thus, we estimate ECMs in which the dependent variable is the annual difference in the CBI index. The right-hand side includes a lagged dependent variable along with differences and levels of all other explanatory variables.

A well-known challenge is selection bias due to non-random selection of countries into IMF programs (e.g., Dreher, Sturm and Vreeland, 2014). To mitigate concerns that our results might be contaminated by these selection effects, we are applying an instrumental variables approach. Taken together, we estimate a recursive system of at least two equations – one for the change in the continuous CBI index and one for the binary IMF program indicator – along with a covariance structure allowing for country-clustered correlated errors across equations (Roodman, 2011). We discuss the full details on our estimation approach in the supplemental appendix and present a short version of our basic model below:

$$\Delta y_{it} = a_1 y_{i,t-1} + b_{11}\Delta IMF_{it} + b_{12} IMF_{i,t-1} + b_{13}\Delta CBI_{it} + b_{14} CBI_{i,t-1} + \gamma_{11}\Delta x_{it} + \gamma_{12} x_{i,t-1} + \alpha_i + \varphi_t + \varepsilon_{it} \tag{1}$$

$$IMF_{i,t-1} = \begin{cases} 1, & \text{if } IMF^*_{i,t-1} > 0 \\ 0, & \text{else} \end{cases} \tag{2}$$

$$IMF^*_{i,t-1} = b_{21}[\bar{q}_i q_{t-1}] + \gamma_{21} x_{i,t-1} + \nu_i + \phi_{t-1} + \varepsilon_{2it-1} > 0 \tag{3}$$

$$\begin{pmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \end{pmatrix} \sim \mathcal{N}\left[\mathbf{0}, \begin{pmatrix} 1 & \sigma_{12} \\ \sigma_{12} & 1 \end{pmatrix}\right] \tag{4}$$

whereby in the first stage the dependent variable is the annual difference in the CBI index ($\Delta y_{it}$), and right-hand side variables are the lagged CBI index ($y_{i,t-1}$), followed by two IMF program variables and two CBI conditionality variables, a representative control variable ($x_{i,t-1}$) in levels and differences, country-fixed effects ($\alpha_i$), year-fixed effects ($\varphi_t$), and an error term ($\varepsilon_{it}$). Error terms across equations are allowed to be correlated (equation 4).

In the IMF equation, we follow Lang (2016) in deploying the interaction between the time-invariant probability of a country to obtain IMF credit and the IMF liquidity ratio as an instrument ($[\bar{q}_i q_t]$), which is a proxy measure of how unconstrained the IMF is to give out loans at any given point in time. The identifying assumption is that changes in CBI will not be affected differently by changes in the IMF liquidity ratio between regular and irregular IMF borrowers other than through their impact on IMF programs, conditional on fixed effects and control variables. This approach is akin to a difference-in-difference design which compares the effect of an IMF program on CBI in regular borrowers *versus* irregular borrowers as the IMF liquidity ratio changes (Nunn and Qian, 2014; Lang, 2016; Dreher and Langlotz, 2017). The relevance of the instrument is underpinned by the significantly positive correlation between the IMF liquidity ratio and the presence of an IMF program. We report this result in the supplemental appendix.

An alternative instrument often used in the related literature is the voting alignment of a country with the G-7 in the UN General Assembly. Several studies show that countries voting in line with the United States in the UN General Assembly are more likely to receive IMF credit (Thacker, 1999; Barro and Lee, 2005; Dreher, Sturm and Vreeland, 2014). The main inconvenience with using this instrumental variable is that it identifies a local average treatment effect for those programs that are geopolitically motivated, rather than the full set of programs. We hence use this alternative approach for robustness tests, noting that our results are unchanged (or even better) when doing so (see, Table A4).

Given the observational nature of the data, we need to rely on well-specified models to obtain

credible estimates. Hereby, a specific challenge is to find a balanced approach in selecting control variables. On one hand, we want to include numerous additional controls to help us mitigate concerns that confounding factors drive our results. At the same time, we want to minimize the risk of bias arising from post-treatment effects (Acharya, Blackwell and Sen, 2016). Drawing on previous CBI literature (e.g., Bodea and Hicks, 2015), we control for GDP per capita, inflation, trade openness, external debt, exchange rate stability, financial assets, G-5 bank exposure, and regime type.

To account for the macroeconomic environment in a country, we include GDP per capita and inflation as control variables. In particular, we expect that emerging market and developing countries that rely on foreign investors and those countries with higher inflation rates have more incentives to strengthen their monetary institutions to reap the economic benefits of CBI (Maxfield, 1997; Bodea and Hicks, 2015). Similarly, we include a measure for trade openness and external debt, as these mirror the importance of international trading partners and investors and thus constitute channels of policy diffusion and international pressures to adopt CBI (McNamara, 2002; Polillo and Guillén, 2005). Due to collinearity with country-fixed effects, we do not include the exchange rate regime in our main models. In robustness tests, we include an indicator of the exchange rate regime in a random-effects model, which does not affect our overall findings (see, Table A3).

To mitigate concerns that the adoption of CBI is driven by special interest interference from the financial industry (Posen, 1993, 1995), we include two sets of variables. First, we proxy the strength of domestic financial interests by measuring the sum of financial assets of money banks, non-bank financial institutions, and the central bank (Pepinsky, 2013). Second, in the context of IMF programs it is well established that international investors exert substantial pressure on the IMF and thus have a first order impact on IMF loan conditionality (Copelovitch, 2010). To gauge the influence of these foreign financial interests, we construct a measure of foreign bank exposure to the G-5 countries.[8] Furthermore, we expect autocratic regimes to be less inclined to adopt CBI because they are less willing to give up a powerful tool for meddling with financial and macroeconomic outcomes (Broz, 2002; Keefer and Stasavage, 2003; Pond, 2018). For instance, it is well documented that the Central Bank of Iran operates several special refinancing windows and

[8]These are France, Germany, Japan, the United Kingdom, and the United States. The data come from the Bank of International Settlements (BIS, 2018).

credit subsidy schemes for important political constituents (Zahedi and Azadi, 2018). To account for these effects, we include the (combined) Polity IV index indicating the level of democracy (Marshall, Gurr and Jaggers, 2015).

Finally, we include country and year-fixed effects in all our models. Using country-fixed effects, we want to mitigate confounding effects of time-invariant country-specific factors. We also include year-fixed effects to account for global CBI trends common to all countries. To mitigate concerns that our results are contaminated by outliers, we also log-transform the absolute values of all variables, except for regime type.

### 4.2 Results

We first conduct simple T-tests of differences in changes of the CBI index according to the type of IMF program. We find that the average annual change in the CBI index in a subsequent year for non-IMF countries is 0.70. Although being under an IMF program is positively associated with an annual change in the CBI index in the next year (i.e., +0.14 index points), this difference is statistically not significant at conventional levels. However, IMF programs that include at least one CBI condition have a subsequent CBI index that is higher by 1.56 index points ($p<0.05$) relative to the IMF program observations without such condition. Albeit merely correlational, these results support the notion that CBI conditionality is positively associated with increasing CBI. To further explore these preliminary findings, we now now turn to the results of our multivariate analysis.

In Table 1, we present our main results. By including indicators of both CBI conditionality and IMF programs, our approach allows us to untangle the differential effect of such conditionality in the presence of an adjustment program. Consistent with our theoretical argument, we find that IMF interventions are particularly effective in promoting CBI when they entail specific CBI conditions. Substantively, an IMF program with CBI conditionality increases CBI by up to 2.5 index points more compared to an IMF program without such conditionality ($p<0.05$) – a fairly small, yet non-negligible effect, given the range of the CBI index (from 0 to 100). Interestingly, we cannot detect an immediate short-run effect of CBI conditionality. As changing the mandate of the central bank often requires successfully passing several legislative hurdles or even to change the constitution of a country (Aklin and Kern, 2019), this result is hardly surprising. Albeit statistically insignificant,

its point estimate corresponds to a positive effect of up to 1.1 index points.

