

# Central bank independence

## SUMMARY

*What explains the worldwide changes in central bank design over the past five decades? Using a new dataset on central bank institutional design, this paper investigates the timing, pace and magnitude of reforms in a sample of 154 countries over the period 1972–2017. I construct a new dynamic index of central bank independence (CBI) and show that past levels of independence, as well as regional convergence, represent important drivers of changes in central bank design. An external pressure, such as obtaining an IMF loan, or political events, such as democratic reforms and the election of nationalistic governments, also impact the reform process. Reforms also follow periods of high inflation rates suggesting an endogenous evolution of CBI. The results also reveal important heterogeneities in the reform process depending on the level of development, the size and direction of reforms, as well as the different dimensions along which central bank legislation can be amended.*

*JEL codes: E58, G28, N20, P16*

—Davide Romelli



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# The political economy of reforms in Central Bank design: evidence from a new dataset

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## 1. INTRODUCTION

The past five decades have been characterized by significant changes in the institutional design of central banks around the world, generally towards assigning monetary authorities a higher degree of independence from the executive branch. Yet, despite the large

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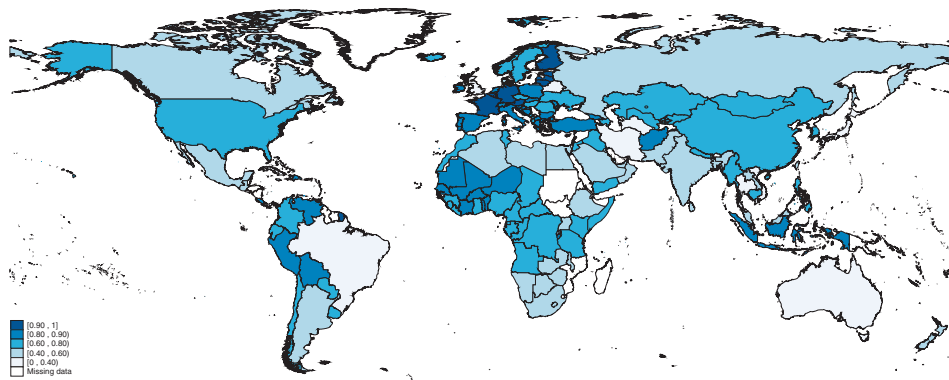
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consensus on the optimality of this institutional arrangement in stabilizing inflation rates, the degree of central bank independence (CBI) still varies considerably across countries (see Figure 1). Moreover, the legacy of the 2008 global financial crisis brought several threats to CBI, first as a result of Central Banks' involvement in financial supervision<sup>1</sup> and second due to an increased risk of fiscal dominance as a result of extensive asset purchase programmes.<sup>2</sup> The autonomy of central banks has also come under political pressure in countries with populist political movements (The Economist, 2019).

This paper investigates what factors shape the institutional design of central banks and can explain why and how countries reform the functioning of their monetary policy institutions. While a considerable body of work has investigated the *consequences* of assigning more independence to monetary policy authorities, the *causes* of reforms in central banking have received less attention. This paper provides the first comprehensive study of the drivers of institutional changes in central banks and finds that CBI evolves endogenously in response to both domestic and international factors such as past reforms, political elections, inflationary episodes or regional pressures.

Two empirical challenges in investigating central bank reforms are represented by (i) the use of different definitions for constructing indices of CBI and, more importantly, (ii) the fact that such indices are generally computed at specific points in time and do not capture the entire set of reforms. This paper overcomes these limitations by introducing a large cross-country database on the timing of legislative changes in central banking for a set of 154 countries during the period 1972–2017. It constructs a dynamic measure of *de jure* CBI that allows for a more precise determination than previously possible of the timing and magnitude of reforms in central bank design. This dynamic index builds on the two most common measures of *de jure* CBI in Grilli *et al.* (1991) (GMT) and Cukierman *et al.* (1992) (CWN).<sup>3</sup> However, given that the role of central banks has

- 1 For example, the Dodd–Frank Act of 2010 in the United States increased the responsibilities of the Federal Reserve Bank as financial supervisor. Similar reforms occurred in the United Kingdom (2012), Euro Area (2014), New Zealand (2010) or Russia (2013). Central banks' involvement in financial supervision puts pressure on CBI as it might conflict with the goal of price stability.
- 2 For example, the extraordinary policies implemented by many countries in response to the Covid-19 pandemic stimulated a lively debate on how central bank financing of government debt might increase the risk of fiscal dominance and might violate the principle of central bank independence (Blanchard and Pisany-Ferri, 2020; Gali, 2020a,b; Schnabel, 2020).
- 3 Classical measures of CBI are built using two different methodologies: i) *de jure* and ii) *de facto* measures of independence. The first consists in the codification of central banks' statutes. *De facto* indices, on the other hand, associate the independence of central banks to the autonomy of its governor, that is, higher turnover rates of central bank governors are associated with a lower independence of the central bank. *De facto* indices, however, are known to suffer from important limitations such as the fact that the reasons behind the dismissal of the governor are not considered or the fact that they focus on the governor only and overlook the entire board of directors (see, among others Dreher *et al.*, 2008). At the same time, legal measures of CBI may not reflect the actual relationship between the central bank and the government (Walsh, 2010). While political pressure can undermine the independence of central banks (see, e.g., Binder, 2021), quantifying the impact of such pressures in a comparable manner across a large sample of countries and over time is difficult to achieve. For this reason, this paper focuses on measures of CBI that are comparable across the 154 countries included in the sample.



