

# International finance and central bank independence: Institutional diffusion and the flow and cost of capital

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## Abstract

Research on the consequences of central bank independence (CBI) focuses overwhelmingly on its effect on domestic variables like inflation and the tradeoff with economic growth. The sources of CBI reform are also thought to be mostly domestic. We argue that CBI is an institutional reform deeply connected to outcomes that investors care about and independence has the potential to create an autonomous domestic actor in favor of property rights protection. Consequently central bank reform and independence ought to be considered in relation with global finance. Analytically we view such interdependence in two steps. A first links a government's decision to reform central bank legislation to a perceived need to attract and retain capital, be that in the form of foreign direct investment or sovereign borrowing. A second step models investors' decision to move capital and the price of such capital as a function of central bank independence. We test our argument on a sample of 78 countries from 1974 to 2007. Logit models are used to investigate the determinants of central bank reform. Results show a strong effect of international capital, both through a direct competition channel and through norms of good governance of the macroeconomy. Learning from peer countries about when CBI is likely to be functionally able to deliver on key outcomes is not a robust effect. On the other hand, we find evidence that CBI affects the flow and cost of capital in particular contexts. The effect is strong for non-OECD countries, before CBI became widely adopted and where political institutions allow the central bank to de facto be credible to deliver the outcomes that investors care about.

## 1. Introduction

In the last twenty years there has been a global move towards the adoption of neoliberal policies, including central bank reform aimed at increasing the independence of monetary policy from politicians. Much of the extant work has focused on the effect of central bank independence (CBI) on inflation and its trade-off with economic growth (Grilli et al. 1991, Cukierman et al 1992, Alesina and Summers 1993, Franzese 1999, Franzese 2002a, Keefer and Stasavage 2003, Stasavage 2003, Crowe and Meade 2008). This is mostly because bank independence has been seen as a solution to the time inconsistency problem in monetary policy (Rogoff 1985) or as driven by domestic politics (Bernhard 1998, Crowe and Meade 2008, Hallerberg 2002, Broz 2002, Boylan 2001). Moreover, the political economy literature (Broz 2002, Keefer and Stasavage 2003, Bodea and Hicks forthcoming, Bodea Higashijima 2013) brings significant evidence that the legal delegation of monetary policy to an independent central bank affects domestic economic outcomes (inflation, money supply or fiscal deficits) only in democracies where there is political system transparency, contestation of power by distinct veto players and media freedom.

Yet in the last two decades, countries as different as Venezuela, Russia or Belarus, on the one hand and Japan, Chile or the Czech Republic, on the other, have delegated more independence to their central bank. If CB reform can be expected to have little credibility in particular political environments, why and when would politicians nonetheless delegate nominally and does this delegation actually affect investor behavior? Some extant work suggests that CBI reform is driven by incentives created by globalization, exposure to trade and investment, and competition for capital (Maxfield 1998, Guillen and Polillo 2005, McNamara 2011). Yet, surprisingly little research has focused on the reciprocal relationship between CBI and international financial flows.

We argue that the credibility benefits of CBI extend logically beyond its potential effects on inflation and growth. International investors are interested in economic policy stability and the guarantee that policies will not change drastically, affecting the value of their investment. A more independent central bank should provide assurance to international investors in those political configurations where CBI ties the hands of the government. In this case, central bank reform and independence ought to be considered in relation with global finance. Analytically we view such interdependence in two steps. The first links a government's decision to reform central bank legislation to a perceived need to attract and retain capital, be that in the form of foreign direct investment or sovereign borrowing. A second step models investors' decision to move capital and the price of such capital as a function of central bank independence. We use the extensive literature on the international diffusion of liberal policies and institutions to model central bank reform and posit specific causal mechanisms. Reform of the central bank can thus spread because (i) countries with the same sovereign risk or export profile compete directly for capital; (ii) countries learn from peers with similar political institutions about when CBI can be expected to be functionally effective; (iii) CBI becomes a global or regional norm of good governance; or (iv) countries have liberalized their capital account or direct investment is a large part of their economy. We then suggest conditions when central bank independence can be attractive to investors. CBI may (i) provide cues about the future path of key policy outcomes to investors who want to enter a country early; (ii) credibly signal stable prices and fiscal discipline and the presence of a domestic actor favorable to property rights protection in democracies; or (iii) increase the information available to investors in countries with non-negligible risk of default.

We use new author-collected data on central bank independence that allows us to test our argument on a sample of 78 democracies, mixed regimes and dictatorships from 1974 to 2007. In addition to coding the central bank laws to update the Cukierman, Webb, and Neyapti index, we also identify the years countries reformed their central banks. This allows us to test not only the effect of CBI on international economic outcomes, but also the effect of international competition for capital on central bank reform. A first set of empirical models uses logit regressions to explain the dichotomous decision to reform a country's central bank. Our key explanatory variables are spatial lags of CBI reform and CBI levels from country groupings that reflect our theoretical mechanisms. We find strong evidence that central bank reform is driven by competition for capital and responds to the decisions of other countries. The most robust mechanisms reflect diffusion following a regional norm and direct competition among countries in similar sovereign risk categories. The effect of CBI on international outcomes is more ambiguous and reflects to a larger extent investors' attention to functional considerations vis-à-vis CBI. Thus, we find inconsistent evidence that CBI by itself affects FDI flows, bond rates, or credit ratings. There is evidence, however, that in non-OECD countries CBI in democracies results in a positive flow of FDI and lower 10-year bond rates. We also find some evidence of a temporal component to CBI and FDI flows and bond rates. CBI has a larger effect before roughly 1997, or in countries that reformed their central bank before CBI started to become a norm of governance of the macro-economy.

Our paper contributes directly to several research agendas. First, our work fills a gap in explaining why and when CBI should matter beyond inflation control, and, importantly, proposes to evaluate our hypotheses with newly collected information on central bank legislation that identifies precisely the year of central bank reform. In doing so, we re-open the discussion on the sources of central bank law reform and document additional likely benefits of CBI (more foreign direct investment, lower cost of capital). Second, the paper directly increases our understanding of the implications and causes of global capital flows. Central bank independence is an institutional reform deeply connected to outcomes (inflation, fiscal discipline) that investors care about and independence has the potential to create an autonomous domestic actor in favor of property rights protection. Yet, while other neo-liberal policies have been shown to respond to competition for capital (Simmons 2000, Simmons and Elkins 2004, Quinn and Toyoda 2007, Elkins, Guzman and Simmons 2006), there has been little understanding of the mechanisms that translate a global market for capital into domestic reform of the central bank. Importantly, we show that the one of the least robust mechanism of diffusion is through learning about the context when CBI can be expected to have an effect on outcomes. Countries rather imitate neighbors, direct competitors for sovereign capital or are incentivized to reform by the presence of significant flows of foreign direct investment. In addition, while we understand the effect of democracy (Jensen 2003, Li and Resnick 2003, Jensen 2008, Saiegh 2005, Archer, Biglaiser and DeRouen 2007, Beaulieu, Cox, and Saiegh 2012) or international institutions or treaties (Buthe and Milner 2008, Gray 2009, Dreher and Voigt 2011) on the flow and cost of capital, there is no theorizing or up-to-date evidence on when CBI can be expected to influence the flow and cost of capital. We show that in non-OECD countries, foreign direct capital flows and 10-year bond interest rates react significantly to CBI reform in democracies, regardless of whether countries reform early or late. This is important, because while, CBI reform is not robustly driven by the experience of countries with similar political institutions, the reaction of capital appears to be driven by functional considerations. It is also important because it complements research showing that developing countries face strong additional scrutiny from investors (Mosley 2000,

2003, Sobel 1999) by bringing evidence that democracies with CBI can be of informational value to investors. Finally, Broz (2002) has influentially argued that the political transparency of democracies can increase the inflation credibility of central banks. Therefore, democracies should prefer CBI versus fixed exchange rates because fixed rates have costs and the transparency of political institutions in democracies substitutes for the relative lack of transparency of central banks. Convincing evidence exists that autocracies are more likely to choose fixed exchange rates (Broz 2002, Bearce and Hallerberg 2011, Hall 2008) or that transparency aids CBI to lower inflation (Broz 2002, Keefer and Stasavage 2003) and reduce disinflation costs (Stasavage 2003). Because, however, previous data do not identify precisely the year of reform, the literature has been unable to properly test whether democracies are more likely reform their central bank and make them more independent.<sup>1</sup> Using our annual data we find little direct evidence that democracies are more likely to reform. Rather, it appears that autocracies ignore the functional considerations of when CBI can work and follow norms or direct competitive pressures or, although this is a less robust finding, that democracies increase the level of CBI only following reform in other democratic countries.

The rest of the paper proceeds as follows. Section 2 provides background on the drivers of CBI. Section 3 reviews research on the effects of institutions on the cost and flow of capital. Section 4 explains the mechanisms through which competition for capital can drive central bank reform and section 4.1 presents empirical evidence for our propositions. Section 5 discusses in turn how we expect CBI to affect the flow and cost of capital, while section 5.1 presents our empirical evidence. Section 6 concludes.

## **2. Domestic and international drivers of central bank independence**

In the last twenty years, governments of every political stripe, democracies as well as mixed regimes and autocracies, have reformed their central bank laws in order to give their banks more autonomy from the government. Some of the reasons behind such reforms rest with countries' domestic conditions, particularly the time inconsistency problem faced by governments in monetary policy (Kydlund and Prescott 1977, Barro and Gordon 1983). Time inconsistency results from a government's incentive to generate economic growth through surprise inflation. Given this incentive and markets' rational expectations, it is optimal for governments to delegate monetary policy to an independent and conservative central bank. Other factors influencing the level of central bank independence include information asymmetries between governments and legislators or coalition partners (Bernhard 1998); diverse political coalitions (Crowe 2008); more checks and balances (Moser 1999); federal systems and party veto players (Hallerberg 2002); the presence of coalitions favoring price stability (Goodman 1991, Treisman 1998); transparent political systems (Broz 2002); or the interests of propertied classes in transitions to democracy (Boylan 2001).

At the same time, international factors, especially the competition to attract international finance, may also play a role in central bank reform. Convergence theories argue that policy diffusion and international competition have an effect on the proliferation of other liberal policies like current account liberalization (Simmons 2000, Simmons and Elkins 2004), capital account liberalization (Simmons and Elkins 2004, Quinn and Toyoda 2007), or the legalization of investment obligations via bilateral investment treaties (BITs) (Elkins, Guzman and Simmons

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<sup>1</sup> Polillo and Guillen (2005) investigate central bank reform in the 1990s and find little evidence that reform is more likely in countries with more checks and balances, which tend to be democracies.

2006, Jandhyala, Henisz and Mansfield 2010).<sup>2</sup> In turn, others have looked at the effect of countries signing such international agreements on the particular international outcomes over which countries supposedly compete. For example, Simmons (2000) shows that regional competition drives countries to accept IMF's Article VIII requiring countries to keep current account transactions free from restrictions. That is, more signatories from a particular region induce a similar behavior in other countries in the region. Simmons then shows that agreement with Article VIII actually influences country restrictions on the current account. The literature of capital account liberalization also actively looks into the effect of such liberalization on capital flows (Bartolini and Drazen 1997, Kose et al. 2009). Furthermore, while there is still some disagreement in the literature, BITs are shown to indeed increase FDI flows to developing countries (Busse et al. 2010, Kerner 2009, Tobin and Rose-Ackerman forthcoming, Neumayer and Spess 2005).