Before we conduct additional analyses, we discuss results for the control variables and the selection model. Overall, most control variables are statistically not significant at conventional levels, which suggests that our model produces rather conservative estimates. The only exception is financial assets, which has a positive relationship with CBI ($p<0.1$). This is in line with a literature underscoring the importance of the financial sector in driving CBI (e.g., Posen, 1995). In the CBI equation, the lagged dependent variable has a significant, negative coefficient, indicating mean-reversion behavior of CBI ($p<0.01$). That is, CBI increases are followed by CBI reductions in the next year. Due to the inclusion of two-way fixed effects, the model fit – with up to three percent of the within-country variation explained – is necessarily low. Turning to the IMF program equation, we find the compound instrument to be highly relevant (as indicated by the positively significant coefficient). Interpreted literally, under a more liquid IMF budget, regular recipients become more likely to benefit from an IMF program than irregular recipients ($p<0.01$). Included instruments are also statistically significant predictors of IMF programs, including per-capita income, external debt, and inflation (whose sign is reversed, likely due to reverse causality). Overall, selection models explain about one-third of the variation.

We explore some variations in the modeling setup to probe the robustness of our main results. First, we verify that our findings are robust to an alternative CBI index (Garriga, 2016), which is based on the same coding protocol but provides a slightly different country-year coverage and coding of individual country cases (Table A1).

Second, we use a more restricted variant of our measure of CBI conditionality based solely on an exact match of the four dimensions of the above CBI index (Table A2). As a result, we observe a reduction in the incidence of CBI conditionality by roughly 0.8 percentage points (from 4 percent of all country-years). Although the point estimates hint to a smaller effect, our main conclusion from our analysis is not affected: CBI conditionality is effective in promoting CBI.

Third, as we used fixed effects, we were unable to include further time-invariant determinants of CBI. To test some of the institutional factors that CBI scholars have proposed, we drop the fixed effects and use pooled estimation including time-invariant factors such as plurality, federalism, and the exchange rate regime. We find some evidence that plurality is negatively related to CBI. Since

plurality implies increased electoral competition and accountability to local districts, we suspect that politicians under plurality have greater incentives to manipulate monetary policy (Lohmann, 1999; Hallerberg, 2002). We find no significant effects on the remaining institutional variables. Most importantly, however, the effect of CBI conditionality increases in its magnitude and becomes more statistically significant. For instance, in the baseline specification, CBI conditionality is related to a CBI increase by 4.6 index points in the long term ($p<0.01$) and 2.7 points when immediately applicable ($p<0.05$). These results are not surprising because pooled estimation allows some of the effect to be captured by cross-country variation in CBI conditionality and CBI reform (Table A3).

In Table 2 we present the results of the tests that we ran to verify three additional observable implications of our theory. To that end, we create sub-samples in which we expect the effect of CBI conditionality to be particularly pronounced. First, we suspect that CBI conditionality is more effective in countries with many veto players. We use an index measuring the strength of domestic veto players (Henisz, 2002) and use the sample median as the cutoff value for the two groups. We find that CBI conditionality is only effective in promoting CBI when there is a significant number of veto players (Column 1).

Second, we suspect the benefit of CBI reform to be greater in small open economies that heavily rely on international capital markets. We therefore compare countries with relatively high capital account openness to those in which it is relatively low according to the sample median. We use the Chinn-Ito measure of capital account openness to that end (Chinn and Ito, 2008). CBI conditions have a positive coefficient only in the former countries, although the effect is not present in the model with extended control set (Column 3).

Third, we also argue that the benefits of CBI reform are greater during financial crisis, when governments have difficulty to establish the credibility of their policy reforms. To that end, we sub-sample our data along the time dimension to only include observations around financial crises. We employ a widely-used crisis indicator (Laeven and Valencia, 2013) and restrict our sample to ten-year windows around each crisis. As a result, the estimated coefficient increases in size and remains statistically significant, which indicates that our results are driven mainly by crisis episodes (Column 5).

Taken together, these additional empirical tests show that our results are consistent with our

theoretical predictions. Furthermore, we have initial evidence that our results are stable and survive a battery of modifications to model specification, measurement of variables, and sample choices.

### 4.3 Inferential Threats

We initially proceeded under the assumption that no unobserved confounder obstructs the relationship between CBI conditionality and the CBI index. We justify this approach by arguing that any potential bias due to omitted variables would work against our findings. The IMF should assign CBI conditionality to countries with initially low CBI, implying a negative relationship between these variables. Since such selection is likely to exist, the fact that we (nonetheless) find positive associations between CBI conditionality and the CBI index indicates support for our argument. Below we conduct further tests to examine the robustness of our findings.

First, we wish to rule out that all IMF programs alike effectively promote CBI reform. We can test this by dropping the CBI conditionality terms from our model. We find less consistent evidence of a positive relationship between IMF programs and the CBI index, which also is not statistically significant at conventional levels. The substantive average effect – with about 1.1 index points at most – is also small (Table 3).

We also wish to rule out that CBI conditionality is a mere proxy for other kinds of IMF interventions that correlate with it. To that end, we jointly test CBI conditionality and policy conditionality in five areas of intervention: fiscal policy, government revenue, the financial sector, government institutions, and the public sector (Table 4). For instance, one might think that CBI conditionality is a more specific form of institutional conditionality, and when controlling for the latter, the former should be irrelevant. However, this is not the case for any of the alternative conditionality channels. CBI conditionality remains significant and positively related ($p<0.05$) to CBI, with highly stable coefficient estimates.

Second, an omitted variable could in fact be the incidence of a financial crisis, which would trigger both an IMF program (and the CBI conditionality including it) *and* CBI reform adopted independently by the crisis-affected country. A key empirical concern is that a crisis situation leads to an upset of the domestic political equilibrium, opening a window of opportunity for monetary reform (e.g., Romelli, 2014). We do not deny this possibility, but argue that the IMF becomes

the force tipping the political scale in favor of CBI. Therefore, we expect CBI conditionality to be particularly effective during such crises. To address this challenge, we return to our above analysis in which we restricted our dataset to crisis episodes, using an omnibus indicator of financial crisis (Laeven and Valencia, 2013). Since the crisis sub-sample only includes crisis-related observations, we have essentially controlled for the presence of a crisis. If indeed crises caused CBI reform, we should find no effect on IMF variables. However, our results on IMF interventions, notably CBI conditionality, continue to hold (or become even stronger). In a second step, we re-estimate our model on a sub-sample that includes all financial crises and five-year symmetric intervals around them (Laeven and Valencia, 2013). Indeed, we find a more robust relationship between CBI conditionality and the CBI index ($p<0.05$). Thus, financial crises reflect another instance in which governments need to restore market confidence quickly and when they are more ready to adopt reforms.

Third, we use an instrumental-variable design to address potential endogeneity of CBI conditionality. Specifically, we predict CBI conditionality using the total number of IMF conditions that a country is required to implement in a given year. We argue that a high number of conditions indicates that the IMF has substantial leverage in the negotiations with a recipient country (Nooruddin and Simmons, 2006; Eichengreen and Woods, 2016). In this situation, it is more likely to assert itself over a relatively weak borrowing country and more often succeeds in including CBI conditionality into the loan package, which it cares about. Our first-stage regression results indicate a strong correlation between the number of conditions and CBI conditionality. The F-statistic for the instrument is well above the conventional threshold of ten (Staiger and Stock, 1997; Stock, Wright and Yogo, 2002), which implies that we face low bias due to weak instruments.