**Figure 1. CBI around the world in 2017**

*Note:* The figure shows the degree of CBI around the world in 2017.

evolved considerably since the early 1990s, the new measure of CBI proposed extends previous ones by capturing new characteristics that can affect the conduct of monetary policy, such as financial independence and reporting and disclosure.

Employing this dynamic index, I provide a comprehensive overview of the evolution and timing of reforms in central bank design around the world. I find that, while central banks have become increasingly more independent over the last five decades, there is still a large variation across regions. Moreover, significant improvements in independence relate to a few dimensions of the index, such as those referring to the primary objectives of the central bank or its lending to the government.

I then employ a political economy framework to identify five sources of reforms: (i) status quo bias, (ii) external inducements, (iii) crises and shocks, (iv) ideology and political factors and (v) economic conditions. The results show that the lagged level of CBI or status quo, as well as regional pressures are important in the reform process, as countries with lower levels of independence or those that are further from their regional average are more likely to adopt reforms that increase their level of independence. An external pressure to reform also comes from international institutions, as countries receiving an IMF loan or becoming a member of a currency union adopt reforms that increase the independence of their central banks.

Reforms that increase the level of CBI also follow periods of high inflation rates, suggesting central bank institutional design is endogenous to the inflation dynamics of a country. On the other hand, other types of crises such as systemic banking crises, currency or sovereign debt crises are not followed by reforms that increase the level of CBI. The data also show important heterogeneities depending on the level of development. For instance, government fractionalization, cabinet changes or economic growth matter for the reform process among advanced economies, while external pressures and inflationary episodes are more important in developing economies.

The index constructed also allows for a more granular analysis of the magnitude and direction of reforms. This highlights important differences in the reform process. For instance, I find that financial crises are generally followed by reforms that decrease the level of CBI, while external inducements, regional convergence and status quo bias matter for reforms that increase the level of independence, but not those that decrease it.

The robustness of these results is checked along several lines. First, I employ several estimation strategies, alternative definitions and proxies for the main determinants of reforms. Next, I control for the different dimensions along which central bank legislation can be amended, as well as the interaction between the lagged level of independence and external factors. I also perform various split sample analyses and control for other reform processes such as democratic reforms. For instance, I find that countries undertaking democratic reforms will experience improvements in CBI, while the election of nationalistic political parties is typically associated with reforms that decrease the degree of independence. The results are robust to all these alternative specifications and provide the first comprehensive picture of the determinants and timing of reforms in central bank design over the last five decades.

These results, together with the new dataset introduced in this paper, contribute to two main streams of literature. First, a large body of work has tested the effectiveness of CBI in lowering inflation.<sup>4</sup> Overall, while higher levels of CBI are negatively correlated with inflation rates, this link is not always robust across countries, time periods or when different controls are included.<sup>5</sup> One explanation for these heterogeneous results might rest in the construction of the various indices. For example, the two most common measures of CBI, the GMT and the CWN indices, capture quite different information: 40% of the criteria collected in the former are not present in the latter (Mangano, 1998).<sup>6</sup> The index proposed in this paper comprises the most comprehensive set of central bank characteristics, including elements of financial independence and reporting and disclosure that have been of key interest in light of recent unconventional monetary policy measures.

Second, a more general literature on endogenous political institutions discusses how regulatory changes are rarely imposed ‘exogenously’, but rather respond to changing

4 See, among others, Grilli *et al.* (1991), Cukierman *et al.* (1992), Alesina and Summers (1993) and Siklos (2008). Extensive reviews of this literature are included in Arnone *et al.* (2006); Cukierman (2008); Klomp and de Haan (2010); Arnone and Romelli (2013) and Garriga (2016).

5 For example, Cukierman *et al.* (2002) look at former socialist economies and find that CBI is unrelated to inflation during the early stages of liberalization, but the link becomes significant when countries become more liberalized. Similarly, Campillo and Miron (1997) and Oatley (1999) show that CBI has no effect on inflation when they control for the degree of openness, political instability or historical levels of debt and inflation (see also Posen, 1995; Forder, 1998).

6 A different argument is that *de jure* measures, which look at legislative reforms, do not represent actual levels of central bank independence, in particular in developing countries where written rules are often circumvented by *de facto* procedures. A common measure of *de facto* independence is the turnover rate of the central bank governor (Cukierman *et al.*, 1992). However, the link between this measure and inflation dynamics is also not very robust (see, e.g., Crowe and Meade, 2007).

political, social or economic factors. For example, [Aghion \*et al.\* \(2004\)](#) argue that central banks have been made more independent in order to ‘insulate’ monetary policy in periods of high inflation.<sup>7</sup> [Alesina and Stella \(2010\)](#) build a political economy model in which the fractionalization of the party system makes the delegation of monetary policy to independent experts more cumbersome given the conflicts among groups. Empirically, [Moser \(1999\)](#) finds that legal independence is higher in OECD countries with legislative processes characterized by extensive checks and balances, while in [Keefer and Stasavage \(2003\)](#) monetary policy credibility (captured by a lower governor turnover rate) is enhanced by the presence of multiple veto players in the government.

The arguments above have created avenues for a recent stream of research that looks at the timing of reforms in central bank legislation. For example, [Bodea and Hicks \(2015a\)](#) build a dummy variable that takes value of 1 in years in which the CWN’s (1992) index has been modified. They find that the competition between countries for international capital increases the likelihood of reforms. [Berggren \*et al.\* \(2016\)](#) investigate the effect of social trust on central bank legislative reforms, where information on reforms is collected from a questionnaire sent to central banks. Finally, [Crowe and Meade \(2008\)](#) look at the change in the degree of independence between the index computed by CWN in 1989 and its recomputed value in 2003. However, this approach does not take into account the timing of reforms and may under/overestimate the magnitude of changes given the potentially different interpretations of the central bank charters. Furthermore, these empirical findings on the endogeneity of CBI are, nonetheless, limited to smaller samples, sensitive to the choice of CBI indices and are mainly concerned with the probability of reforms and not the magnitude or direction of changes.