The globalization of finance has also been part of an explanation of the trend toward increased CBI. Yet the mechanisms remain underexplored and the evidence is limited to specific cases or time periods. In a revealing example, during the 2002 Brazilian presidential election, the eventual winner, leftist candidate Luiz Inacio "Lula" da Silva, advocated a plan to replace the sitting central bank president, who was popular with the international markets, with someone from his own party.<sup>3</sup> Wary of Lula's non-liberal policies, many international investors fled Brazil, causing the value of the currency and the stock market to decline. In response, Lula softened his anti-market rhetoric and promised that Brazil would honor its debt obligations. He even proposed granting the central bank greater independence shortly after elected, though he also did replace the sitting central bank governor. In a more recent example, democratizing Myanmar has been working on legislation to separate its central bank from the ministry of finance as part of a legal and institutional framework that will project economic stability in the eyes of foreign investors. Central bank reform is expected to work as a "seal of good housekeeping" that will associate Myanmar with countries like the Philippines or Thailand and separate it from laggards like Vietnam.<sup>4</sup>

In a more comprehensive fashion, Maxfield (1997) prominently suggests that CBI reform signals creditworthiness to potential investors. Using a series of case studies from the developing world she substantiates the idea that central bank autonomy is more likely when countries have low capital account restrictions or balance of payment problems, and, as a consequence, compete for mobile capital in international markets. More specifically, Maxfield traces changes to the informal (rather than legal) relations between the government and the central bank to governments' perceived need for foreign capital. In addition, Polilo and Guillen (2005) argue that competition among states leads to the adoption of institutions prevalent in each country's environment. Their evidence shows that in the 1990s the trend in CBI legal reform was driven by exposure to international trade, foreign direct investment and multilateral lending, as well as trade competition.

Such arguments for the international diffusion of CBI reform can, at least on face value, contradict the evidence on how CBI affects the domestic policy outcomes that investors care about. CBI reform has occurred in countries as diverse as Belarus or Venezuela, on the one hand,

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<sup>2</sup> Diffusion processes have also been shown to be at play in other areas like tax policy (Swank 2006), democracy (Gleditsch and Ward 2008), infrastructure reform (Henisz, Zellner and Guillen 2005) or international labor standards (Neumayer and de Soysa 2006, Baccini and Koenig-Archibugi 2011).

<sup>3</sup> *Associated Press*, 24 September 2002.

<sup>4</sup> Wall Street Journal Europe "Myanmar Central Bank sees Independence Near", June 10 2013.

and the Czech Republic or Chile, on the other. Previous work finds quite starkly that CBI has its intended effect on domestic variables like inflation or fiscal deficits only in democracies. Broz (2002) argues that in political systems where decision making is transparent (i.e. democracies), independent central banks can contribute to low inflation. Keefer and Stasavage (2002, 2003) also show that central bank independence is credible only when the political system is populated by veto players with distinct preferences, which, again, is predominantly a feature of democracies. The combination of central bank independence and political regimes is also found to have a discipline effect on rates of money growth and a credibility effect on inflation in democracies but not in autocracies (Bodea and Hicks forthcoming). And fiscal discipline is improved by the presence of an independent central bank, but only in democracies (Bodea 2013, Bodea and Higashikjima 2013).

Even more, we know little about whether and how bank independence actually affects financial flows, even if, as noted above, globalization via trade or lending channels has been argued to influence CBI reform. Most extant work is old and finds mixed results regarding the effect of central bank independence on the cost of capital. For example, Alesina and Summers (1993) show that CBI does not reduce risk premia in real interest rates (also in Cukierman et al. 1993). On the other hand, Spiegel (1998) finds that the 1997 reform of the Bank of England reduced inflation expectations as reflected in lower long term bond yields.<sup>5</sup> Related, Maxfield (1997) uncovers a statistically significant relationship between CBI and the share of private investment to GDP. On the other hand, virtually no work examines the effect of CBI on flows of foreign direct investment nor does it examine whether the recent worldwide reforms in CBI have affected financial flows.<sup>6</sup>

### **3. Institutions and international capital**

We argue that a feedback loop exists between a government's desire to attract foreign capital, and the institutions of countries, in particular here the status of the central bank, which in turn affects the flow and cost of international capital.<sup>7</sup> A significant body of research finds that the institutions and the legal constraints countries adopt affect important features of international finance like the flow of direct capital or the cost of sovereign borrowing. The risk and return on both types of investment are affected by the actions of host governments.<sup>8</sup>

Following an early focus on economic factors affecting international capital flows, more recent work investigates the role of domestic political institutions and international agreements.

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<sup>5</sup> Gurkaynak et al. (2010) show that inflation targeting (in the UK and Sweden) contributes to lower long term inflation expectations, and a lower sensitivity of interest rates to economic news. Moser and Dreher (2010) find that sovereign bond spread in developing countries react to the replacement of central bank governors.

<sup>6</sup> Poast (forthcoming IO) finds that before 1914 central banks reduced the cost of war finance.

<sup>7</sup> In important work, Mosley (2000) argues that international financial markets affect the policy choices of national governments, which in turn respond by rewarding particular policies. Mosley brings evidence for one part of the posited relationship between markets and government policy and shows that changes in interest premiums of government debt are influenced by macroeconomic outcomes. Mosley (2003) also has preliminary analysis of the reciprocal effect between international capital and monetary and fiscal institutions,

<sup>8</sup> While globalization certainly includes the significant growth in international trade, we investigate here the relationships between the institutional reform of the central bank and international finance. Our focus is on direct investment and sovereign lending (lending to governments), which can broadly be differentiated by the amount of investor involvement in management decisions as well as the degree of liquidity and volatility. Both types of investment are prized by host governments. Direct investment is valued because it implies a longer term commitment to a particular country and, many times, results in significant local employment. On the other hand, while volatile, sovereign lending is valued because it allows the freedom to spend financial resources on government priorities.

Democratic institutions are argued to increase inflows of foreign direct investment because of higher policy stability, transparency, audience costs or property rights protection (Henisz 2002, Jensen 2003, Li and Resnick 2003, Jensen 2008). Yet electoral competition and policy responsiveness to preferences of voters and local firms are argued to reduce the appeal of democracies as FDI destinations (Li and Resnick 2003, Jensen 2008). Other work argues that international agreements such as BITs or PTAs can signal a commitment to more credible policies limiting government intervention in the economy, thus increasing FDI flows (Buthe and Milner 2008). Democratic political regimes further enhance the credibility of international commitments due to open ratification procedures and transparency of processes of policy change (Buthe and Milner 2012).

Institutions are important for sovereign lending as well. Schultz and Weingast (2003) argue that political constraints increase the likelihood that governments honor debt, which should translate into better access to credit and lower cost of capital. Historical analyses tend to support this idea.<sup>9</sup> Several recent articles, however, fail to find a significant “democratic” advantage for the cost of capital (Saiegh 2005, Archer, Biglaiser and DeRouen 2007).<sup>10</sup> Additional work accounts for the selection involved in entering the bond market and finds that credit rating agencies give better ratings to democracies (Beaulieu, Cox, and Saiegh 2012). Other research finds that adherence to the rule of law, strong judiciaries and property rights protection also improve ratings given by credit rating agencies (Biglaiser and Staats 2012). Prior research also finds that fiscal institutions affect bond rates and interest rate spreads (Lowry and Alt 2001, Hallerberg and Wolff 2008). As in the case of FDI, international institutional commitments are also shown to affect the cost of capital: The European Union’s seal of approval reduces sovereign bond rates for countries meeting accession criteria (Gray 2009)<sup>11</sup>, or more generally membership in international organizations reduces countries’ risk ratings (Dreher and Voigt 2011).

#### **4. International capital and the diffusion central bank independence reform**

Our argument is that central bank reform and independence are deeply interrelated with global finance. We suggest that analytically we can view such interdependence in two steps. The first links a government's decision to reform central bank legislation to the perceived need to attract and keep international capital. A second models investors’ decision to move capital and the price of such capital as a function of central bank independence. In this section we use the large literature on international diffusion to model central bank reform and distinguish specific causal mechanisms. We also proceed to test the mechanisms we posit. In the next section we suggest conditions when central bank independence can be attractive to investors, either by signaling the future path of important outcomes like inflation or fiscal deficits, by acting as a domestic actor favorable to property rights protection or by providing additional information to investors in information poor environments.

Extant research classifies the overlapping influence that the international environment can have on a country’s policy choice into mechanisms of competition, coercion, emulation or

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<sup>9</sup> North and Weingast (1989), Schultz and Weingast (2003); Qualified support in Stasavage (2007).

<sup>10</sup> The evidence is also mixed on the effect of the democratic advantage on portfolio capital flows (Ahlquist 2006, Cao and Prakash 2012). On the other hand, competitive elections are part of the institutional make-up of democracies and Block and Vaaler (2004) show that in developing countries electoral cycles affect sovereign risk and bond spreads.

<sup>11</sup> Gray (2013) has a broader argument suggesting agreements signed with countries with good reputations lower risks but those signed with poor reputation countries may increase risk.

learning (Simmons and Elkins 2004, Elkins, Guzman and Simmons 2006, Simmons, Dobbins, Garrett 2008). We specify plausible channels for the diffusion of CBI reform. Our purpose is to explain how international finance may affect CBI reform, with an eye to our next question on the effect of CBI on the flow and cost of international capital. While prior work does suggest that the global flow of capital influences the relative attraction of CBI reform, the literature lacks a systematic discussion of the channels through which international finance may affect reform.

Convergence theories predict that competition for capital and capital mobility lead countries to adopt market sanctioned sets of policies or institutions and convergence across those countries that are close investment substitutes.<sup>12</sup> There are several features of central bank reform that make it attractive to international financial markets. First, CBI likely affects key outcomes that investors care about like domestic inflation and fiscal deficits and therefore can serve as a signal of the predictability of returns to capital. In Maxfield's view, CBI's largest signaling effect should be on bond investors because they tend to be dispersed and lack reliable access to local information.<sup>13</sup> FDI investors, however, should still favor CBI and its conservatism if they use host countries as export platforms in which case currency stability matters for the competitiveness of exports (Frieden 1991 – IO, Polillo and Guillen 2005) or if they prefer liberal policies of limited government intervention in the economy (Milner and Buthe 2008).<sup>14</sup> Second, the central bank can be an important veto player with a long term perspective against decisions to alter property rights, nationalize or default.<sup>15</sup> For example, Banaian and Luksetich (2001) show that countries with greater security of private property rights tend to have more independent central banks. Financial stability and capital flight play a large role in the central bank's preference for property rights protection. In this respect, the central bank, if independent, can be part of what Elkins, Guzman and Simmons (2006) call "institutions and practices that are favorable to investors, transparent and predictable" (p. 827). Following the competition logic, countries should reform the laws governing their central bank when direct rivals for portfolio capital or direct investment make changes to their own domestic legislation.

Yet, as explained earlier, CBI legal reform brings domestic credibility gains only in countries with transparent political institutions and real political competition. The conditional effect arises because governments in authoritarian regimes can exert covert pressure on an

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<sup>12</sup> Research also finds that the effect of international competition for capital is conditional on domestic institutions, political calculations or norms of fairness (Basinger and Hallerberg 2004, Hays 2003, Pluemper et al. 2009). Divergent responses to international competition are likely due to increased domestic demand for protection or are more specific to particular policy areas like government consumption spending, transfer payments or public employment (Garrett 1998, Garrett and Lange 1991).

<sup>13</sup> Ahlquist (2006) argues similarly that portfolio capital should have a larger reaction to signals coming from fiscal policy outcomes when compared to FDI.

<sup>14</sup> A key premise in Rogoff (1985) is that the bank has more conservative preferences than politicians and the public at large. An independent central bank concerned with inflation is thus likely to actively push for de-indexation of labor contracts and a social pact that contains wage increases. This is congruent with the preference of investors with containing labor costs, particularly since the evidence shows that CBI does not affect negatively GDP growth or volatility (Grilli et al. 1991). Adolph (2013) links central bank conservatism to financial sector career histories of officials.