This instrumental variable is plausibly excludable with respect to CBI – implying that the total number of conditions exerts an impact on CBI only through CBI conditionality. While we cannot directly test for the validity of the exclusion condition – to the best of our knowledge – we are not aware of any mechanism through which the number of conditions would affect CBI other than through CBI conditionality. Even if the exclusion restriction were to hold only imperfectly, the strength of our instrument ensures that the associated bias remains negligible (Conley, Hansen and Rossi, 2012).

We present our results in Table 5. Throughout all control sets, we find remarkably robust evidence of a positive effect of CBI conditionality on CBI ($p<0.01$). Substantively, the effect is at least 3.5 index points, which is slightly bigger than before. In other words, compared to an IMF program without CBI conditionality, the one with such a condition leads to a 3.5 points higher CBI index, which is roughly 20% of its standard deviation. To ensure the robustness of our findings, we present the results of alternate identification strategies in the appendix. Here, we briefly discuss the main findings of these additional tests.

Relying on a similar identification strategy as proposed in Pop-Eleches (2009), we predict incidence of CBI conditionality using the share of IMF programs with CBI conditionality in the same region. We suspect this instrument to be relevant because similar to liquidity constraints, the IMF also faces capacity constraints in devising its policy advice. When facing a decision whether to include CBI conditions in its assistance package, the IMF takes into account that its central bank experts might already need to advise other countries in the region and therefore would not be able to follow through with CBI advice in the given country (IMF, 2015).

Furthermore, we use the interaction of the time-varying interest rate in the United States and the geographical distance of a country to Washington D.C. to instrument for CBI conditionality – akin to a difference-in-difference design (Werker, Ahmed and Cohen, 2009; Lang, 2016; Dreher and Langlotz, 2017). This instrument is based on the logic that in period of increasing US interest rates and related higher vulnerability of developing countries, the IMF insists more on sound monetary policies as precautionary measure, but specifically so in more distant countries in which IMF staff has less-developed contacts and relations of trust to authorities (Bekaert and Hodrick, 2017).

Finally, we also test an instrument that relies on time-varying information about logistical support bases for US military operations. In particular, when the US military has deployed troops in a given country, the countries adjacent to these countries are strategically important to the US military for logistical support (Aklin and Kern, 2019). The US government thus has incentives to stabilize these adjacent countries, for instance by offering IMF loans with less stringent conditionality. Using these alternative identification strategies, our results remain quantitatively similar: CBI conditionality has strong predicting power of CBI.

# 5 Concluding Discussion

In general, governments try to avoid painful IMF adjustment programs. Nevertheless, during times of financial turbulence, governments often find themselves in a situation in which they do not have any options left other than turning to the IMF. For example, facing mounting macro-financial pressures in 2002, Turkish policymakers urged the U.S. government officials to provide a direct financial standby arrangement instead of "*a new IMF standby, which 'would have too many conditionalities.'*"[9] In these situations, the IMF traditionally brings a battery of conditions to the bargaining table. Besides, fiscal austerity measures, governments often agree to monetary conditions that imply a loss in substantial political autonomy over monetary policy-making. Given that governments have substantial leverage in negotiations with the IMF (Nooruddin and Simmons, 2006; Eichengreen and Woods, 2016), we were interested in answering the question as to why countries participating in IMF programs are more likely to adopt CBI?

Here, we argue that IMF involvement and particularly CBI conditionality can tip the domestic balance favorably towards the adoption of CBI by (a) enhancing the benefits and (b) mitigating the costs of implementing CBI. Using a unique dataset that includes detailed information on CBI reforms and IMF conditionality for up to 124 countries between 1980 and 2012, our quantitative findings indicate that targeted loan conditionality plays a critical role in promoting CBI. These findings withstand a battery of robustness checks. To further explore our results, we tested for institutional configurations where we would expect CBI conditionality to especially effective. In fact, we find the effect of CBI conditionality to be stronger in countries with (a) many veto players, (b) small open economies that heavily rely on international capital inflows, and (c) during financial crisis episodes.

From a policy perspective our findings have important implications. First, we find that it is not the sheer existence of an IMF program, but CBI conditionality that leads to higher levels of CBI. Second, CBI conditionality can produce important second round economic policy effects (Johnson and Barnes, 2015). Exploring these second round effects represents an interesting future research avenue. Finally, we believe that the IMF's role in the context of CBI will change significantly. In a recent interview, commenting on President Erdogan's attempt to reign in CBI in Turkey, Christine

[9] *Wikileaks.* "Subject: Wolfowitz and Grossman Press Turks for Support on Iraq." December 20th, 2002.

Lagarde stated that "*in terms of monetary policy, it's always better for all political leaders to let the central bank governors do the job that they have to do.*"[10] Thus, besides continuing to provide technical assistance to countries that aim to strengthen their monetary frameworks, in times of populist movements threatening the political independence of central banks, we expect the Fund to become an even more important policy anchor for monetary authorities to fend off political pressures.

[10] *Bloomberg.* "Lagarde, Carstens Tell Turkey to Leave Central Bank Alone." May 25, 2018.

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**Table 1**: The effect of IMF programs on CBI.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.CBI condition | 0.798 | 1.136 | 0.689 |
| | (0.647) | (0.759) | (0.757) |
| L.CBI condition | 1.690** | 2.553** | 2.180** |
| | (0.847) | (1.094) | (1.108) |
| D.IMF program | -0.224 | -0.388 | -0.364 |
| | (0.374) | (0.431) | (0.432) |
| L.IMF program | 0.472 | 0.729 | 0.708 |
| | (0.470) | (0.447) | (0.474) |
| L.CBI index | -0.126*** | -0.136*** | -0.136*** |
| | (0.009) | (0.017) | (0.013) |
| D.GDP per capita | | -0.084 | -0.088 |
| | | (0.059) | (0.061) |
| L.GDP per capita | | -0.458 | -0.462 |
| | | (1.109) | (1.293) |
| D.Openness | | -0.702 | -1.133 |
| | | (1.213) | (1.342) |
| L.Openness | | 0.874 | 0.495 |
| | | (0.583) | (0.609) |
| D.Polity IV | | 0.141 | 0.271 |
| | | (0.177) | (0.167) |
| L.Polity IV | | 0.013 | 0.028 |
| | | (0.069) | (0.074) |
| D.Inflation | | 0.024 | 0.033 |
| | | (0.097) | (0.103) |
| L.Inflation | | -0.002 | 0.083 |
| | | (0.173) | (0.187) |
| D.Debt | | 0.012 | -0.032 |
| | | (0.069) | (0.073) |
| L.Debt | | 0.409 | 0.309 |
| | | (0.377) | (0.355) |
| D.Financial assets | | | 0.186* |
| | | | (0.107) |
| L.Financial assets | | | 0.766* |
| | | | (0.392) |
| D.G5 bank exposure | | | -0.011 |
| | | | (0.031) |
| L.G5 bank exposure | | | -0.185 |
| | | | (0.158) |
| L.IMF program | | | |
| Compound instrument | 0.007*** | 0.006*** | 0.006*** |
| | (0.001) | (0.001) | (0.001) |
| L.GDP per capita | | -0.226*** | -0.269*** |
| | | (0.086) | (0.103) |
| L.Openness | | -0.029 | 0.024 |

| | | | |
|---|---|---|---|
| | | (0.108) | (0.110) |
| L.Polity IV | | 0.015 | 0.017* |
| | | (0.009) | (0.010) |
| L.Inflation | | -0.087** | -0.093** |
| | | (0.041) | (0.042) |
| L.Debt | | 0.426*** | 0.429*** |
| | | (0.090) | (0.089) |
| L.Financial assets | | | -0.101 |
| | | | (0.082) |
| L.G5 bank exposure | | | 0.032 |
| | | | (0.025) |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.02 | 0.03 | 0.04 |
| Pseudo-R2 | 0.38 | 0.32 | 0.32 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of two equations. The CBI index equation includes country- and year-fixed effects. The IMF program equation includes region- and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table 2**: Conditional effects of CBI conditionality on CBI.