This paper overcomes these empirical challenges by building a comprehensive survey of the timing and magnitude of reforms in central bank design. As such, it also relates to a broader literature that looks at the determinants of institutional reform processes. Closely related to this paper is [Abiad and Mody \(2005\)](#) who look at the determinants of financial liberalization reforms, and [Giuliano \*et al.\* \(2013\)](#) who study the effect of democracy on the adoption of financial and product market reforms. Other related work includes [Gokmen \*et al.\* \(2021\)](#) who find that, contrary to conventional belief, crises are followed by fewer structural reforms that liberalize trade, agriculture, network industries and financial markets. [Mian \*et al.\* \(2014\)](#) also find that financial crises can result in legislative stalemates that are not conducive to meaningful macroeconomic reforms.

7 A typical example is the German Bundesbank, whose statute was modified in 1957 as a result of a strong public aversion towards inflation following periods of hyperinflation ([Alesina and Stella, 2010](#)). [Posen \(1995\)](#) also argues that the different levels of CBI across the world reflect differences in countries’ preferences for low inflation (see also [de Haan and van’t Hag, 1995](#)). [de Jong \(2002\)](#) finds that the distribution of power in the society and the degree of uncertainty avoidance explain differences in CBI. In a political economy model, [Masciandaro and Passarelli \(2019\)](#) argue that the distribution of financial wealth among individuals can influence the decision to maintain or reform a central bank regime.

The paper is organized as follows. Section 2 discusses the methodology followed in building the new index of CBI and identifying reforms. Section 3 discusses the political economy arguments of reforming monetary policy institutions and the explanatory variables used. Section 4 presents the empirical strategy and results, while Section 5 concludes.

## 2. DATA AND STYLIZED FACTS

This section describes the new index of CBI proposed in this paper and provides some stylized facts about the evolution of central bank design over the last five decades in a sample of 154 countries.<sup>8</sup>

### 2.1. Indices of CBI

This paper constructs a comprehensive index of CBI covering a wide range of central bank characteristics based on their charters. The construction of the index uses, as a starting point, the two most commonly employed CBI indices, namely the GMT and CWN.<sup>9</sup> The new index, called CBI – extended (CBIE) index, provides information on 42 criteria of central bank institutional design across six dimensions: (1) governor and central bank board, (2) monetary policy and conflict resolution, (3) objectives, (4) limitations on lending to the government, (5) financial independence and (6) reporting and disclosure.

This extended index incorporates the characteristics of *both* the GMT and CWN indices. Moreover, it expands the GMT political independence index by collecting additional information on the dismissal of the governor and other board members, in addition to identifying if the governor is legally allowed to hold other offices in the government. It also augments the GMT economic independence index by including information on the authority responsible for setting the financial conditions on lending to the government.

Apart from integrating these two indices, one important innovation of the CBIE index is the inclusion of new criteria that capture good practices in central bank financial independence and reporting and disclosure. The financial independence criterion concerns the conditions for capitalization and recapitalization of the central bank capital, the identification of the authority that determines and approves the budget of the central bank, as well as the requirements for profit allocation. These last two features are particularly important during periods in which central banks' assets increase exponentially,

8 See [Appendix Table A.1](#) for the full set of countries and information on data availability.

9 For a detailed explanation of these indices and a literature review, see [Eijffinger and de Haan \(1996\)](#); [Arnone et al. \(2006\)](#); [Masciandaro and Romelli \(2015\)](#); [de Haan et al. \(2018\)](#); [de Haan and Eijffinger \(2019\)](#); [Masciandaro and Romelli \(2019\)](#) and [Peia and Romelli \(2019\)](#).



such as following large asset purchase programmes. In this context, the presence of conditions on the budget and the distribution of profits may reduce central banks' capacity to implement monetary policy. Regarding profit allocation, in particular, [Reis \(2013\)](#) argues that governments under fiscal stress will be tempted to demand the central bank to generate more profits and transfer them to the Treasury.

Previous literature has also argued that central bank accountability nowadays goes in tandem with CBI ([Haan \*et al.\*, 2005](#); [Jacome and Vazquez, 2008](#)). [Haan \*et al.\* \(2005\)](#) outline three main features of central bank accountability: (i) explicit definition and ranking of objectives of monetary policy; (ii) final responsibility with respect to monetary policy and (iii) disclosure of actual monetary policy (see also [de Haan \*et al.\*, 2018](#)). Elements of accountability captured in the first two categories are already incorporated in the GMT and CWN indices.<sup>10</sup> The CBIE index includes additional information related to disclosure, namely information on the legal provisions that require central banks to report on a regular basis the fulfilment of their policy targets. A question related to the publication of financial statements and whether these are certified by an independent auditor is also included in this dimension. The assumption is that higher disclosure and regular publication of certified financial statements correspond to greater central bank accountability and decreases the risk of being 'captured' by the executive branch.