<sup>15</sup> Central bank preference for the protection of property rights is well illustrated in a recent example. In the latest bailout in the euro zone, Cyprus left large bank depositors with significant losses. Following the announcement of the bailout plan, Jeroen Dijsselbloem, the head of the Eurogroup, voiced the opinion that the Cypriot bailout may become a model for future bank bailouts in the euro-zone. On the other hand, Benoit Coeure, a member of the executive board of the European Central Bank was more conservative with regards to property rights and rejected the idea that depositors should fear their savings on grounds that Cyprus has unique features in terms of the size of its financial sector (Associated Press March 26 2013 "ECB, Eurogroup at odds over Cyprus rescue as a model".)

independent bank or even easily reverse the independence of the central bank. Without meaningful opposition to highlight such interference or block changes, the investors and public more broadly will not believe promises.<sup>16</sup> A valid question is then whether countries looking to reform their central bank legislation consider the broader institutional conditions that make CBI de facto credible. Simmons and Elkins (2004) distinguish different ways to process information, stretching from learning from best performers, learning via membership in networks or through cultural emulation. We suggest that, distinct from these channels, countries may look at the effectiveness of particular institutional innovations and mirror the behavior of relevant peers based on functional considerations. That is, in addition to direct competition, CBI adoption can emerge from a process of learning from the experience of countries with similar political institutions.

While CBI credibility is important for outcomes like inflation or fiscal deficits, diffusion of institutional reform may take place for other reasons. For one, countries may initiate central bank reform not to fall behind other countries. Jandhyala, Henisz and Mansfield (2011) for example make an argument that the early adopters of BITs and the later adopters differ in their motivation. The late adopters (or the second wave) could be motivated by what they call a “rational cascade, in which countries uncertain of the net benefits of BITs or the full nature of the liabilities to which they are obligating themselves nevertheless sign such treaties because peer states are doing so” (p. 4). Similarly, Simmons and Elkins (2004) argue that capital and current account liberalization as well as exchange rate unification are driven by the logic of the “threshold model” (Schelling 1978), with countries changing policies because of an emerging consensus on neoliberal ideas (see also McNamara 1998, McNamara 2011). In this view, the costs for states not adhering to global norms come from doubts about their approach to economic policy and the legitimacy of their governance. In a similar fashion, countries may be uncertain about the benefits of CBI or whether their particular domestic context can make CBI credible. The trend in CBI reform coincides with the publication of studies showing a correlation between CBI and lower inflation in developed countries (Grilli et al. 1991, Cukierman et al. 1992, Alesina and Summers 1993). It also coincides with the International Monetary Fund (IMF) taking an interest not just in macro-economic conditions, but also institutional reform and the inclusion of CBI reform as a condition for IMF lending.<sup>17</sup> To a great degree, then, as trade and investment became global by the late 1990s, legal central bank independence was elevated to a norm of good economic governance. Therefore, as with other liberal outcomes, countries can rush to reform the legal status of their central banks because a critical mass of other countries has already done it either globally or at the regional level.

In addition, international capital may compel institutional reform. Although coercion is often conceived as the influence of powerful actors in the international system, Maxfield (1997), for example, writes that “financial globalization raises the cost of poor economic policy and increases the value of central bank independence” (p. 9). Accordingly, countries should reform their central bank when in greater need of balance of payment support and when there are fewer restrictions on international financial flows. Polillo and Guillen (2005) also note that countries with large exposure to direct investment (FDI) depend on the decisions taken by multinational firms and such firms care about currency stability. Dependence or exposure to international

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<sup>16</sup> By analogy to international commitments, agreements such as BITs or PTAs or signing onto multilateral agreements represent a strong commitment because they are relatively difficult to renounce.

<sup>17</sup> Khan and Sharma (2001), Polillo and Guillen (2005), McNamara (2011). In the latest World Economic Outlook report (2013, ch. 3), the IMF continues to see central bank independence as crucial for inflation control.

capital can then increase the vulnerability to interest rate increases or sudden outflows of capital, and thus the opportunity cost of delayed central bank reform.

Based on our discussion of the likely influence of international capital on CBI reform, several hypotheses can be derived:

*H1.1 (competition):* Central bank reform is driven by behavior of other countries with similar credit ratings or similar export profiles.

*H1.2 (functional learning):* Central bank reform is driven by behavior of countries with a similar political regime.

*H1.3 (norms)* Central bank reform is driven by the proportion of other countries that have reformed, globally or regionally.

*H1.4 (coercion):* Countries with more exposure to foreign investment or countries that are financially open are more likely to reform their central bank laws.

#### **4.1 Diffusion of CBI reform and international capital: The evidence**

Despite the popularity of central bank independence measures, there have been few attempts to code independence annually, to directly identify the year of reforms, or even, beyond a handful of countries, to code new legislation of the last twenty years. Our data does exactly this.<sup>18</sup> We code the level of central bank independence based on the Cukierman et al. (1992) original index and identify reform years when the central bank law is amended and the CBI index increases for 78 countries for years 1973 to 2008.<sup>19</sup> In our empirical estimations we use different thresholds of CBI index change to identify reform. The CBI scores are based on a weighted calculation of 16 indicators in 4 categories regarding the Chief Executive Officer, Policy Formation, Objectives, and Limitations on Lending to the Government.<sup>20</sup> The overall CBI index ranges from 0 to 1, with 1 representing the most independent central bank.<sup>21</sup> For our primary measure, we consider a reform to be any increase in the CBI index. There are 90 cases of reform in our data. Sixty of the 79 countries in our sample reformed their central bank; while most countries underwent only a single reform, Portugal and Venezuela both experienced 4 reforms. As an alternative measure, we code reform as any increase or decrease in independence of more than 0.10 (64 observations that meet this criterion).

We use several indicators to measure the hypothesized role played by international capital in the diffusion of CBI reform. For all measures, the average CBI score or number of reforms does not include the observation country. For direct international competitive pressures (H1.1), we first group countries into categories based on their sovereign bond ratings by credit rating agencies.<sup>22</sup> We show results with the Standard & Poor ratings.<sup>23</sup> We then compute the average CBI index and average number of reforms in the last year for each category (our results

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<sup>18</sup> Other work covers specific decades: For the 1990s see Polillo and Guillen (2005); For the 2000s see Dincer and Eichengreen (2013).

<sup>19</sup> Because of data availability the years in our analyses are 1974 to 2007.

<sup>20</sup> We use the original Cukierman et al. (1992) weights to aggregate the CBI index.

<sup>21</sup> A bank has more legal independence when the governor's term in office is longer; the appointment and dismissal procedures are insulated from the government; when the bank's mandate is focused on price stability; when the formulation of monetary policy is in the hands of the central bank; and when the terms on central bank lending to the government are more restrictive. In all the models we report below, CBI is lagged one year.

<sup>22</sup> We split credit ratings into three categories. Ratings BB+ and lower are non-investment grade. A second category includes ratings between BBB- and AA. The final category includes AA+ and AAA. For the Moody ratings, default to Ba1 is the lowest category; the second category includes ratings between Baa3 and A1 while the final category includes scores of Aa3 and higher.

<sup>23</sup> The letter sovereign risk rating is converted to a scale from 0 to 16, with 16 as the highest bond rate (AAA). For both ratings we use Beaulieu et al. (2012) as a source. Findings are similar if we use Moody's ratings.

are similar if we count reforms in past three or five years). Second, to identify export competitors we create an export similarity measure based on Elkins, Guzman, and Simmons (2006) using 11 different export categories from the World Development Indicators - WDI<sup>24</sup>. We take the average CBI score and number of reforms for the countries in the 75<sup>th</sup> percentile of similarity for each country. For the mechanism involving learning from countries with similar political institutions (H1.2) we use Polity 2 scores to define relevant country groups.<sup>25</sup> We split Polity into four categories: scores between -10 and -6, -5 and 0, 1 and 5, and 6 and 10. The first and last groups correspond to autocracies and democracies, respectively, while the middle groups correspond to different levels of anocracy. Subsequently we count the number of central bank reforms and average level of CBI for country group that matches each observation's level of democracy. To examine regional pressures from international capital (H1.3), we count the number of reforms and take the average CBI score of the countries in the region, excluding the observation country. Finally, to capture the potential coercive effect (H1.4) on international capital all models include FDI inflows (as a percentage of GDP) and a measure of capital account openness (Chinn and Ito 2008)<sup>26</sup>. In our empirical estimations all the key measures of the effect of international capital are lagged one year.

To explore the determinants of CBI reform we estimate logit models with country clustered standard errors. In addition to the key spatial lag and coercion variables described above, we include several control variables that may impact the likelihood of reform. As political controls, we include countries' democracy score (Polity2), the number of veto players (Henisz 2002), and dummy variables for the executive's partisanship from the Database of Political Institutions (Beck et. al. 2001), the lagged log of inflation (WDI); the lagged logged value of GDP per capita (WDI); lagged GDP growth (in constant dollars WDI); lagged trade openness (WDI); a dummy variable for a fixed exchange rate regime based on the IMF's official classification;<sup>27</sup> and the lagged value of a country's fiscal budget deficit/surplus relative to GDP<sup>28</sup>. We also include the lagged value of CBI on the assumption that reform is less likely once a country has reached a certain level of CBI.

[Table 1 about here]

Table 1 shows a large and significant effect of international capital on central bank reform. All of the spatial diffusion measures are positive and highly statistically significant, as is one of our proxies for coercion. Models 1 through 4 indicate that competition for capital is a driver of CBI reform. That is, CBI reform is more likely if the countries in the same Standard and Poor's category have a higher average level of independence (Model 1) or have reformed recently (Model 2). If we increase the average CBI level for countries with a similar S&P rating, the probability a country will reform its bank increase by 78%. Also, CBI is more likely when countries that compete in export markets have higher levels of CBI or have changed the status of the central bank in the recent past (Model 3 and 4). Increasing the level of CBI by one standard

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<sup>24</sup> The categories include exports of agricultural, computer services, food, fuel, high tech, financial services, tourism, manufacturing, ores and metals, transportation services, and travel services.

<sup>25</sup> The Polity 2 score is constructed by subtracting a country's autocracy score from its democracy score. Both the democracy and autocracy scores range from 0 to 10 so the Polity 2 score ranges from -10 to 10 with a higher score indicating greater democracy.

<sup>26</sup> We use the Chinn Ito (2008) index of capital account openness, with values ranging from -1.85 to 2.5 and larger numbers indicating more openness.

<sup>27</sup> Ilzetzki, Reinhart, and Rogoff 2009. A fixed regime is coded if the observation is a 1 under the IMF's coarse coding.

<sup>28</sup> IMF IFS, EBRD transition reports, OECD, Brender & Drazen 2005.

deviation increases the odds of reform by 65%. Models 5 and 6 indicate that reforms and the level of CBI in countries that share similar political institutions increase the chance that a particular country reforms its own central bank. Whether a country is a democracy, mixed regime or dictatorship, it will reflect the behavior of other countries with a similar political regime (Models 5&6). Moving the Polity group average from the mean level of CBI to one standard deviation above the mean increases the odd of reform by 57%. Model 7 and 8 show that a higher average CBI level of neighboring countries or larger number of regional reforms increases the chance of CBI reform in individual countries.<sup>29</sup> The regional average has the largest effect—if the average increases by one standard deviation, the probability of reform will increase by 108%. Finally, of the coercion measures, countries with more exposure to FDI are more likely to reform their central bank. Across all our models, the coefficient for FDI as a percentage of GDP is positive and consistently statistically significant. Across the models, the effect ranges from an increase of about 20% to an increase of about 34% if FDI is increased by one standard deviation. On the other hand, CBI reform is unaffected by the degree of openness of the capital account. Maxfield (1997) links the relative strict regulation of international capital transactions in South Korea and Brazil to a low perception of need to signal creditworthiness on the side of the government and more informal autonomy for the central bank. We cannot find a similar effect for legal, formal changes to central bank statutes.