| | Veto players | | Financial openness | | Financial crises |
|---|---|---|---|---|---|
| | many | few | high | low | (sub-sample) |
| | (1) | (2) | (3) | (4) | (5) |
| D.CBI condition | 1.878* | 0.156 | 0.817 | 1.038 | 1.642 |
| | (1.080) | (1.004) | (1.072) | (1.058) | (1.083) |
| L.CBI condition | 2.578* | 1.908 | 3.805** | 1.205 | 3.893** |
| | (1.422) | (1.434) | (1.810) | (1.165) | (1.699) |
| D.IMF program | -0.175 | -0.695 | -0.590 | -0.519 | -0.665 |
| | (0.578) | (0.533) | (0.694) | (0.467) | (0.761) |
| L.IMF program | 1.940*** | 0.238 | 0.520 | 0.322 | 1.763** |
| | (0.734) | (0.398) | (0.782) | (1.770) | (0.758) |
| Observations | 751 | 887 | 1059 | 579 | 814 |
| Within-R2 | 0.03 | 0.09 | 0.04 | 0.07 | 0.04 |
| Pseudo-R2 | 0.23 | 0.30 | 0.26 | 0.32 | 0.22 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of two equations run over sub-samples indicated in column headers. Cutoffs for all variables are based on the median over country-year observations. For financial crises, the entire system is estimated on a restricted sample consisting of symmetric five-year windows around all crisis events. For readability, always the first column of any pair of column should have a positive effect. The CBI index equation includes a lagged dependent variable, baseline controls, country-, and year-fixed effects. The IMF program equation includes baseline controls, region-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table 3**: The effect of IMF programs on CBI.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.IMF program | -0.012 | -0.080 | -0.127 |
| | (0.360) | (0.424) | (0.413) |
| L.IMF program | 0.739 | 1.039* | 0.977* |
| | (0.468) | (0.531) | (0.587) |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.02 | 0.03 | 0.03 |
| Pseudo-R2 | 0.30 | 0.28 | 0.28 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of two equations. The CBI index equation includes country- and year-fixed effects. The IMF program equation includes region- and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table 4**: Ruling out alternative channels of conditionality.

| | Fiscal policy | Revenues | Financial sector | Institutions | Public sector |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| D.CBI condition | 1.070 | 1.103 | 0.927 | 0.895 | 1.175 |
| | (0.743) | (0.73) | (0.769) | (0.691) | (0.795) |
| L.CBI condition | 2.430** | 2.555** | 2.303** | 2.324** | 2.501** |
| | (1.163) | (1.105) | (1.105) | (1.056) | (1.100) |
| D.Other channel | 0.047 | 0.084 | 0.096 | 1.377 | -0.049* |
| | (0.092) | (0.131) | (0.055) | (0.867) | (0.159) |
| L.Other channel | 0.069** | 0.018 | 0.109 | 2.135 | 0.250 |
| | (0.133) | (0.185) | (0.071) | (0.717) | (0.269) |
| D.IMF program | -0.530 | -0.422 | -0.938 | -0.552 | -0.425* |
| | (0.463) | (0.426) | (0.522) | (0.447) | (0.434) |
| L.IMF program | 0.564 | 0.738 | 0.196 | 0.673* | 0.679 |
| | (0.480) | (0.427) | (0.495) | (0.434) | (0.446) |
| Control set | Baseline | Baseline | Baseline | Baseline | Baseline |
| Observations | 1638 | 1638 | 1638 | 1638 | 1638 |
| Within-R2 | 0.12 | 0.12 | 0.12 | 0.14 | 0.12 |
| Pseudo-R2 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 |

*Notes*: Maximum-likelihood estimation of vector error correction models including two equations. The CBI index equation includes baseline controls, country-, and year-fixed effects. The IMF program equation includes the baseline controls, region-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table 5**: The effect of CBI conditions on CBI using an instrumental variable design.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.CBI condition | 0.777 | 0.743 | 0.394 |
| | (0.669) | (0.657) | (0.607) |
| L.CBI condition | 3.534*** | 5.340*** | 4.981*** |
| | (1.107) | (1.042) | (1.122) |
| D.IMF program | -0.331 | -0.251 | -0.329 |
| | (0.383) | (0.386) | (0.399) |
| L.IMF program | 5.462*** | -7.103*** | -6.807*** |
| | (1.178) | (0.608) | (0.703) |
| *L.CBI condition* | | | |
| L.Total conditions | 0.016*** | 0.026*** | 0.026*** |
| | (0.004) | (0.005) | (0.004) |
| Control set | -- | Baseline | Extended |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.08 | 0.12 | 0.13 |
| Pseudo-R2 | 0.30 | 0.27 | 0.28 |
| F-statistic | 19.72 | 31.14 | 34.92 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of three equations. The CBI index equation includes the indicated control sets, country-, and year-fixed effects. The IMF program equation includes the indicated control sets, region-, and year-fixed effects. The CBI condition equation includes indicated control sets, country-, and year-fixed effects, and the lagged IMF dummy. 'IMF program' is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. CBI condition is instrumented using the total number of conditions of a country in a given year. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

## A. Robustness checks

**Table A1**: Main results under alternative definition of the dependent variable.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| D.CBI condition | 0.798 | 1.136 | 0.689 | 0.925 | 0.994 | 0.847 |
| | (0.647) | (0.759) | (0.757) | (0.573) | (0.726) | (0.732) |
| L.CBI condition | 1.690** | 2.553** | 2.180** | 1.741* | 3.498** | 3.410* |
| | (0.847) | (1.094) | (1.108) | (1.031) | (1.552) | (1.756) |
| D.IMF program | -0.224 | -0.388 | -0.364 | 0.014 | -0.402 | -0.303 |
| | (0.374) | (0.431) | (0.432) | (0.289) | (0.327) | (0.323) |
| L.IMF program | 0.472 | 0.729 | 0.708 | 1.094 | 3.058** | 3.290* |
| | (0.470) | (0.447) | (0.474) | (3.078) | (1.425) | (1.767) |
| Control sets | -- | Baseline | Extended | -- | Baseline | Extended |
| Selection correction | yes | yes | yes | yes | yes | yes |
| Instrument for condition | no | no | no | yes | yes | yes |
| Observations | 3077 | 1550 | 1425 | 3077 | 1550 | 1425 |
| Within-R2 | 0.03 | 0.04 | 0.04 | 0.10 | 0.13 | 0.14 |
| Pseudo-R2 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 |
| F-statistic | -- | -- | -- | 2.49 | 4.08 | 7.29 |

*Notes*: Maximum-likelihood estimation of vector error correction models with additional equations as indicated. The CBI index equation (using the Garriga data to construct the index) includes a lagged dependent variable, indicated control sets, country-, and year-fixed effects. The IMF program equation includes the indicated control sets, region-, and year-fixed effects. The CBI condition equation includes indicated control sets, country-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. CBI condition is instrumented using the interaction between the US interest rate and the distance of a country to Washington D.C. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table A2**: Main results under alternative definition of the independent variable.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| D.CBI condition | 0.397 | 0.452 | 0.107 | 0.372 | 0.43 | 0.088 |
| | (0.637) | (0.727) | (0.705) | (0.634) | (0.722) | (0.701) |
| L.CBI condition | 1.671 | 2.295* | 1.917 | 2.045* | 2.947** | 2.464* |
| | (1.048) | (1.313) | (1.302) | (1.129) | (1.433) | (1.395) |
| D.IMF program | -0.151 | -0.271 | -0.265 | -0.144 | -0.261 | -0.258 |
| | (0.378) | (0.444) | (0.434) | (0.379) | (0.443) | (0.435) |
| L.IMF program | 0.493 | 0.753 | 0.727 | 0.464 | 0.805 | 0.721 |
| | (0.472) | (0.466) | (0.498) | (0.524) | (0.566) | (0.53) |
| Control sets | -- | Basline | Extended | -- | Baseline | Extended |
| Selection correction | yes | yes | yes | yes | yes | yes |
| Instrument for condition | no | no | no | yes | yes | yes |
| Observations | 3237 | 1638 | 1505 | 3237 | 1638 | 1505 |
| Within-R2 | 0.02 | 0.03 | 0.04 | 0.08 | 0.12 | 0.12 |
| Pseudo-R2 | 0.27 | 0.27 | 0.27 | 0.30 | 0.27 | 0.28 |
| F-statistic | -- | -- | -- | 4.95 | 9.56 | 9.94 |