[Table 1](#) presents a summary of the characteristics captured in the GMT and CWN indices as well as the new characteristics added by the CBIE index. Details on the guiding principle for the creation of the CBIE index are presented in [Online Appendix A](#), while [Online Appendix B](#) shows the coding rules. The codification strategy follows CWN closely and the points assigned to the answers of the 42 questions that construct the CBIE index range between 0 (no independence) and 1 (full independence). A score for each of the six dimensions of the index is obtained by assigning equal weights to each question in a given dimension. Then, the overall index is computed as the average of the scores across these six dimensions. This guarantees that all dimensions are given the same weight in determining the level of independence. The resulting index is normalized over the interval [0; 1].<sup>11</sup>

10 For example, several questions relate to the responsibility of formulating monetary policy, the presence of government representatives in the central bank board or the conditions for the dismissal of monetary policy committee members.

11 There are, of course, different ways to aggregate the collected data. For example, [Grilli \*et al.\* \(1991\)](#) assign an equal weight to the 15 questions included in their index. Since more questions are included in the criterion for governance, the weighting scheme assigns the largest weight to this dimension. [Cukierman \*et al.\* \(1992\)](#), [Jacome and Vazquez \(2008\)](#), [Dincer and Eichengreen \(2014\)](#), among others, assign a set of a priori weights to each dimension. For instance, in the [Cukierman's \(1992\)](#) index, 62.5% of the weight is assigned to the dimension on the limitations on lending to the government. [Online Appendix Figure B.1](#) presents a bar chart that compares the weights assigned to different dimensions across various indices of CBI in the literature. The figure shows considerably different weighting schemes across the main indices of central bank independence. Since this paper is mainly concerned with reforms, I take a conservative approach and assign equal weights to the six dimensions collected. Nonetheless, robustness tests are performed using alternative weighting methods.

**Table 1. Institutional characteristics captured by indices of CBI**

Criteria	GMT	CWN	CBIE
Governor and central bank board			
Who appoints the governor	*	*	*
Term of office of the governor	*	*	*
Reappointment option for the governor			*
Dismissal of governor		*	*
Governor allowed to hold another office in government		*	*
Qualification requirements for governor			*
Who appoints the board members	*		*
Term of office of board members	*		*
Reappointment option for board members			*
Dismissal of board members			*
Board members allowed to hold another office in government			*
Qualification requirements for board members			*
Staggering term of office for board members			*
Government representatives in the board	*		*
Monetary policy and conflicts resolution			
Who formulates monetary policy	*	*	*
Central bank responsible to fix key policy rates	*		*
Banking sector supervision	*		*
Central bank role in government's budget and/or debt	*		*
Final authority in monetary policy	*	*	*
Objectives			
Central bank's statutory goals	*	*	*
Limitations on lending to the government			
Direct credit: not automatic	*	*	*
Direct credit: market for lending		*	*
Who decides financing conditions to government		*	*
Beneficiaries of central bank lending		*	*
Direct credit: type of limit	*	*	*
Direct credit: maturity of loans	*	*	*
Direct credit: interest rates	*	*	*
Prohibition from buying government securities in primary market	*	*	*
Financial independence			
Payment of the initial capital of the central bank			*
Authorized capital of the central bank			*
Central bank financial autonomy			*
Arrangements for automatic recapitalization			*
Transfers of money from the treasury			*
Central bank approves its annual budget			*
Central bank adopt its annual balance sheet			*
Auditing agency			*
Allocation of net profits			*
Allocation of profits to a general reserve fund			*
Partial payments of dividends before the end of the fiscal year			*
Unrealized profits included in the calculation of distributable profits			*
Reporting and disclosure			
Central bank reporting			*
Central bank financial statements			*

*Note:* The table summarizes the set of information collected in the GMT, CWN and CBIE indices of CBI.

## 2.2. Central bank legislative reforms

To construct the dataset of reforms in central bank design, I identify, for each country, all the years in which the central bank charter has been changed or amended over the period 1972–2017.<sup>12</sup> A total of 2,490 changes to central bank legislation took place in the sample, with 1,303 reforms in the form of complete changes of statutes or reprints of central bank charters and 1,187 legislative amendments. This implies that countries have modified their legislation, on average, about 16 times over the analysed period. Yet these legislative changes may not necessarily modify, in a significant way, the institutional design of central banks. To gauge the magnitude and significance of these legislative changes, I focus my attention on reforms that change the degree of CBI, which has been long considered the optimal institutional design for modern central banks.

For each year in which a change to the central bank charter has occurred, I recompute the value of the CBIE index. A reform is then defined as a date in which the level of the CBIE index changes. The information collected also allows me to construct the dynamic evolution of other indices of CBI proposed in the literature. [Table 2](#) shows that the new index introduced in this paper captures the highest number of reforms: out of the 2,490 changes in legislation collected, 286 have changed the degree of independence of the central bank. This large number of identified reforms is due to the fact that I recompute the index in *every* year a legislative change takes place, while in previous work reforms are identified by computing the change in an index of CBI between two random (usually distant) moments in time. For example, [Acemoglu et al. \(2008\)](#) build a dummy variable that captures reforms by looking at the CWN index computed at different points in time. They identify 40 major central bank legislative reforms in a sample of 52 countries over 1972–2005. This approach, however, overlooks the fact that significant changes in independence might have occurred between the dates when the indexes are computed. While this might be less important when looking at long-run inflation outcomes as they do, capturing the exact timing and magnitude of reforms is crucial in understanding the reform process. Indeed, by looking at the full set of legislative changes, I identify 286 reforms that modify the degree of CBI in a sample of 154 countries. This shows that CBI indices are rather dynamic over time and motivate the main empirical investigation in this paper that aims to understand the triggers of these many reforms.<sup>13</sup>