We subject each of our measures of international capital influence to several robustness tests. First, although we lose 19 of our countries we include country fixed effects to control for unobservable country level characteristics. Second, we include regional fixed effects that control for features shared by country groupings, but do not result in observation loss. Third, we include a year trend. Fourth, we include a dummy variable for participation in an IMF program. Finally, we drop the partisanship variables to increase our sample size. The spatial lags based on Polity categories do not perform very well in the robustness tests. They are insignificant when a year trend is included and when we control for the presence of an IMF program. The spatial lags constructed with the use of export similarity measures also are insignificant when a year trend is included. Regional CBI and the similarity measures based on Standard and Poor's categories perform much better and remain significant in all of the robustness tests. The ratio of FDI to GDP loses significance when country or region fixed effects are included in some of the models.<sup>30</sup>

In addition, as expected, the lagged level of CBI has a negative and significant effect on the probability of reform. The countries with lower levels of CBI are more likely to reform their banks. Surprisingly, none of the political variables are significant. While positive, a country's Polity score by itself does not affect the decision to reform the bank. That is, democracies do not appear to reform their central banks unless other democracies have done it already. Partisanship of the executive or the number of veto players in a country are similarly statistically insignificant. Key macroeconomic outcomes like past inflation, economic growth or deficit levels are not consistency statistically significance, although the coefficients of inflation are positive and statistically significant in two of our models. Countries with fixed exchange rates, on the other hand, are significantly less likely to reform their central banks.

## **5. Central bank independence and investor decisions**

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<sup>29</sup> Results are similar if we use the global averages or number of reforms.

<sup>30</sup> The variable based on Moody's risk ratings loses significance with a year trend. We also include all four of the diffusion measures in the same model. The regional CBI measure is the only diffusion variable that remains significant whether we measure it based on the CBI average or the number of reforms.

Given that countries do consider international capital in their decision to reform the central bank, has the spread of CBI had its desired effect on international investors? That is, are investor's decisions influenced by a country's level of central bank independence? We argue there are distinct ways to describe the logic of such decisions. A first is a somewhat unsophisticated choice to invest more direct capital or to offer better lending terms (lower interest rates) to any country where the central bank is nominally independent. A second is to condition the signal sent by legal CBI on the political institutions that make it more likely that nominal delegation of monetary policy has a de facto bite on inflation and fiscal outcomes. Finally, investors can look around at the institutional make-up of groups of countries and decide whether central bank independence is informative given other countries' practices.

As we show above, one of the strongest effects of international capital on CBI reform is likely working through regional or global norms. Thus, as CBI becomes a standard of governance of the macroeconomy, countries may change central bank legislation while not fully sure of the benefits and not necessarily having in place the institutional constraints that make CBI credible.<sup>31</sup> Reform can be an informational cue about the future course of macroeconomic policy. Investors looking for new countries with low labor costs or high return on government debt look for such cues to reap the benefits of investing early. Such benefits of early entry into a country include more concessions on the side of the government (taxes loopholes, public infrastructure linking investment to ports or major roads, etc.) and higher yield on government bonds still perceived to be risky by other investors. Polillo and Guillen (2005), for example, suggest that the government expects the flow of direct capital to simply react to the legal independence of the central bank. In this account, the level of CBI by itself is a signal to investors about the future course of policy and may increase FDI flows or lower the costs of sovereign borrowing.

Second, the value of CBI as a signal may vary depending on its informational value to investors. Mosley (2000, 2003) and Sobel (1999) find that interest rates on government sovereign debt in developing countries react to comparatively more indicators than is the case in developed economies, reflecting more thorough investor scrutiny. Given the non-negligible risk of default or nationalization in developing countries, CBI will be a more important cue for investor destinations outside the OECD. In such countries, the central bank, if truly independent, can be both an indicator of conservative macroeconomic outcomes and an actor with a preference for property rights protection.<sup>32</sup> In addition, when considering committing additional capital or reallocating existing funds, investors compare the information provided by the central reform in particular country against the practice of other, earlier reformers. In this case, the effect of CBI may be contingent on whether countries are early adopters of central bank reform. This is likely because, on the one hand, late reformers may simply be playing a catch-up game with investors remaining skeptical that CBI can work if adopted mainly to fit an international norm. In addition, investors may discount the level of CBI because it no longer sends a clear separating signal—if all countries have an independent bank, it no longer distinguishes countries.

Finally, if CBI matters in the ways that the literature describes, investors should understand the crucial role played by political institutions in determining the central bank's de

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<sup>31</sup> For emerging market countries with little legal central bank autonomy (Thailand, Korea, Brazil, Mexico), Maxfield (1997) shows that actual central bank behavior varies, with periods of significant de facto autonomy.

<sup>32</sup> For example, Mosley (2003) finds that inflation risk is a more salient issue for investors in developed countries than default risk. On the other hand, investors are more concerned about the investment risk and trustworthiness of emerging market governments.

facto status and power to determine monetary policy. Only in countries with rule of law, strong constraints and freedom of the press, that is, in democracies, is the legally independent central bank a credible indicator for the path of inflation and fiscal deficits. Also, only in such conditions can the central bank's preference for investor property rights protection translate into real influence on government policy. In this case, capital flows and cost should react to CBI only in democracies.

Based on the discussion, our hypotheses follow:

*H2.1 (naive):* CBI helps attract more foreign direct investment (FDI) and lower the cost of sovereign borrowing.

*H2.2 (information):* The effect of CBI is on the flow and cost of capital is likely stronger for non-OECD countries.

*H2.3 (information):* The effect of CBI is more likely to hold for the early adopters of central bank reforms.

*H2.4 (functional):* The effect of CBI on FDI and sovereign borrowing depends on the level of democracy in a country.

### **5.1. CBI level and the flow and cost of capital**

The second step in our analysis is to understand the effect of central bank independence on investor decisions. We use several dependent variables to measure the flow and cost of capital: foreign direct capital flows, two measures of domestic bond rates and two credit agency sovereign risk ratings. We use OLS models with country fixed effects, and a time trend included, as well as country clustered standard errors.<sup>33</sup> For all the dependent variables, the sample years range from 1974 to 2007. Fixed effects control for time invariant country characteristics, while the time trend helps control for any systemic trend over time that leads to an increase in FDI or sovereign borrowing. To deal with issues of reverse causality we use lagged five year averages of the CBI index as well and system GMM models (Arellano and Bover 1995, Blundell and Bond 1998). Our GMM estimations include a lagged dependent variable which is treated as endogenous together with the CBI index. Five lags of each variable are included, but are collapsed to limit the number of instruments and the risk of over-fitting the data. All other independent variables are treated as exogenous.<sup>34</sup>

Our main measure of FDI inflows is FDI as a percentage of GDP. The literature has some concern about this measure: Because it is scaled to GDP, it may capture openness to foreign direct investment rather than the amount of foreign direct investment; that is, it is more a measure of the relative importance of FDI in a country (Li and Reuveny 2003; Choi 2009; Li 2009). Figure 1 plots FDI inflows as a percentage of GDP and shows a significant number of outliers. Most observations are between -15 and 20 percent, but about 4 percent of observations are above 20 percent. Because these values may skew our results, we correct for them in two ways. First, we restrict the sample to cases where the absolute value FDI as a percentage of GDP is less than 30. There are 86 observations that fail this criterion in our data, all with positive values of FDI. Second, to ensure that dropping positive values does not create its own bias, we

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<sup>33</sup> Hausman tests reject a random effects specification. We do not include the lagged dependent variable because using country fixed effects in an OLS regression with lagged dependent variable introduces the Nickell bias, a problem aggravated by the small time duration for many countries in our data (Wooldridge 2002).

<sup>34</sup> For GMM models we report two standard specification tests: The Hansen test of over-identifying restrictions tests the overall validity of the instruments and failure to reject the null hypothesis gives support for the model, including our choice of endogenous variables. The Arellano–Bond test for AR(2) in first differences tests whether the residuals from the regression in differences is second order serially correlated and failure to reject the null hypothesis supports the model specification.

log the variable (results are shown in the supplementary material which drops 118 observations where FDI flows as a percentage of GDP is negative).<sup>35</sup>

To measure the effect of CBI on government borrowing, we focus on 3-month Treasury bill and 10-year government bond rates which have the largest country/year coverage. Both series are from the Global Financial Database and are inflation-adjusted, giving us real rather than nominal rates. The data covers only 56 countries (out of 78) for the 3 month rate and 50 countries have information for the 10-year rate. As with FDI, a histogram reveals the presence of extreme outliers (Figure 4). Here 42 of the 1310 observations for the 3 month rate have values less than -50 or greater than 50, as do 7 of the 1190 observations for the 10-year rate. In the models reported below we exclude observations where the absolute value is greater than 50.<sup>36</sup>

Finally, we use annual Moody and Standard & Poor country risk ratings. Risk ratings by the largest credit rating agencies influence the availability and cost of capital (Archer et al. 2007). Country ratings are based on Cox et al. 2012, and our sample includes 49/48 countries depending on the credit risk agency. The letter sovereign risk rating is converted to a scale from 0 to 16, with 16 as the highest risk rate.

The key independent variable is the level of CBI, as described above. To test our interactive hypothesis (H2.4) we rely again on Polity 2 democracy scores (Polity IV), with values ranging from -10 (most autocratic) to 10 (most democratic). Our models include a number of other relevant controls that may affect a country's FDI flows or cost of capital. Unless otherwise indicated, all variables are lagged one year. All models include trade openness, GDP growth, the logged inflation rate, a country's fiscal balance, capital controls and a dummy variable for a de jure fixed exchange rate regime. In the credit rating and the bond rating models, we include both GDP and GDP per capita to control for the economic size and the wealth of a country which make affect perceptions of credit risk. In the models examining FDI as a percentage of GDP, we include GDP per capita as a control for size. The FDI models also include a count of the number of BITs signed by a country which is a proxy for a country's protection of property rights (Buthe and Milner 2008). The credit rating models include a dichotomous indicator if a country defaults in a given year (from Beaulieu, Cox, and Saiegh 2012).

Finally, in the paper we do not present tables of results from the interactive models that operationalize conditional hypotheses (H2.3-H2.4), although tables are available in the supplementary material. Interactions and their components are difficult to interpret in isolation from their substantive or marginal effects (Brambor, Clark, and Golder 2005). The coefficients on each of the constituent terms shows the effect when the other constituent term is equal to zero. The interaction term may be significant for some values of the constituent terms but not others. Graphing the marginal effect is the easiest way to show the size and statistical significance of interactive effects.

#### *FDI Inflows*

Model 1 and shows the results for all countries and with Polity and CBI included separately. Models 2-6 restrict the sample to non-OECD countries. Because of the earlier diffusion results, the endogeneity of CBI is a potential concern. Therefore, Model 3 includes the average CBI score over the past five years. Deeper lags of CBI should be less affected by the dependent variable and similar results should ease concerns about endogeneity. In Model 4, we show results from a system GMM model. Finally, Model 5 limits the sample to the years 1973 to

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<sup>35</sup> In the supplemental material, we report results using an alternative measure of FDI: the log of total FDI inflows.

<sup>36</sup> In both series, more than 25% of observations have real negative rates so we using the log of the variable make little sense.

1997 and column 6 to the years 1998 to 2007, attempting to distinguish the effect of CBI before and after it became a global and regional standard.