*Notes*: Maximum-likelihood estimation of vector error correction models with additional equations as indicated. The CBI index equation includes a lagged dependent variables, indicated control sets, country-, and year-fixed effects. The IMF program equation includes the indicated control sets, region-, and year-fixed effects. The CBI condition equation includes indicated control sets, country-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. CBI condition is instrumented using the interaction between the US interest rate and the distance of a country to Washington D.C. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table A3**: Pooled estimation with additional time-invariant controls.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.CBI condition | 1.408 | 2.737** | 2.393* |
| | (0.982) | (1.273) | (1.278) |
| L.CBI condition | 2.631** | 4.637*** | 4.093** |
| | (1.277) | (1.786) | (1.731) |
| D.IMF program | -1.080 | -1.229 | -1.152 |
| | (0.692) | (0.769) | (0.758) |
| L.IMF program | 1.284 | 1.080* | 1.117* |
| | (0.788) | (0.623) | (0.643) |
| L.CBI index | -0.068*** | -0.075*** | -0.076*** |
| | (0.012) | (0.016) | (0.016) |
| Plurality | -0.544 | -0.906** | -0.912** |
| | (0.386) | (0.430) | (0.439) |
| Federalism | 0.305 | -1.007 | -0.895 |
| | (0.515) | (0.717) | (0.661) |
| Mixed exchange rate regime | 0.201 | 0.421 | 0.456 |
| | (0.382) | (0.564) | (0.593) |
| Fixed exchange rate regime | 0.645 | 0.936 | 0.747 |
| | (0.446) | (0.581) | (0.586) |
| Control sets | -- | B | E |
| Observations | 1607 | 810 | 810 |
| Within-R2 | 0.02 | 0.04 | 0.04 |
| Pseudo-R2 | 0.43 | 0.29 | 0.30 |

*Notes*: Maximum-likelihood estimation of vector error correction models including two equations. The CBI index equation includes indicated control sets and year-fixed effects. The IMF program equation includes the indicated control sets, time-invariant controls, region-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table A4**: Different instrument for IMF programs.

| | (1) | (2) | (3) |
|---|---|---|---|
| L.CBI | -0.126*** | -0.136*** | -0.136*** |
| | (0.009) | (0.017) | (0.013) |
| D.CBI condition | 0.795 | 1.125 | 0.682 |
| | (0.647) | (0.758) | (0.755) |
| L.CBI condition | 1.688** | 2.531** | 2.167** |
| | (0.848) | (1.094) | (1.103) |
| D.IMF program | -0.224 | -0.392 | -0.371 |
| | (0.374) | (0.431) | (0.431) |
| L.IMF program | 0.228 | 0.932* | 0.919 |
| | (0.396) | (0.496) | (0.572) |
| D.GDP per capita | | -0.442 | -0.440 |
| | | (1.081) | (1.251) |
| L.GDP per capita | | 0.860 | 0.450 |
| | | (0.579) | (0.606) |
| D.Openness | | -0.635 | -1.074 |
| | | (1.211) | (1.337) |
| L.Openness | | 0.013 | 0.028 |
| | | (0.069) | (0.074) |
| D.Polity IV | | 0.141 | 0.271 |
| | | (0.177) | (0.167) |
| L.Polity IV | | 0.008 | 0.095 |
| | | (0.172) | (0.188) |
| D.Inflation | | 0.359 | 0.259 |
| | | (0.397) | (0.377) |
| L.Inflation | | -0.085 | -0.088 |
| | | (0.059) | (0.061) |
| D.Debt | | 0.023 | 0.033 |
| | | (0.097) | (0.103) |
| L.Debt | | 0.012 | -0.033 |
| | | (0.068) | (0.073) |
| D.Financial assets | | | 0.784** |
| | | | (0.396) |
| L.Financial assets | | | -0.192 |
| | | | (0.158) |
| D.G5 bank exposure | | | 0.187* |
| | | | (0.107) |
| L.G5 bank exposure | | | -0.011 |
| | | | (0.031) |
| L.IMF program | | | |
| L.UNGA vote alignment | 1.780** | 3.371*** | 3.472*** |
| | (0.703) | (1.061) | (0.999) |
| L.GDP per capita | | -0.379*** | -0.476*** |
| | | (0.126) | (0.153) |
| L.Openness | | -0.086 | 0.040 |
| | | (0.148) | (0.157) |
| L.Polity IV | | 0.012 | 0.015 |
| | | (0.012) | (0.012) |
| L.Inflation | | -0.099** | -0.107** |

| | | | |
|---|---|---|---|
| | | (0.043) | (0.044) |
| L.Debt | | 0.463*** | 0.463*** |
| | | (0.103) | (0.102) |
| L.Financial assets | | | -0.146 |
| | | | (0.089) |
| L.G5 bank exposure | | | 0.073** |
| | | | (0.033) |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.02 | 0.03 | 0.04 |
| Pseudo-R2 | 0.19 | 0.25 | 0.26 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of two equations. The CBI index equation includes country- and year-fixed effects. The IMF program equation includes region- and year-fixed effects. IMF program is instrumented using the vote alignment of a country with the G7 in the UNGA (as shown). Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table A5**: Distance to Washington and crisis exposure as CBI conditionality instrument.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.CBI condition | 0.779 | 1.125 | 0.674 |
| | (0.645) | (0.756) | (0.757) |
| L.CBI condition | 2.068** | 3.078*** | 2.616** |
| | (0.933) | (1.194) | (1.149) |
| D.IMF program | -0.217 | -0.387 | -0.360 |
| | (0.374) | (0.432) | (0.433) |
| L.IMF program | 0.439 | 0.988 | 0.809 |
| | (0.524) | (0.613) | (0.563) |
| Control set | -- | Baseline | Extended |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.08 | 0.12 | 0.13 |
| Pseudo-R2 | 0.30 | 0.27 | 0.28 |
| F-statistic | 2.96 | 7.96 | 8.09 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of three equations. The CBI index equation includes the indicated control sets, country-, and year-fixed effects. The IMF program equation includes the indicated control sets, region-, and year-fixed effects. The CBI condition equation includes indicated control sets, country-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. CBI condition is instrumented using the interaction between the US interest rate and the distance of a country to Washington D.C. Standard errors are allowed to be correlated across equations and clustered on countries.
Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table A6**: Country neighboring a US conflict as instrument for CBI conditionality.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.CBI condition | 0.776 | 1.124 | 0.670 |
| | (0.644) | (0.756) | (0.756) |
| L.CBI condition | 2.092** | 3.080*** | 2.667** |
| | (0.940) | (1.203) | (1.162) |
| D.IMF program | -0.216 | -0.386 | -0.358 |
| | (0.374) | (0.431) | (0.433) |
| L.IMF program | 0.430 | 0.957 | 0.778 |
| | (0.520) | (0.604) | (0.549) |
| Control set | -- | Baseline | Extended |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.08 | 0.12 | 0.13 |
| Pseudo-R2 | 0.30 | 0.28 | 0.28 |
| F-statistic | 4.99 | 5.43 | 4.91 |