[Figure 2](#) shows the distribution of reforms over time. A large number of reforms occurred during the 1990s, with a peak in 1998, when the ECB became the unique

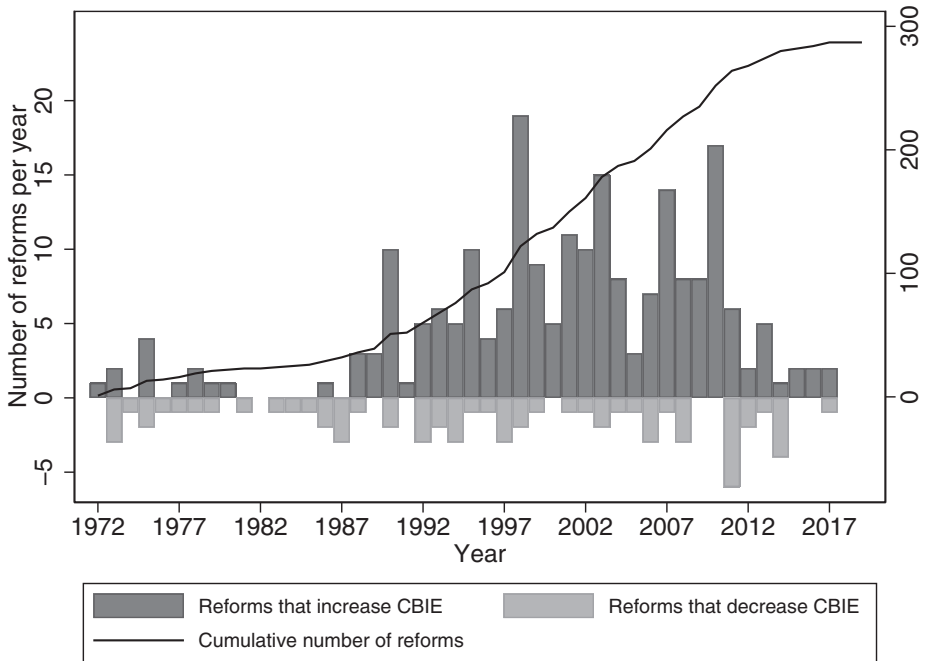
12 The full list of analysed documents was obtained from central bank websites or by directly contacting central banks and can be made available upon request.

13 Since the CBIE index also captures some new central bank characteristics, in robustness checks I employ the re-computed indices of [Grilli et al. \(1991\)](#) and [Cukierman et al. \(1992\)](#) to check that the results presented in this paper are not exclusively driven by the reforms along the new dimensions considered.

**Table 2. Measures of CBI and reforms**

Paper	Index name	Variables	Countries	Period	Number of reforms
Grilli <i>et al.</i> (1991)	GMT	16	18	1989	–
Cukierman <i>et al.</i> (1992)	CWN	16	72	1950–1989	35
Cukierman <i>et al.</i> (2002)	CWN	16	26	1991–1998	9
Polillo and Guillén (2005)	CWN	16	91	1989–2000	60
Crowe and Meade (2008)	CWN	16	99	2003	–
Jacome and Vazquez (2008)	CWNE	17	24	1990–2002	13
Acemoglu <i>et al.</i> (2008)	CWN	16	52	1972–2005	40
Arnone <i>et al.</i> (2009)	GMT	16	162	2003	–
Dincer and Eichengreen (2014)	CBIU	24	85	1998–2010	44
Bodea and Hicks (2015a)	CWN	16	83	1972–2010	108
<b>This paper</b>	<b>CBIE</b>	<b>42</b>	<b>155</b>	<b>1972–2017</b>	<b>286</b>

*Note.* The table shows the number of countries and reforms in CBI identified in previous works and in this paper.

**Figure 2. Central Bank legislative reforms (1972–2017)**

*Notes:* The figure shows the frequency of reforms that increased/decreased the CBIE index, together with the cumulative number of reforms in CBI between 1972 and 2017.

monetary policy authority for Euro area countries.<sup>14</sup> A new reform wave can also be noticed following the 2008 financial crisis, with increases mainly associated with improvements in the degree of independence along the dimension related to the governor and board, while decreases in the index corresponded to reforms regarding the involvement of central banks in banking supervision.

Figure 3 compares the level of CBI proxied by the CBIE index in 1972 (or the first year available) and 2017. As most countries cluster above the 45 degree line, there is a clear tendency towards adopting higher levels of CBI. One of the countries with the highest level of independence is Finland, while the lowest is in Macao. The highest drop in independence is recorded in Vietnam, which moved from 0.38 to 0.24, after a reform that took place in 1997. Similarly, Figure 4 shows the evolution of the average CBIE index by regional clusters.<sup>15</sup> Several regions appear to lag behind in the reform process, such as South and East Asia, the Middle East and North Africa.