[Table 2 about here]

The first hypothesis tested is whether CBI affects international outcomes similarly in all countries and without regard to political institutions. The results do not support H2.1. The CBI index by itself, in the full sample or the non-OECD sample, does not have much of an effect, suggesting that CBI by itself does not serve as an indicator for eager investors of the path of future monetary and fiscal policies. In the non-OECD sample, the 5-year lag model offers some support for H2.1, but that is not consistent with the system GMM estimation.<sup>37</sup> There is, however, evidence of a temporal aspect to CBI as a signal. In non-OECD countries, CBI has a positive and significant effect that is unconditioned by regime type in the years before 1998, but has no effect for later years.<sup>38</sup> This is supportive evidence for H2.2 and H2.3.

To test the hypothesis that the effect of CBI depends on a country's political institutions, we include in Model 2 the interaction between Polity2 and the CBI index. We plot the marginal effect of CBI as democracy increases in non-OECD countries in Figure 2. The marginal effect is significant only at high levels of Polity, supporting hypothesis H2.4.<sup>39</sup> The marginal effect, however, is only significant with FDI inflows as a percentage of GDP; in the appendix we show the marginal effect when the dependent variable is either the log of FDI flows as a percentage of GDP or the log of FDI flows. In both of these cases, the marginal effect is in the correct direction, but is insignificant.<sup>40</sup>

Is there an interactive effect to the temporal results? That is, did CBI have a larger effect before 1998 in democracies and little effect in non-democracies? To examine this, we ran models with all non-OECD observations, but including a three-way interaction between CBI, democracy, and a dummy variable for the years after 1997. The marginal effect of CBI is plotted in Figure 3. The graph does lend support to the idea that CBI loses effectiveness as more countries make their central banks independent. The marginal effect of CBI at higher levels of democracy is significant and positive in the years until 1997. The marginal effect is significant after 1998 for the three highest levels of Polity, but the effect is smaller than before 1998. Also, as shown in the supplementary material, with the other two measures of FDI, the marginal effect of CBI is significant only at higher levels of Polity before 1997. From 1998 on, there is no effect of CBI.<sup>41</sup> This supports our intuition that CBI is adopted in part in reaction to the decisions of other countries to reform their bank. The competition for investment based on CBI, though, has diminishing marginal returns as once enough countries have independent banks, CBI loses its effect.<sup>42</sup>

#### *Bond and Treasury bill yields*

We next turn our attention to CBI's effect on the costs of government borrowing. Both CBI and Polity are expected to have a negative effect on 3 month Treasury bill and the 10 year

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<sup>37</sup> The lagged 5 year CBI average and system GMM do not have better results if the whole sample is used.

<sup>38</sup> The effect of CBI is positive and significant for the years before 1998 if either the log of FDI inflows as a percentage of GDP or the log of FDI inflows is the dependent variable as well.

<sup>39</sup> This effect obtains with the 5-year average, but not GMM. In the latter, the coefficients are in the right direction (+ before 1997, - after) but not significant

<sup>40</sup> For the entire sample, there is no interactive effect for all years or using the 5-year lag.

<sup>41</sup> As a robustness check, we run models varying the cutoff year from 1994 to 1999. We get the same relationship with all of the cutoffs.

<sup>42</sup> The conditional findings can be replicated when using the 5 year lag of the CBI index..

government bond yields. Countries with more independent central banks and stronger democratic institutions should have lower borrowing costs.

In Table 3, we examine the individual effect of CBI. Models 1 and 2 include all countries while models 3 and 4 focus only on non-OECD countries. The last four columns control for potential endogeneity. Models 5 and 6 include the five-year average of CBI and models 7 and 8 report GMM results. Neither CBI nor Polity has much of an effect on yields by themselves. Polity is significant in only one model and CBI is significant only in one model, when the 5-year average is included for the 3 month yields. Again, there is not much support for a simple signaling effect of CBI.

We find evidence of an interactive effect between democracy and CBI in reducing 10-year rates in non-OECD countries. In Figures 5 and 6, we graph the marginal effect of CBI as Polity changes. As expected, the marginal effect of CBI is downward sloping and negative at higher levels of democracy. The effect is not significant for the 3-month rates, only for the 10-year rates. For these bonds, higher levels of CBI reduce borrowing costs in democratic governments but has no effect in non-democracies.

Does the pattern change over time as it did with FDI? To conserve space, we report the results of including CBI or democracy individually in the online appendix for the two subsamples. CBI again has a negative and significant effect before 1998 but not afterwards for both types of rates. Figures 7 and 8 plot the marginal effect of CBI for different time periods on the 3-month and 10-year bond rates. We find further support for a change over time. The slope of the marginal effect is in the correct direction for the years before 1998 for the 3-month rates. CBI has a positive and significant marginal effect at the lowest values of Polity before 1998. The effect is only negative and significant at the very highest level of Polity (score of 10). From 1998 on, there is no effect at any Polity level.

For the 10-year rates, we find a similar pattern for the years before 1998. The marginal effect of CBI is positive and significant for low levels of CBI and negative and significant only for the highest values of Polity (scores greater than 7). Surprisingly, after 1997, the marginal effect of CBI is significant and negative (though very flat) for most of the range of Polity scores. Again, we find strong support for a temporal aspect to CBI. CBI works as a signal, especially in democracies, only as long as not every country is joining in.

#### *Credit ratings*

Finally, we turn our attention to credit ratings. As discussed above, recent work by Beaulieu, Cox, and Saiegh (2012) finds that democracies have higher credit ratings than non-democracies. In Table 4, we examine whether the presence of a more independent central bank also can increase a country's credit rating. In these models, the dependent variable is the credit rating (either Moody's or Standard & Poor's) given to a country.<sup>43</sup>

Our results are mostly consistent with those of Cox, Beaulieu, and Saiegh. We find a positive and marginally significant effect of Polity for both types of ratings in the full sample. As democracy increases, so does the credit rating. There is very little evidence that CBI affects the credit rating. It is significant only in the GMM models with S&P ratings as the dependent variable. If we look at the years before 1998 and from 1998 on separately, we find a similar effect of CBI in each period for the full sample of countries. If we limit the sample to non-OECD countries, we find a significant effect of CBI for the years before 1998 for the S&P rating and no

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<sup>43</sup> The country ratings models include the lagged dependent variable. Most of the country ratings are very sticky over time and the lagged dependent variables have a large effect on the current country rating. The lag of the dependent variable will help eliminate some of this correlation.

effect in the other cases (see supplemental material for results). So there is little evidence that the effect of CBI varies over time.

Neither is there much evidence of an interactive effect, either over the entire time or for the subsample. Figures 9 and 10 plot the marginal effects of CBI when it is interacted with Polity. CBI in democracies is not more effective at increasing a country's credit rating. Similarly, the marginal effect of CBI is never significant after 1997; before 1998, CBI has no effect on the Moody rating, but the marginal effect is negative and significant for the S&P rating at low levels of Polity. The effect is no longer significant after Polity reaches about 7.

For country ratings, then, we find little evidence for any of our hypotheses. CBI has little effect on ratings by itself, in combination with democracy, or temporally. This may result from a selection effect. Since not all countries have a rating, perhaps it is only the countries with stronger economic fundamentals that apply. The non-OECD countries that have been rated by Moody also have significantly higher mean CBI and Polity scores than countries that have not been rated.

## **6. Conclusion**

CBI has been seen as an important institutional mechanism for providing domestic credibility to monetary policy, at least in some circumstances. Inextricably then, central bank reform and independence are linked with outcomes that investors care about, including inflation, fiscal conservatism and stable exchange rates. That is, governments may want to reform their central bank in the face of more competition for capital and investors may consider the status of the central bank when making decisions. In this paper we advance testable mechanisms for the influence of international capital on central bank reform, ranging from direct competition within peer groups of countries with similar sovereign credit risk or export profiles; functional learning from countries with similar political institutions; norms of good governance; and coercion. We also posit ways in which investors may react to CBI reform. This ranges from a naive acceptance of reform as signals of future policy to considering CBI as information contingent on a country's level of development and political institutions and other countries central bank reforms.

Our results show that countries reform their central banks in order to attract international capital. Most robust we find evidence that countries give their central bank more legal independence as a reaction to reform in direct competitors with similar sovereign risk ratings, a reaction to regional or global norms and when FDI is an important part of the economy. Surprisingly, findings are not particularly robust in showing functional learning from countries with similar political institutions. So, if countries hope to please international capital when changing central bank legislation, does CBI, in return, affect investor's choice as reflected in FDI inflows, bond yields and sovereign risk ratings? The evidence is mixed. Investors appear to care about CBI when it acts as a clear separating signal, especially in democracies. That is, as long as central bank independence is not too common, democracies may expect more FDI or lower bond yields. There is little effect of CBI on sovereign risk ratings in democracies or across time. This may not be surprising though. Because countries have to ask to be rated, there may be a selection effect in the ratings. These results have policy implications. We return to the example of Myanmar, a country that is reforming its central bank in order to attract foreign investment and differentiate itself from laggard neighbors. A strategy of attracting FDI and sovereign lending can be an important contributor to economic growth and, a likely contributor to legitimizing the timid steps undertaken towards democracy. It is apparent, however, that legal CBI reform needs further political and intuitional reform before foreign investors can be convinced to enter

Myanmar in a significant fashion.<sup>44</sup> Legal central bank reform may very well need strong checks on the power of the executive and media freedom to be an effective tool for attracting foreign direct investment. Also, with CBI, Myanmar may be simply playing a catch-up game and the country may need additional, more unique strategies to attract investors.

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<sup>44</sup> A recent Wall Street Journal Article (“A Gold Rush Begins in Myanmar”, November 12 2012) outlines the significant attraction of Myanmar to US investors, but also the major risks that the initial boom becomes a crash, similar to other countries where political reforms stalled, including Russia and Vietnam.

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Graph 1: Histogram of FDI/GDP