*Notes*: Maximum-likelihood estimation of vector error correction models including three equations. The CBI index equation includes indicated control sets, country-, and year-fixed effects. The IMF program equation includes the indicated control sets, region-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. The CBI condition equation includes indicated control sets, country-, and year-fixed effects. CBI condition is instrumented using a binary indicator for whether the given country is neighboring a US conflict zone (another country in which the US has troops on the ground) in a given year. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table A7**: IMF regional capacity constraints as instrument for CBI conditionality.

| | (1) | (2) | (3) |
|---|---|---|---|
| D.CBI condition | 0.773 | 1.126 | 0.659 |
| | (0.645) | (0.756) | (0.755) |
| L.CBI condition | 2.005** | 2.852** | 2.658** |
| | (0.925) | (1.165) | (1.161) |
| D.IMF program | -0.217 | -0.389 | -0.360 |
| | (0.374) | (0.431) | (0.433) |
| L.IMF program | 0.424 | 0.990 | 0.806 |
| | (0.517) | (0.609) | (0.574) |
| *L.CBI condition* | | | |
| L.Regional share | -3.890*** | -4.641*** | -4.583*** |
| | (1.254) | (1.482) | (1.553) |
| Control set | -- | Baseline | Extended |
| Observations | 3237 | 1638 | 1505 |
| Within-R2 | 0.08 | 0.12 | 0.13 |
| Pseudo-R2 | 0.30 | 0.27 | 0.28 |
| F-statistic | 9.59 | 9.81 | 8.71 |

*Notes*: Maximum-likelihood estimation of a vector error correction model system of three equations. The CBI index equation includes the indicated control sets, country-, and year-fixed effects. The IMF program equation includes the indicated control sets, region-, and year-fixed effects. The CBI condition equation includes indicated control sets, country-, and year-fixed effects, and the lagged IMF dummy. 'IMF program' is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. CBI condition is instrumented using the regional share of IMF programs that have at least one CBI condition. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

## B. Verifying assumptions

Our most demanding model posits that both IMF programs and CBI conditions are non-random. To mitigate threats to inference, we employ an instrumental-variable approach that is akin to a continuous difference-in-difference design for both these endogenous variables. We need to use compound instruments because no obvious instruments for both IMF programs and CBI conditions are available. The core assumptions needed for identification include (1) parallel trends (i.e., the trends in IMF treatment variables and the outcome are similar across countries with high exposure and low exposure to IMF treatments); and (2) non-overlapping trends (i.e., non-linear trends in these variables for high-exposure countries do not overlap with the trend in the exogenous time-varying variables). Our approach yields unbiased estimates if these assumptions are fulfilled.

First, consider the compound instrument for IMF programs. Figure B1 shows no stark differences in the trending behavior of the CBI index across IMF program exposure groups. For both groups, the curve displays a characteristic logarithmic growth since the end of the Cold War. Therefore, we do not find evidence of violation of the parallel trends assumption. Figure B2 shows the trend for the IMF liquidity ratio. It differs markedly from the trends in both the outcome (and IMF programs which is not shown here). Hence, there are no overlapping trends between IMF liquidity and IMF program and outcome variable.

**Figure B1**: Outcome variable trend across different IMF program exposure groups.

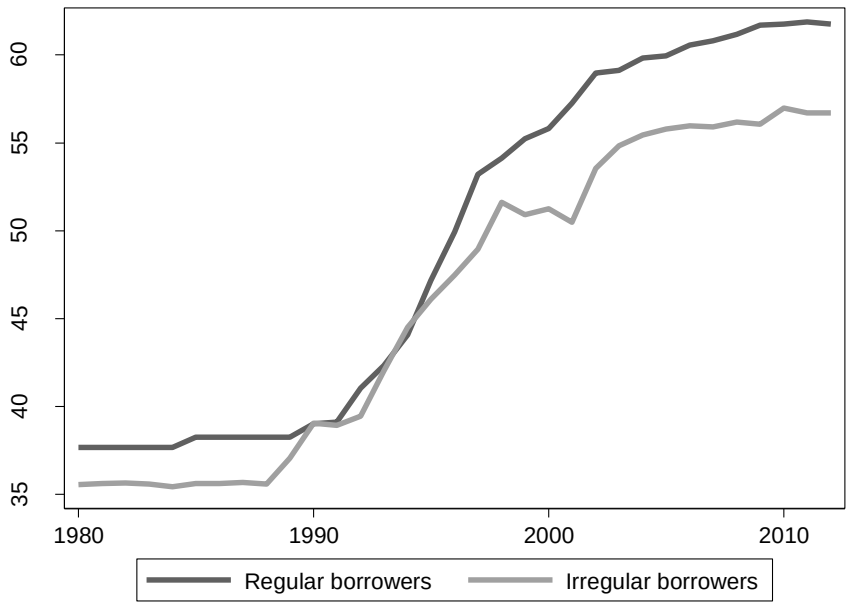
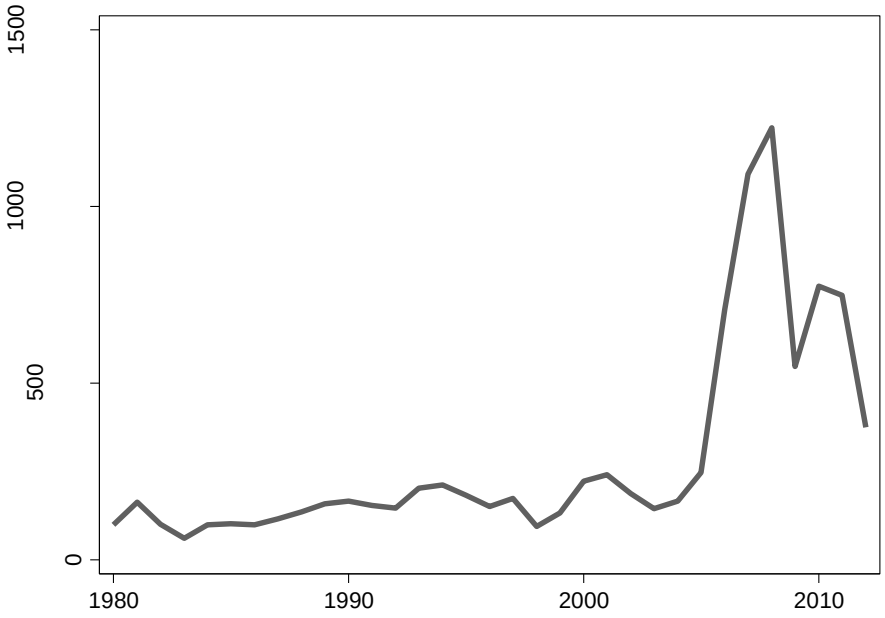



**Figure B2**: IMF liquidity ratio.




Second, consider the compound instrument for CBI conditionality. Figure B3 confirms that trends in CBI are similar across different exposure groups in terms of CBI conditions. This undergirds the common trend assumption. Moreover, using Figure B4, the trends in CBI (and CBI conditionality which is not shown) and the US interest rate do not overlap; hence, results cannot be driven by non-linear overlapping trends in the endogenous variable and the time-varying part of the instrument.