Figure 5 shows the evolution of independence across the six dimensions of the CBIE index. Independence increases, on average, across all dimensions, with the highest increase in the dimension regarding the objectives of monetary policy-making, which more than doubles during the period 1972–2017. This confirms the increasing focus on the goal of price stability across the world over the past five decades. Central banks have also increased significantly their independence in terms of lending to the government. Interestingly, financial independence as well as reporting and disclosure were the two dimensions characterized by the highest degree of independence in the early 1970s and have only marginally increased since then.<sup>16</sup>

### 3. THE POLITICAL ECONOMY OF REFORMS

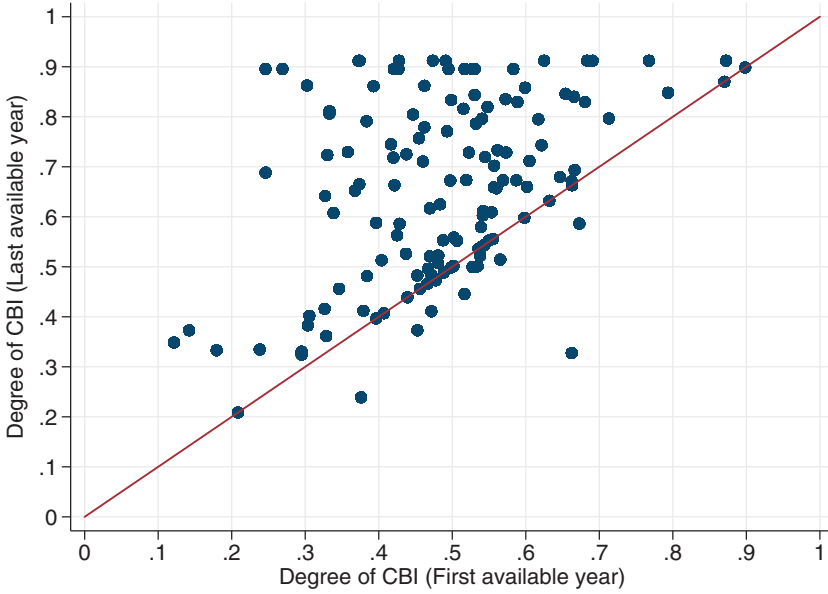
This section employs a political economy perspective to highlight some potential drivers of the timing and pace of reforms in central bank design over the past half-century. Motivated by these theoretical arguments, it also describes the set of variables that proxy the potential determinants of reforms.

A classical political economy framework to study reform processes is the war of attrition model in which a political conflict between two different social groups, such as political parties, can delay the implementation of reforms (Alesina and Drazen, 1991). In

14 Many former socialist economies have also adopted new central bank legislation over the 1990s (Cukierman *et al.*, 2002). However, since the legislation prior to 1990 was not available, most of these reforms are not captured in this dataset. Hence, in most of these countries, the first index of central bank independence corresponds to the one in the post-communist era.

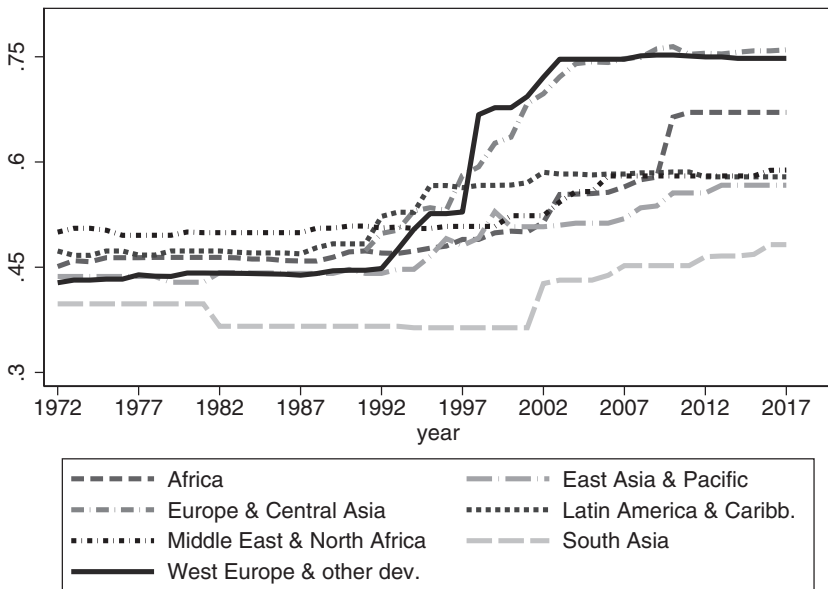
15 Similar to Acemoglu *et al.* (2019), I create regional clusters by following the World Bank classification which groups countries into seven geographic regions: (1) Africa, (2) East Asia and the Pacific, (3) Eastern Europe and Central Asia, (4) Latin America and the Caribbean, (5) Middle East and the North of Africa, (6) South Asia and (7) Western Europe and other developed countries.

16 Online Appendix Figures C.2–C.7 show the evolution of the six dimensions of the CBIE index by regional clusters.



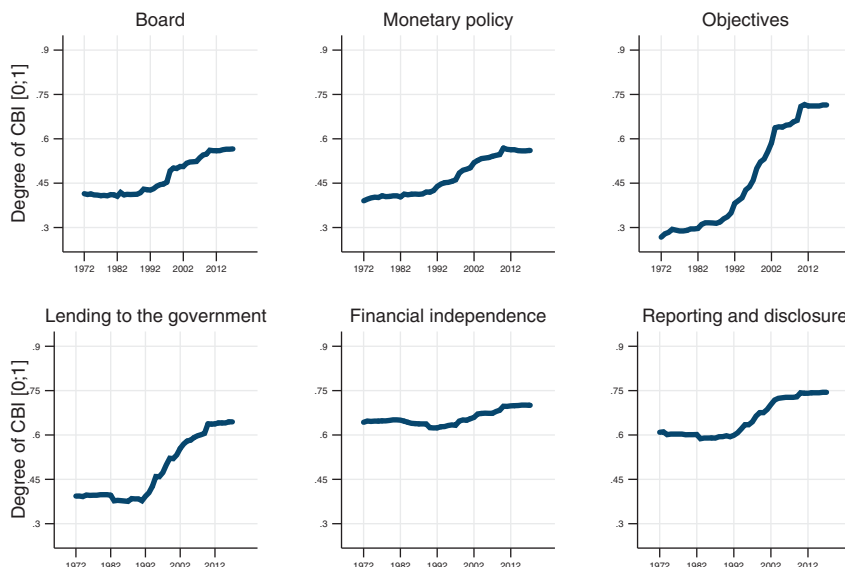
**Figure 3. Evolution of CBI**

*Note.* The figure compares the level of CBI proxied by the CBIE index in 1972 (or the first year available) and 2017.