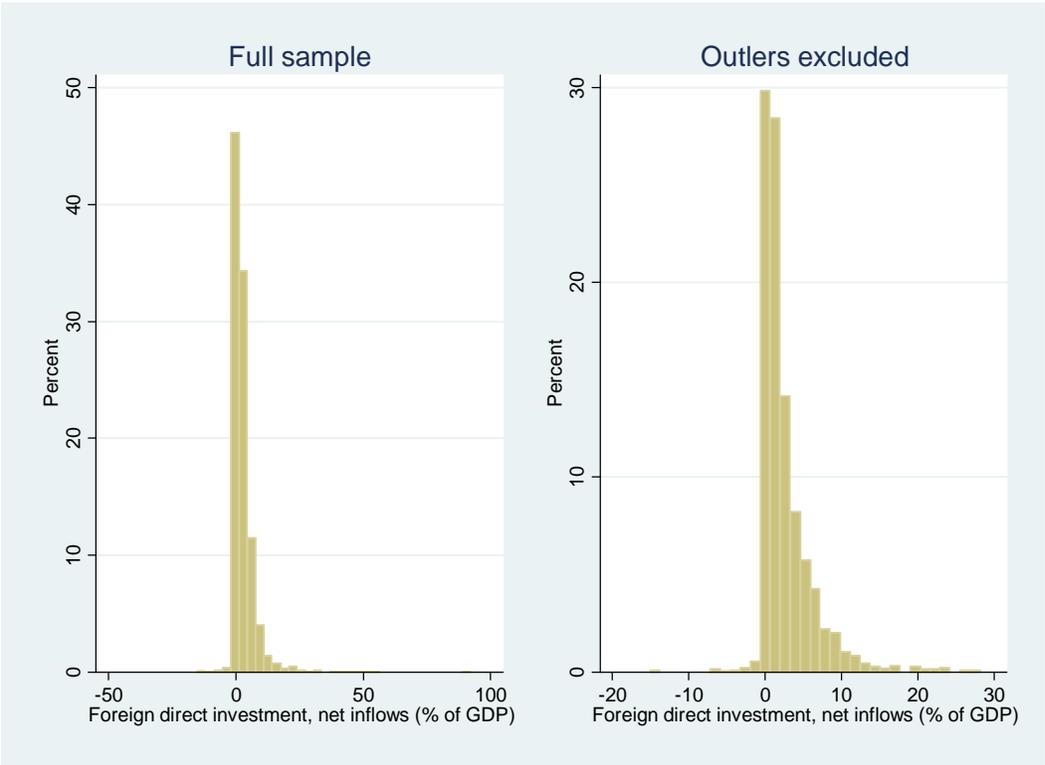


Table 1: Central bank reform and diffusion

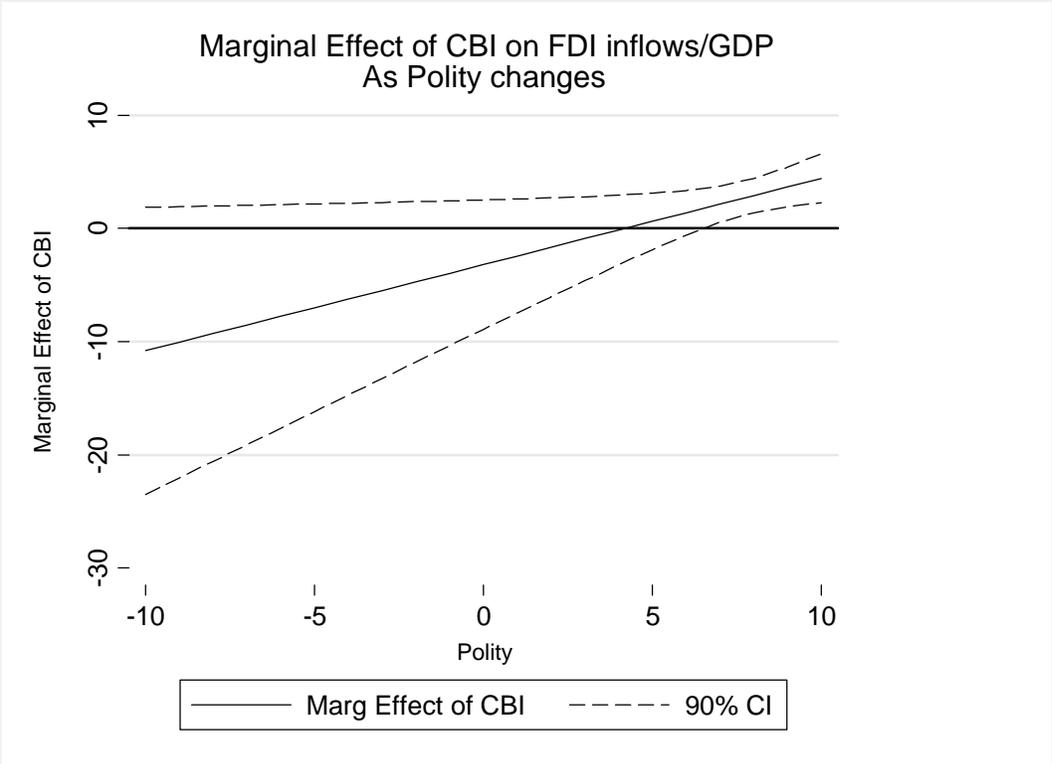
	S&P LVAW b/se	S&P Reform b/se	Export LVAW b/se	Export Reform b/se	Polity LVAW b/se	Polity Reform b/se	Regional LVAW b/se	Regional Reform b/se
Polity	0.030 (0.040)	0.044 (0.039)	0.020 (0.045)	0.030 (0.044)	0.021 (0.039)	0.051 (0.041)	0.046 (0.041)	0.046 (0.039)
Polcon	0.582 (1.221)	0.480 (1.244)	1.192 (1.279)	1.339 (1.291)	0.498 (1.193)	0.625 (1.212)	0.454 (1.256)	0.561 (1.211)
S&P CBI average	5.152*** (1.299)							
S&P reform average		6.150*** (1.454)						
Export CBI average			4.029*** (1.510)					
Export reform average				4.563*** (1.471)				
Polity CBI average					3.612*** (1.317)			
Polity reform average						3.768*** (1.414)		
Regional CBI average							4.691*** (1.322)	
Regional reform average								2.712** (1.158)
Lagged CBI	-2.314*** (0.757)	-1.903*** (0.677)	-2.100*** (0.770)	-1.660** (0.675)	-2.128*** (0.774)	-1.671** (0.656)	-2.818*** (0.802)	-1.731*** (0.629)
Left	0.271 (0.353)	0.209 (0.367)	0.473 (0.419)	0.464 (0.427)	0.364 (0.374)	0.279 (0.374)	0.181 (0.340)	0.262 (0.357)
Right	0.070 (0.342)	-0.049 (0.359)	0.159 (0.403)	0.151 (0.415)	0.091 (0.356)	-0.016 (0.361)	0.012 (0.323)	-0.023 (0.347)
Center	0.206 (0.402)	0.129 (0.427)	0.456 (0.460)	0.436 (0.496)	0.251 (0.430)	0.158 (0.440)	0.075 (0.390)	0.152 (0.428)
Lag log inflation	0.216 (0.137)	0.191 (0.131)	0.302*** (0.113)	0.263** (0.104)	0.202 (0.132)	0.169 (0.125)	0.227* (0.138)	0.152 (0.129)
Lag FDI (% of GDP)	0.068*** (0.020)	0.088*** (0.022)	0.078*** (0.019)	0.090*** (0.021)	0.077*** (0.020)	0.084*** (0.022)	0.057*** (0.019)	0.084*** (0.020)
Lag openness	0.001 (0.003)	0.002 (0.003)	0.002 (0.003)	0.004* (0.003)	0.001 (0.003)	0.002 (0.003)	-0.001 (0.003)	0.002 (0.003)
Lagged GDP growth	-1.160 (3.079)	-0.185 (3.164)	0.387 (3.448)	0.424 (3.404)	-0.413 (3.085)	-0.690 (3.236)	-1.531 (3.098)	-0.887 (3.074)
Lag GDP per capita	-0.015 (0.145)	-0.109 (0.138)	-0.076 (0.145)	-0.162 (0.140)	-0.127 (0.136)	-0.170 (0.136)	-0.124 (0.137)	-0.178 (0.133)
De jure XR	-0.661* (0.340)	-0.752** (0.351)	-0.603* (0.346)	-0.662** (0.331)	-0.615* (0.345)	-0.667* (0.346)	-0.553 (0.340)	-0.718** (0.347)
Fiscal balance	0.005 (0.028)	0.018 (0.027)	0.012 (0.031)	0.024 (0.029)	0.008 (0.027)	0.015 (0.026)	0.018 (0.030)	0.018 (0.026)
Lag capital controls	-0.010 (0.112)	0.010 (0.112)	0.037 (0.106)	0.056 (0.101)	-0.012 (0.107)	0.007 (0.109)	0.013 (0.106)	0.018 (0.109)
_cons	-5.527*** (1.648)	-2.757** (1.288)	-5.248*** (1.655)	-3.147** (1.277)	-3.858*** (1.453)	-2.289* (1.278)	-3.861*** (1.470)	-2.029 (1.250)
N	1559	1559	1488	1488	1569	1569	1569	1569

Note:

Table 2: Effect of CBI on FDI

	All countries			Non-OECD		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CBI	0.089 (1.027)	1.199 (1.406)		0.028 (1.430)	4.506*** (1.131)	-3.063 (2.425)
5 year CBI			2.313** (1.098)			
Polity	0.010 (0.029)	0.000 (0.028)	-0.002 (0.027)	0.022* (0.011)	0.003 (0.013)	0.123 (0.092)
Lagged BITS signed	0.021 (0.013)	0.015 (0.016)	0.013 (0.015)	0.000 (0.006)	0.056*** (0.017)	0.011 (0.040)
De jure XR	-0.401 (0.311)	-0.671* (0.383)	-0.706* (0.386)	-0.179 (0.166)	-0.519*** (0.160)	-1.345 (1.144)
Lag openness	0.009 (0.009)	0.004 (0.009)	0.004 (0.009)	0.005 (0.005)	0.023* (0.012)	-0.013 (0.019)
Lagged GDP growth	2.784 (5.212)	1.185 (5.647)	1.038 (5.749)	-0.419 (4.025)	5.849*** (2.086)	-4.576 (7.116)
Lag GDP pc	-1.237 (0.995)	-1.105 (1.055)	-1.067 (0.991)	-0.147 (0.100)	-2.117** (1.035)	2.627 (2.940)
Fiscal balance	0.033 (0.031)	0.026 (0.037)	0.025 (0.037)	0.023 (0.018)	-0.008 (0.018)	0.097 (0.095)
Lag capital controls	0.221** (0.107)	0.242** (0.107)	0.230** (0.106)	0.091* (0.054)	0.035 (0.083)	0.197 (0.319)
Lag log inflation	-0.192 (0.121)	-0.205 (0.138)	-0.184 (0.135)	-0.087 (0.056)	-0.041 (0.102)	-0.224 (0.359)
year	0.055*** (0.019)	0.056** (0.026)	0.049* (0.025)	0.011 (0.020)		
_cons	-98.425** (37.540)	-100.717* (52.277)	-87.408* (51.527)	-21.059 (40.437)	13.996* (7.458)	-12.850 (23.504)
N	1617	1092	1092	1092	579	513
Countries	79	58	58	58	50	58
R2	0.159	0.150	0.155		0.360	0.054
Hansen				12.64 Pr=0.18		
AR(2)				0.76 Pr=0.45		