**Figure B3**: Outcome variable trend across different CBI conditionality exposure groups.

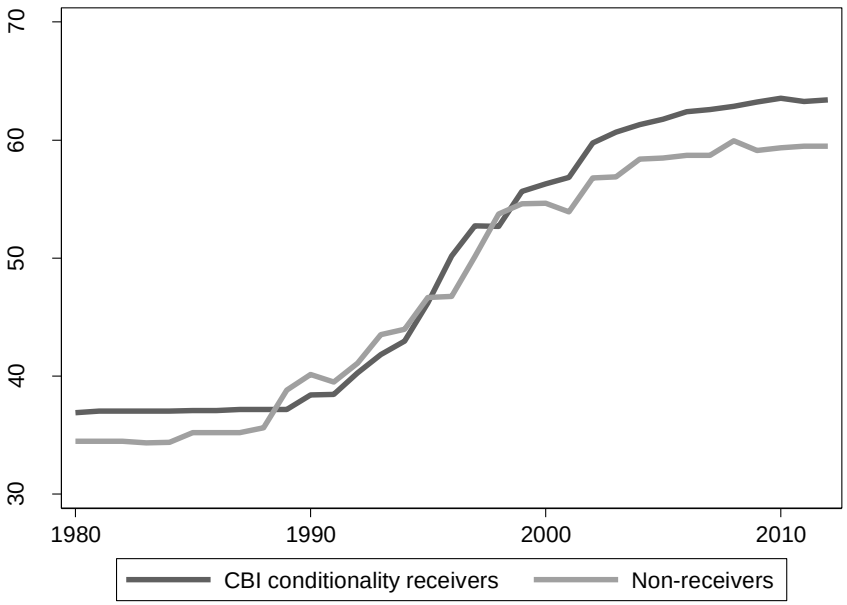
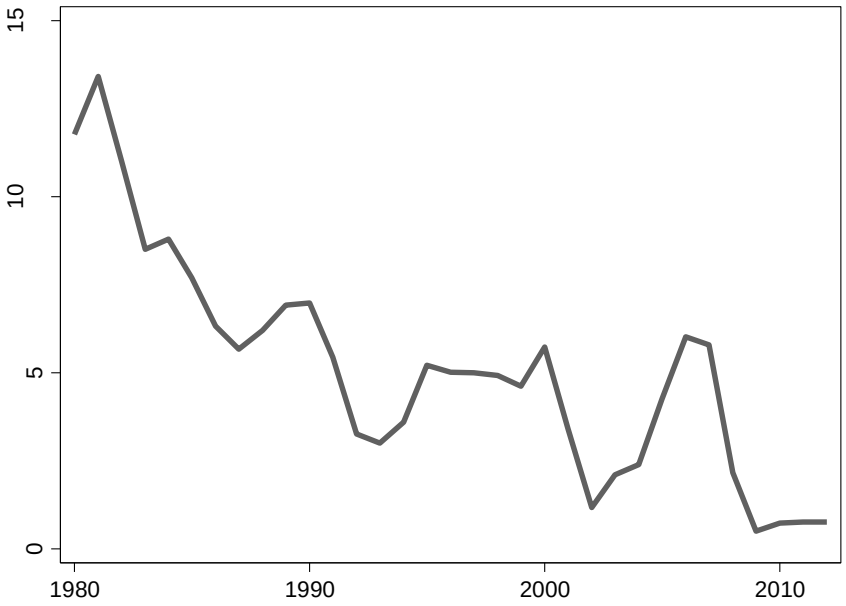



**Figure B4**: Time-varying US interest rate.




Overall, in both cases, the assumptions for identification in the continuous difference-in-difference design is thus fulfilled.

## C. Descriptive statistics

| | Description and source(s) | Observations | Mean | Sd | Min | Max |
|---|---|---|---|---|---|---|
| *Key variables of interest* | | | | | | |
| CBI index | Level of central bank independence based on the Cukierman-Webb-Neyapti coding scheme (unweighted average) covering 81 countries between 1972 and 2008. The CBI scores are based on a weighted calculation of 16 indicators in four categories regarding the central bank's Chief Executive Officer, Policy Formation, Objectives, and Limitations on Lending to the Government (Bodea and Hicks 2014) | 3383 | 48.99 | 19.67 | 10.74 | 97.21 |
| CBI index (extended sample) | Level of central bank independence based on the Cukierman-Webb-Neyapti coding scheme (unweighted average) covering 182 countries between 1970 and 2012. The CBI scores are based on a weighted calculation of 16 indicators in four categories regarding the central bank's Chief Executive Officer, Policy Formation, Objectives, and Limitations on Lending to the Government (Garriga 2016) | 4841 | 51.72 | 19.47 | 7.66 | 97.38 |
| CBI reform | Binary indicator of a central bank reform--a change in the central bank law--toward greater independence (Garriga 2016) | 5427 | 0.04 | 0.20 | 0.00 | 1.00 |
| CBI conditionality | Any IMF condition relating to the central bank of a borrower country. CBI conditionality can be mandated across six domains, including nomination of governors, reforms to the central bank mandate, the role of the central bank in economic policy, quasi-fiscal operations, central bank transparency, and banking supervision. We followed a two-step process to identify the related conditions. First, we searched the full text of the IMF conditionality database (Kentikelenis, Stubbs, and King 2016) for matches with central bank, monetary authority, and related key words. Second, we verified the validity of each identified condition and assigned it to at least one of the six domains. | 6649 | 0.04 | 0.20 | 0.00 | 1.00 |
| Bank governor | Conditions on the central bank governor, for example regarding appointment procedures, term tenures, provisions for dismissal, prohibition of multiple terms, or change of governor | 6649 | 0.00 | 0.06 | 0.00 | 1.00 |
| Bank mandate | Conditions on central bank mandate to ensure price stability as key objective, or extending the mandate to cover banking supervision, or re-organizing the relationship with government | 6649 | 0.01 | 0.08 | 0.00 | 1.00 |
| Bank policy | Conditions on day-to-day operations of the central bank, including target rates and responsibility for policy formulation | 6649 | 0.01 | 0.11 | 0.00 | 1.00 |
| Quasi-fiscal operations | Conditions on limitations of advances to government and securitized lending; in case such lending is not prohibited, conditions affect terms of lending to government, the nature of the beneficiary (excluding non-central government and private market), loan maturity, and interest rates (lending at market rates only) | 6649 | 0.02 | 0.12 | 0.00 | 1.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| IMF program | Binary indicator for whether an IMF program was active in a given year (Kentikelenis, Stubbs, and King 2016) | 6715 | 0.28 | 0.45 | 0.00 | 1.00 |
| *Control variables* | | | | | | |
| GDP per capita | Natural logarithm of GDP per capita in 2005 constant USD (World Bank 2015) | 5861 | 8.04 | 1.64 | 4.24 | 11.97 |
| Openness | Natural logarithm of trade openness, defined as the sum of exports and imports as a percentage of GDP (World Bank 2015) | 5536 | 4.26 | 0.64 | -3.86 | 6.28 |
| Inflation | Natural logarithm of percentage rate of inflation, defined as the annual change in the consumer price index (World Bank 2015) | 5079 | 1.78 | 1.43 | -7.39 | 10.10 |
| External debt | Natural logarithm of the external debt level (World Bank 2015) | 3329 | 3.91 | 0.86 | -1.43 | 7.23 |
| Polity IV | Polity IV index, defined as the combined democracy and autocracy scores (Marshall, Gurr, and Jaggers 2015); drawn from the QoG database (Teorell et al. 2016) | 4835 | 1.94 | 7.23 | -10.00 | 10.00 |
| Financial assets | Natural logarithm of financial assets as percentage of GDP (Pepinsky 2012), including deposit money bank assets, non-bank financial institutions assets (defined as zero if missing), and central bank assets, all three drawn from the Global Financial Development Database (World Bank 2015) | 7130 | 2.56 | 1.92 | 0.00 | 6.15 |
| G5 bank exposure | Natural logarithm of net foreign claims of banks headquartered in the G5 countries--United States, United Kingdom, France, Germany, and Japan--to a given recipient country (Bank of International Settlements 2018) | 7130 | 4.54 | 3.98 | 0.00 | 15.11 |