**Figure 4. Evolution of CBI by regions**

*Note.* The figure shows the evolution of the average index of CBIE by regional clusters.



**Figure 5. Evolution of CBI by dimensions (1972–2017)**

*Notes:* The figure shows the evolution of the average degree of independence of the different dimensions of the CBIE index. *Board* relates to governor and central bank board; *Monetary policy*: monetary policy and conflicts resolution. *Objectives*: monetary policy objectives. *Lending to the government*: limitations on lending to the government. *Financial independence*: financial independence. *Reporting and disclosure*: reporting and disclosure.

Alesina and Drazen (1991), fiscal stabilization following a negative shock to government revenues is delayed because political parties disagree on how to allocate the costs of stabilization. They will thus engage in a war of attrition that delays the implementation of reforms until the passage of time reveals which group bears a higher cost of waiting.

A similar mechanism can explain reforms in central bank legislation if one assumes that an established interest group benefits from maintaining the existing level of CBI. For example, the conventional view that left-wing governments are less receptive to market-oriented reforms suggests that these governments may resist increasing the degree of independence of the central bank since this reduces their ability to monetize fiscal deficits (Alesina and Roubini, 1992). Moreover, uncertainty about the outcome of reforms can also explain why countries prefer maintaining the status quo (Fernandez and Rodrik, 1991). Thus, conflicting political interests coupled with some uncertainty about the cost or benefits of reforming central banks can lead to a war of attrition game that can explain why some countries do *not* reform their central bank legislation. Then what triggers a reform?

Theories of reforms suggest several factors that may explain the timing of reforms as a function of politico-economic characteristics of a country (Drazen, 2000; Abiad and Mody, 2005; Alesina *et al.*, 2006). These can be broadly grouped in several categories, including: (i) status quo bias; (ii) external inducements; (iii) crises and shocks; (iv) ideology, political structure and institutional environment and (v) economic conditions. I

briefly discuss how each of these factors can impact the probability of reforming central bank statutes.

(i) *Status quo bias*. The previous level of CBI can be a proxy for incentives in favour or against the implementation of reforms, in particular if reforms are a multistage process. On the one hand, early reforms can reveal information about the policy regime in place and, in turn, diminish the political opposition to reforming. On the other hand, in countries with low CBI, governments may oppose reforms that reduce their ability to monetize fiscal deficits. I include the lagged level of the index to identify the existence of convergence towards some possible country-specific level of CBI. Moreover, since the CBI index is bounded between 0 and 1, controlling for its lagged value allows us to account for the fact that reforms in countries with already high levels of independence might be smaller in magnitude.

(ii) *External inducements*. International institutions or foreign aids can provide an equally important incentive to reform. For example, binding agreements with international lenders like the IMF or the World Bank often requires countries to commit to a particular set of policies. Among these, granting more independence to the central bank is often suggested (Gutierrez, 2003; Rodrik and Bank, 2006). Empirical evidence on the ability of such international institutions to provide the incentives to implement long-lasting reforms is mixed. For example, Alesina *et al.* (2006) find weak support for fiscal stabilization reforms following IMF programmes, while Abiad and Mody (2005) and Gokmen *et al.* (2021) find a positive impact of IMF programmes on the probability of undertaking reforms to liberalize financial markets or international trade. On the other hand, Kern *et al.* (2019) show that IMF loan conditionality plays a critical role in promoting CBI. I thus employ a dummy variable that takes value 1 in the two years following an IMF agreement.

A second variable is represented by a monetary union dummy that takes value 1 in the five years prior to joining a monetary union. This second proxy is motivated by the reform process that took place in the EU, as prior to joining the European Monetary Union, countries are required to grant more independence to their central bank in order to align with the charter of the European Central Bank that follows the best practices in CBI.

Another type of external pressure can come from regional clustering, which is often found to be cohesive of certain types of reform processes such as democratizations and economic liberalizations (Simmons and Elkins, 2004; Elhorst *et al.*, 2013; Giuliano *et al.*, 2013; Acemoglu *et al.*, 2019). As such, countries might also reform their central bank design following other countries in their region. To capture this effect, I assume that the farther a country is from the average level of CBI in its region, the higher the impetus for reforms to catch-up. Hence, regional pressure is computed as the difference between the average level of independence of other countries in the region and a country's own level of independence.

(iii) *Crises and shocks*. Conventional wisdom states that 'it takes a crisis to reform'. The prevailing view is that economic and financial crises lower the cost of reforming



structural problems as the public is more willing to bear the pains associated with such reforms (Drazen, 2000; Masciandaro *et al.*, 2008). For example, numerous country studies highlight the importance of episodes of hyperinflation in shaping monetary policy institutions (Alesina and Summers, 1993; Hayo, 1998). Similarly, in the wake of financial crises, uncertainty about monetary policy might increase uncertainty about the financial sector, worsening the crisis. As a result, policymakers could modify the degree of independence of the central bank as a way of stabilizing the economy (Alesina and Stella, 2010). For example, following the 2008 global financial crisis, many governments have increased the involvement of central banks in banking and financial sector supervision (Masciandaro and Romelli, 2018). In line with these theoretical arguments, Alesina *et al.* (2006) find that countries are more likely to stabilize their government deficits during crisis periods, while Abiad and Mody (2005) show that financial sector liberalization reforms tend to occur following balance of payments crises, but are less likely after banking crises episodes. Gokmen *et al.* (2021), on the other hand, find no evidence for the crisis hypothesis in driving economic and financial reforms.