Graph 2: Non-OECD countries



Graph 3: Non-OECD countries

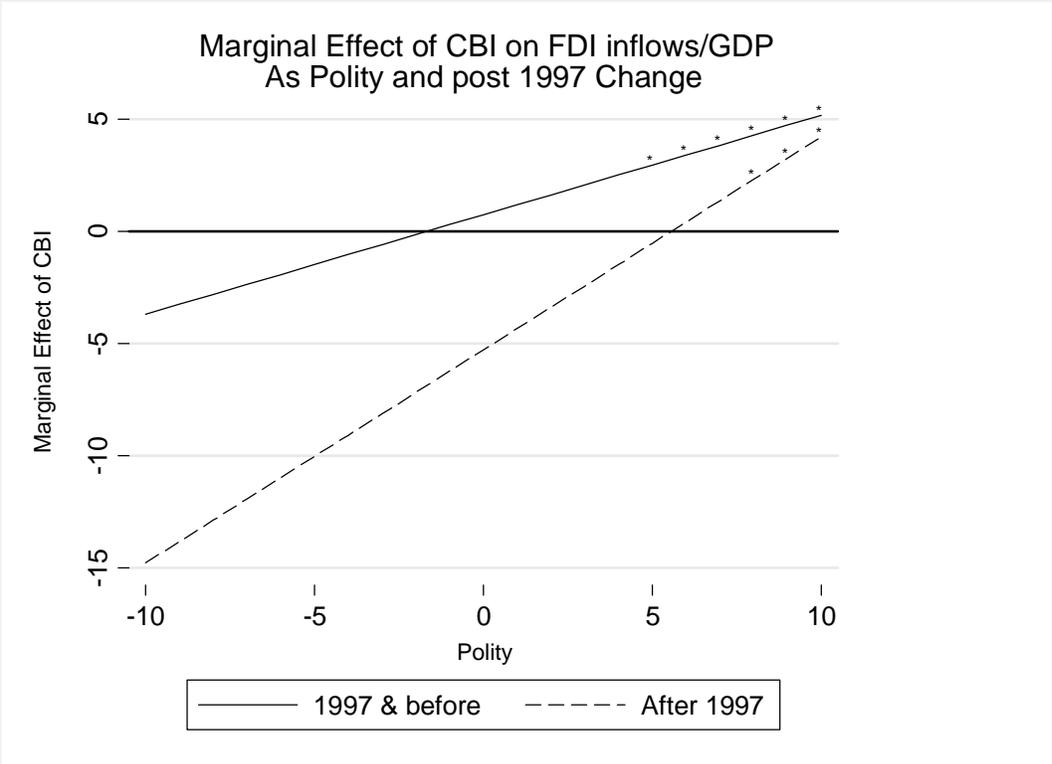


Figure 4: Histogram of real 3-month rates

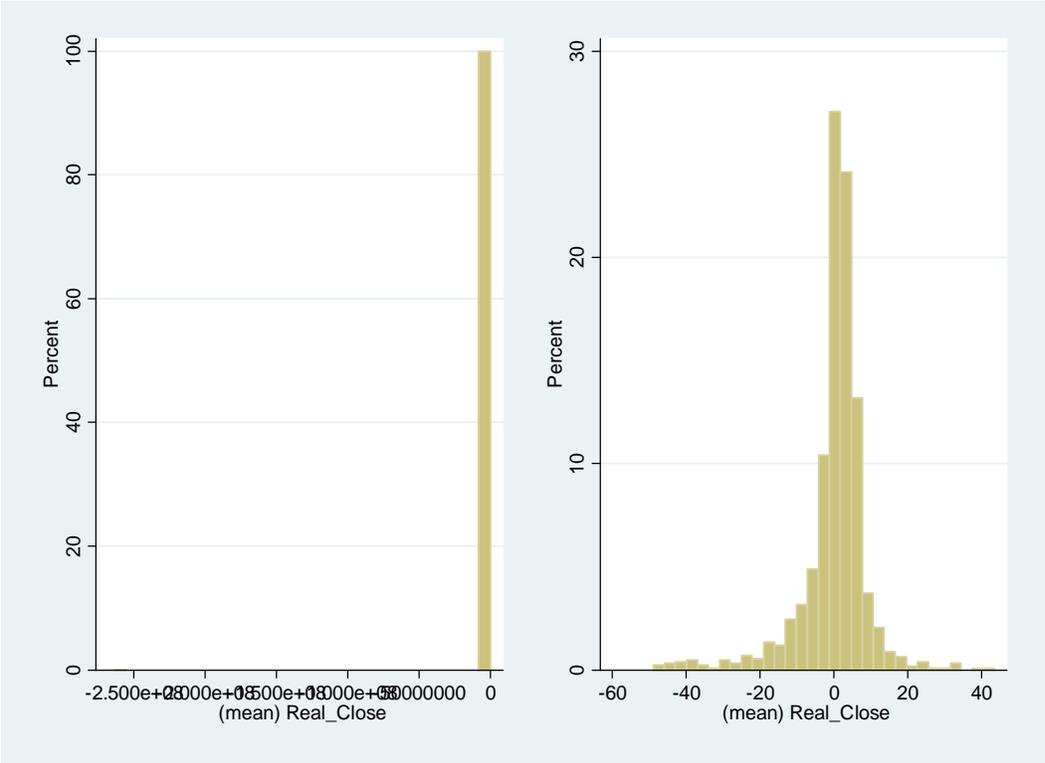


Table 3: CBI effect on Bond rates

	All		Non-OECD				GMM	
			All non-OECD		5-year CBI			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	3 month	10 year	3 month	10 year	3 month	10 year	3 month	10 year
CBI	-1.918 (5.992)	0.314 (6.745)	-9.011 (7.292)	-10.428 (6.495)			-52.327 (78.418)	-7.084 (10.691)
lvaw5yr					-22.677** (9.765)	-7.277 (7.265)		
Polity	-0.836* (0.465)	0.054 (0.232)	-0.537 (0.413)	0.127 (0.320)	-0.458 (0.375)	0.141 (0.310)	2.752 (3.028)	0.119 (0.129)
De jure XR	-3.799** (1.796)	-2.323 (1.736)	-1.273 (1.411)	1.803*** (0.576)	-0.854 (1.412)	1.686*** (0.532)	-87.868 (91.295)	-1.279 (1.247)
Lag openness	-0.056* (0.033)	-0.050 (0.033)	-0.024 (0.035)	-0.068*** (0.024)	-0.041 (0.033)	-0.067** (0.025)	0.020 (0.408)	-0.017 (0.016)
Lagged GDP growth	3.073 (12.745)	-8.702 (6.631)	2.612 (15.612)	-3.648 (9.731)	3.271 (15.201)	-2.845 (9.897)	557.067 (542.610)	0.919 (9.005)
L.lngdppc	-22.045** (8.447)	-20.090** (9.655)	-29.764*** (8.920)	-33.058*** (8.155)	-22.114*** (7.420)	-32.494*** (8.627)	-0.025 (16.721)	0.377 (1.028)
Lag log GDP	15.320** (7.290)	15.807* (7.916)	24.243** (9.280)	33.388*** (8.524)	17.672* (9.688)	33.218*** (9.837)	-5.675 (13.156)	-0.651 (0.664)
Fiscal balance	-0.245* (0.138)	-0.053 (0.171)	-0.390** (0.159)	0.126 (0.122)	-0.351** (0.147)	0.113 (0.124)	3.070 (3.471)	-0.097 (0.182)
L.Cap. controls	0.694 (0.521)	1.683*** (0.621)	0.492 (0.611)	2.171* (1.125)	0.541 (0.591)	2.136* (1.104)	-7.551 (9.984)	1.214* (0.734)
L.lninfl	-0.644 (0.639)	-1.157* (0.626)	-0.666 (0.870)	-0.342 (0.295)	-0.885 (0.828)	-0.404 (0.329)	-51.731 (54.662)	0.115 (0.492)
year	0.145 (0.159)	-0.048 (0.131)	-0.182 (0.334)	-0.642*** (0.203)	0.031 (0.343)	-0.668** (0.276)	-7.916 (7.993)	-0.046 (0.108)
_cons	-469.406* (246.363)	-123.254 (220.736)	14.083 (526.063)	724.473** (306.775)	-302.084 (525.586)	775.745* (408.195)	16094.037 (16255.958)	111.308 (209.207)
N	888	825	469	320	469	320	469	320
Countries	56	49	37	28	37	28	37	28
R2	0.194	0.277	0.146	0.265	0.175	0.258		
Hansen							3.57	10.44
							Pr=0.94	Pr=0.32
AR(2)							-0.72	1.62
							Pr=0.47	Pr=0.11