## D. Model equations

Our main analysis relies on vector error correction models (VECMs). We decided to instrument the levels of the endogenous variables, as the differences of these treatments can be plausibly assumed to be exogenous controlling for their levels and other potential confounders. Overall, our VECMs have up to three equations – one outcome equation, one IMF program selection equation, and one CBI conditionality equation. The latter two equations are necessary if we want to instrument these presumably endogenous variables so that – following valid instrumentation – the entire system is recursive and can be estimated using standard MLE techniques. In more formal notation, our most complex system of equations looks as follows in general terms:

$$y^{*\prime} = \theta^{\prime} + \varepsilon^{\prime} \tag{1}$$

$$\theta^{\prime} = y^{\prime}\Delta + x^{\prime}B \tag{2}$$

$$E[\varepsilon|x] = 0 \tag{3}$$

$$\varepsilon \sim \mathcal{N}(0, \Sigma) \tag{4}$$

$$y = g(y^{*}) = [g_1(y^{*}), g_2(y^{*}), g_3(y^{*})]^{\prime} \tag{5}$$

Therein, $y^{*\prime}$ is the stacked vector of outcome variables, with $y_1^{*}$ denoting the CBI index, $y_2^{*}$ the latent process for being under an IMF program, and $y_3^{*}$ the latent process for being under CBI conditionality. Hence, $g_1$ is linear, while $g_2$ and $g_3$ are non-linear functions.

$\theta^{\prime}$ refers to the linear index, and $\Delta$ is a coefficient matrix representing the effects of the potentially endogenous variables in the system. Since our outcome equation is an ECM, the parameter $\Delta_{11}$ is non-zero, indicating the decay parameter. $B$ collects the coefficients of the exogenous predictors. We assume a multivariate error structure that allows for arbitrary cross-equation correlation. Hence, the matrix $\Sigma$ is one on all diagonal entries and has three unique cross-equation correlation parameters, $\sigma_{ij} = \sigma_{ji}$ for $i \neq j$.

The above system of equations has two key features. First, the number of observations can vary by equation. This also implies that different link functions may be applicable in each equation. While the outcome equation is linear, the auxiliary equations have a probit-type link. Second, the above system is potentially simultaneous as long as we do not impose more structure. Specifically, we assume that we have suitable instruments available, with the result that the simultaneous system becomes a recursive one. By using instrumental variables, we can ensure that the outcome variable does not appear as a right-hand side variable in the treatment equations. For such a 'recursive system', the likelihood function can be readily evaluated and parameters of interest obtained through maximum likelihood estimation. The Stata package *cmp* estimates such systems consistently under fairly mild assumptions (Roodman 2012).

## E. Further analyses

**Table E1**: The effect of sub-areas of CBI conditionality on CBI.

| | Governor | Mandate | Policy | Quasi-fiscal operations |
|---|---|---|---|---|
| D.CBI area | 1.286 | 0.143 | 0.398 | 3.120 |
| | (2.769) | (2.790) | (1.288) | (2.009) |
| L.CBI area | -0.293 | 3.361 | 2.618** | 3.381 |
| | (2.430) | (3.765) | (1.286) | (2.067) |
| D.IMF program | -0.035 | -0.071 | -0.143 | -0.241 |
| | (0.424) | (0.436) | (0.440) | (0.430) |
| L.IMF program | 1.244** | 1.147** | 1.123** | 1.122** |
| | (0.578) | (0.539) | (0.539) | (0.553) |
| Control set | B | B | B | B |
| Observations | 1513 | 1513 | 1513 | 1513 |
| Within-R2 | 0.11 | 0.12 | 0.12 | 0.12 |
| Pseudo-R2 | 0.18 | 0.18 | 0.18 | 0.18 |

*Notes*: Maximum-likelihood estimation of vector error correction models including two equations. CBI area is a binary variable indicating a CBI condition in the area indicated in the column header. The CBI index equation includes baseline controls, country-, and year-fixed effects. The IMF program equation includes the baseline controls, region-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table E2**: The effect of CBI conditionality on sub-indices of CBI.

| | Governor | Mandate | Policy | Quasi-fiscal operations |
|---|---|---|---|---|
| D.CBI condition | 0.212 | 1.482** | 0.896 | 0.929 |
| | (0.491) | (0.746) | (0.790) | (0.725) |
| L.CBI condition | 1.031 | 2.081** | 1.507* | 1.994* |
| | (0.674) | (1.058) | (0.885) | (1.040) |
| D.IMF program | 0.084 | -0.059 | -0.542 | -0.094 |
| | (0.223) | (0.254) | (0.416) | (0.307) |
| L.IMF program | 0.561 | -0.489 | -6.264*** | -7.142*** |
| | (1.157) | (1.040) | (1.460) | (1.443) |
| Control set | B | B | B | B |
| Observations | 1960 | 1940 | 1940 | 1940 |
| Within-R2 | 0.07 | 0.09 | 0.08 | 0.11 |
| Pseudo-R2 | 0.19 | 0.19 | 0.19 | 0.19 |

*Notes*: This is one maximum-likelihood estimation of a vector error correction model including five equations. Four equations (dependent variables of which indicated in the column heads) are related to the four dimensions of the CBI index and include baseline controls, country-, and year-fixed effects. The IMF program equation includes the baseline controls, region-, and year-fixed effects. IMF program is instrumented using the interaction between the IMF liquidity ratio and the country-specific probability of being under an IMF program. Standard errors are allowed to be correlated across equations and clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Table E3**: The effect of CBI conditionality on CBI reform (binary indicator).

| | (1) | (2) | (3) |
|---|---|---|---|
| L.IMF program | 0.331 | 0.816** | 0.833** |
| | (0.274) | (0.408) | (0.414) |
| L.GDP per capita | | 1.423 | 1.615 |
| | | (1.210) | (1.346) |
| L.Openness | | 1.088 | 1.135 |
| | | (0.818) | (0.832) |
| L.Polity IV | | 0.066 | 0.066 |
| | | (0.056) | (0.056) |
| L.Inflation | | -0.000 | 0.002 |
| | | (0.131) | (0.134) |
| L.Debt | | 0.111 | 0.112 |
| | | (0.312) | (0.325) |
| L.Financial assets | | | 0.295 |
| | | | (0.272) |
| L.G5 bank exposure | | | -0.185 |
| | | | (0.184) |
| L.CBI index | -0.068*** | -0.127*** | -0.129*** |
| | (0.011) | (0.027) | (0.027) |
| Observations | 2483 | 1218 | 1218 |
| Pseudo-R2 | 0.16 | 0.25 | 0.26 |

*Notes*: Conditional logit estimations with 'CBI reform' as dependent variable. The equation includes country- and year-fixed effects. Standard errors are clustered on countries.

Significance levels: * p<.1 ** p<.05 *** p<.01.

**Acknowledgements**

We want to thank Sharat Ganapati, Irfan Nooruddin, Nita Rudra, Gerald Schneider, and Carole Sargent for very helpful comments. We are also thankful for feedback from the participants in seminars at the European Central Bank, Georgetown University, and the IR research cluster at the University of Glasgow. Caitlin Chamberlain provided outstanding research assistance. All errors remain ours.

**Andreas Kern**
Georgetown University, Washington, D.C., United States; email: ak679@georgetown.edu

**Bernhard Reinsberg**
University of Cambridge, Cambridge, United Kingdom; email: br385@cam.ac.uk

**Matthias Rau-Goehring**
European Central Bank, Frankfurt am Main, Germany; email: rau.goehring@gmail.com



Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu



PDF ISBN 978-92-899-4381-9 ISSN 1725-2806 doi:10.2866/65533 QB-AR-20-116-EN-N