Figure 5: Interaction effects – Non-OECD

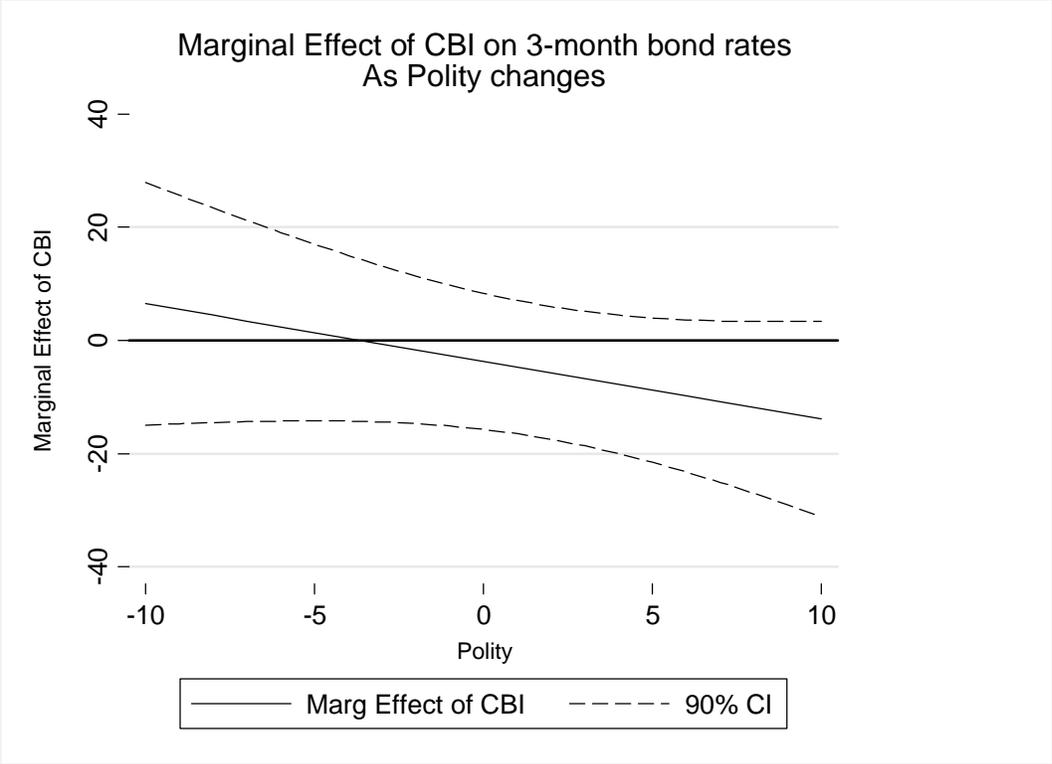


Figure 6: Interaction effects – Non-OECD

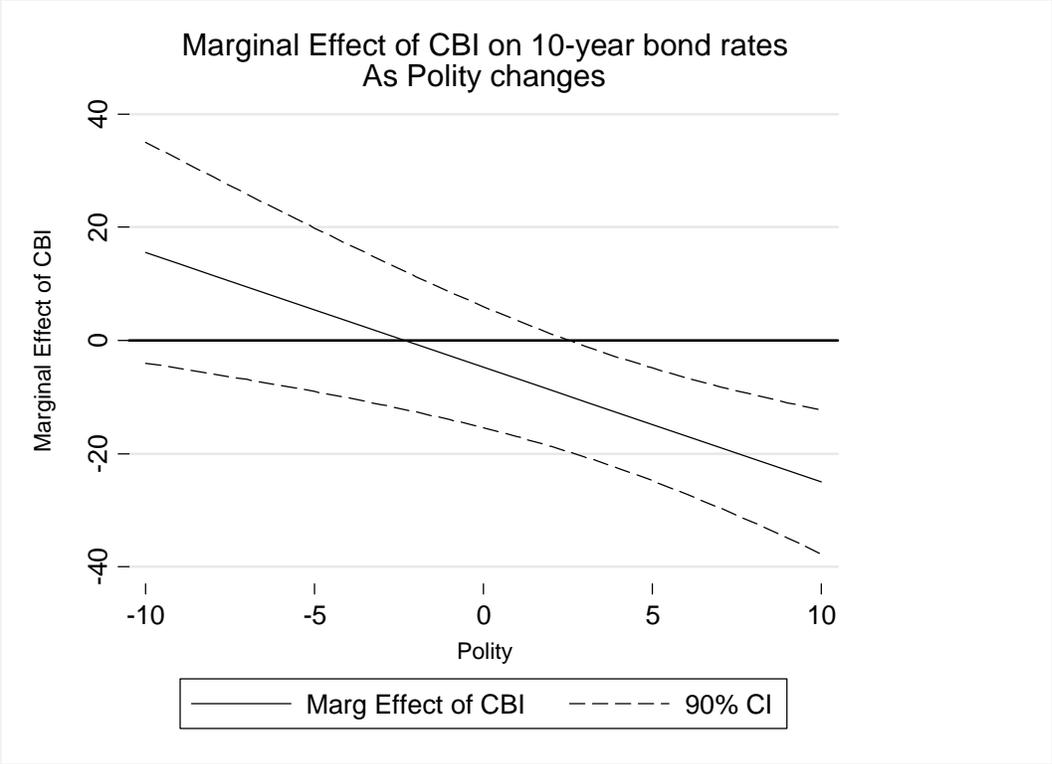


Figure 7: Temporal effect of CBI on 3-month rates

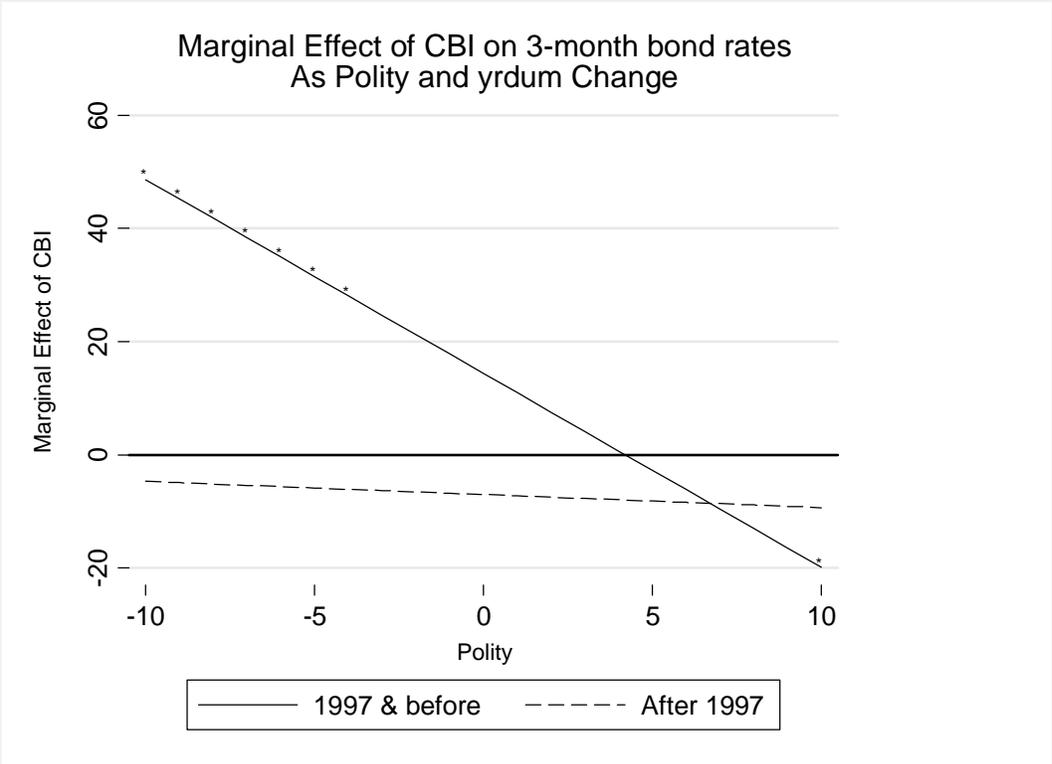


Figure 8: Temporal effect of CBI on 10-year rates

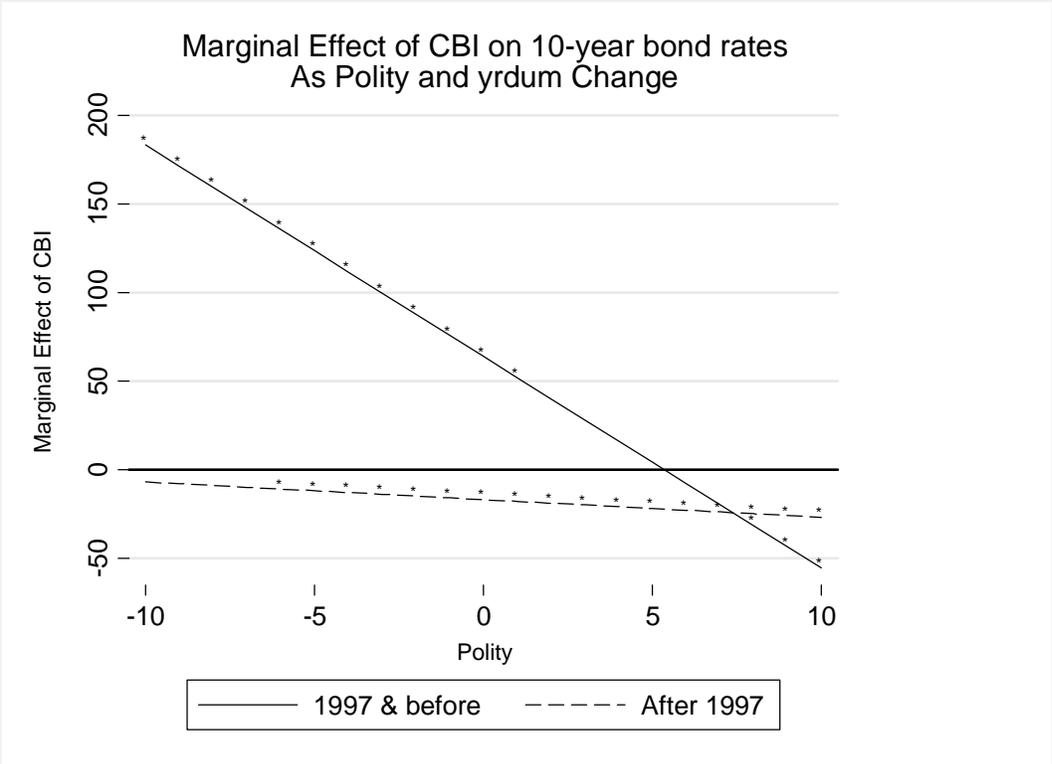


Table 4: CBI Effect on Credit ratings

	Non-OECD							
	All countries		Non-OECD		5-year CBI		GMM	
	Moody	S&P	Moody	S&P	Moody	S&P	Moody	S&P
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
CBI	0.158 (0.227)	-0.000 (0.120)	0.366 (0.623)	0.022 (0.484)			0.774 (0.641)	1.010* (0.519)
lvaw5yr					0.685 (0.820)	1.185 (0.839)		
Polity	0.041* (0.024)	0.037* (0.022)	0.037 (0.022)	0.032 (0.027)	0.035* (0.020)	0.016 (0.031)	0.044* (0.026)	0.032** (0.016)
De jure XR	0.175* (0.088)	0.249*** (0.054)	0.442* (0.232)	0.347*** (0.103)	0.445* (0.230)	0.316*** (0.094)	0.146 (0.115)	0.074 (0.139)
Default	-0.553*** (0.176)	-0.075 (0.214)	-0.524*** (0.189)	-0.088 (0.194)	-0.519*** (0.186)	-0.086 (0.190)	-0.504*** (0.181)	0.244 (0.315)
Lag openness	0.008* (0.004)	0.001 (0.003)	0.012** (0.006)	0.001 (0.004)	0.013** (0.006)	0.004 (0.005)	0.007*** (0.002)	0.003 (0.002)
Lagged GDP growth	3.902* (2.139)	5.617*** (1.179)	3.975 (2.619)	6.199*** (1.424)	3.872 (2.664)	5.850*** (1.356)	3.995* (2.213)	5.403*** (1.544)
L.lngdppc	4.104*** (1.165)	2.218*** (0.790)	5.781*** (2.046)	3.764 (2.242)	5.749*** (2.013)	3.255 (2.123)	0.029 (0.120)	-0.046 (0.149)
Lag log GDP	-3.303*** (1.018)	-1.651** (0.713)	-5.088** (2.409)	-3.281 (2.738)	-4.960** (2.421)	-2.547 (2.585)	0.157*** (0.055)	0.081 (0.050)
Fiscal balance	0.035*** (0.012)	0.019* (0.011)	0.045* (0.025)	0.038 (0.023)	0.047* (0.026)	0.041 (0.025)	0.043** (0.020)	0.028 (0.021)
L.Cap. controls	0.041 (0.051)	0.045 (0.039)	0.119 (0.073)	0.078 (0.065)	0.116 (0.072)	0.072 (0.064)	0.047 (0.043)	-0.061 (0.050)
L.lninfl	0.003 (0.051)	0.048 (0.047)	0.016 (0.071)	0.045 (0.077)	0.014 (0.071)	0.030 (0.075)	-0.007 (0.095)	0.041 (0.097)
year	-0.004 (0.016)	0.003 (0.012)	0.006 (0.059)	0.025 (0.064)	-0.004 (0.066)	-0.013 (0.068)	-0.029 (0.027)	0.016 (0.029)
_cons	58.043** (27.576)	18.105 (17.728)	70.098 (81.541)	3.422 (81.328)	86.891 (96.157)	63.838 (95.116)	53.854 (53.299)	-34.697 (57.112)
N	760	724	369	334	369	334	369	334
Countries	49	48	31	30	31	30	31	30
R2	0.779	0.781	0.795	0.787	0.795	0.788		
Hansen							8.69 Pr=0.47	11.95 Pr=0.22
AR(2)							-1.04 Pr=0.30	-0.70 Pr=0.48

Figure 9: Interaction effects – Non-OECD

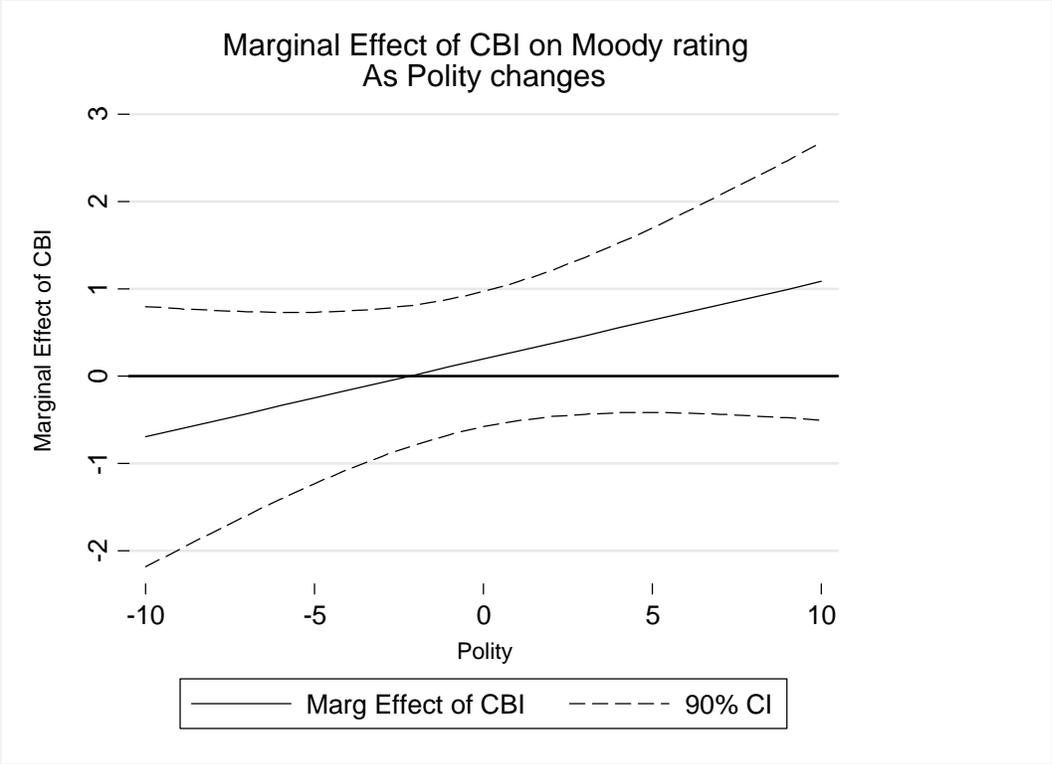


Figure 10: Interaction effects – Non-OECD