Four types of crises and shock episodes are likely to shape the design of monetary policy institutions: financial, currency and sovereign debt crises, as well as severe inflationary episodes with annual inflation rates higher than 20% (see Reinhart and Rogoff, 2004). Each episode is captured through an indicator variable taking the value 1 if the country has experienced such a crisis in the two years prior to a reform.

(iv) *Ideology, political structure and institutional environment.* Reforms are also more likely following elections that lead to a political consolidation or to changes in the government. For example, only four days after the start of Tony Blair's mandate in 1997, his new Chancellor, Gordon Brown, announced the government's intention to implement the 'most radical internal reform to the Bank of England since it was established in 1694'. To capture political instability I follow Giesenow *et al.* (2020) and use two dummy variables from the Cross-National Time-Series Database: one for changes in the cabinet and one indicating the occurrence of a government crisis (Banks and Wilson, 2021). In addition, I control for the degree of political fractionalization of the government.

The level of democracy has also been shown to have a positive impact on the likelihood of implementing economic reforms in a country (see Giuliano *et al.*, 2013, among others).

Furthermore, reforms might be less likely in countries where the degree of independence of the central bank is already entrenched in the constitution.<sup>17</sup> This is due not only to the fact that amending constitutional provisions requires a larger majority than normal law, but also that countries characterized by a more independent central bank might already have the autonomy of its monetary policy institution entrenched in the

17 Gutierrez (2003) documents that, in the late 1980s and early 1990s, several Latin American countries have reformed their constitution by introducing provisions explicitly establishing the autonomy of the central bank.

constitution. To construct a measure that captures the constitutional provisions on CBI, I collected all the constitutions in force in a country since the 1970s (or first year available for younger countries). I then created a dummy variable which takes the value of 1 whenever the independence of the central bank is entrenched in the constitution.

(v) *Economic conditions.* Finally, while crises or periods of instability can potentially reduce the costs of reforms, the opposite view might apply as well. Reforms could also occur during periods of growth since wealthier economies may find it easier to compensate the potential losers of reforms (Giuliano *et al.*, 2013; Alesina *et al.*, 2020). To capture periods of significant economic growth, I construct a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years.

Similarly, the degree of internationalization of a country and/or its willingness to attract international capital may influence the likelihood of reforms. Cukierman *et al.* (2002) argue that the negative relationship between CBI and inflation is connected to the implementation of other sound economic policies together with central bank legislative reforms. Similarly, Bodea and Hicks (2015a) suggest that governments' decision to reform central bank legislation might be connected to the willingness of a country to attract more foreign investors. In such environments, one might expect that the benefits of reforming are higher in economies that are more globalized. I include the change in the KOF Economic Globalization index as a proxy for the implementation of other economic reforms that render an economy more open.

Previous studies have also documented that the debt-to-GDP ratio of a country might influence the probability of reforms (see Giesenow *et al.*, 2020). As the dimension on the limitations on lending to the government represents an important component of our index, I also control for the ratio of debt-to-GDP of a country.

I describe the construction of all these variables in Appendix Table B.1. Appendix Table B.2 provides some summary statistics.

#### 4. DETERMINANTS OF REFORMS IN CENTRAL BANK DESIGN

The baseline empirical strategy investigates the determinants of reforms in central bank design, where a reform is defined as the change in the CBI index over time:  $\Delta\text{CBIE}_{i,t} = \text{CBIE}_{i,t} - \text{CBIE}_{i,t-1}$ . The model estimated is as follows:

$$\Delta\text{CBIE}_{i,t} = \beta_1 \text{Status quo}_{i,t-1} + \beta_2' \phi^{\text{External pressure}} + \beta_3' \phi^{\text{Crisis}} + \beta_4' \phi^{\text{Politics}} + \beta_6' \phi^{\text{Economic}} + \alpha_i + \tau_t + \epsilon_{i,t}, \quad (1)$$

where  $\text{Status quo}_{i,t-1}$  is the lagged level of the index,  $\phi^{\text{External pressure}}$  is the vector of external inducement variables;  $\phi^{\text{Crisis}}$  is the vector of crisis variables;  $\phi^{\text{Politics}}$  is a vector of political characteristics and  $\phi^{\text{Economic}}$  is the vector of economic variables. Most independent variables enter with a lag in Equation (1) to reduce endogeneity concerns and reflect how conditions prior to the reform impacted the policy change. Equation (1) also controls for country- and year-fixed effects to account for country-specific patterns

in reforming their central bank institutional design, as well as the existence of waves of reforms that occur in all countries in a given year. Furthermore, as the dependent variable is highly persistent, the error terms may exhibit serial correlation. To control for this, standard errors are clustered at the country level.<sup>18</sup>

The results of this baseline specification are presented in [Table 3](#). Columns (1)–(3) gradually add the sets of covariates discussed in Section 3. Column (1) shows that status quo and external pressure are important drivers of reforms. Specifically, countries with lower levels of CBI adopt larger reforms in central bank design. External pressure appears equally important. The positive and significant sign of Regional pressure suggests that countries farther from the average level of CBI in their region implement larger reforms. Reforms also follow the participation in IMF loan programmes. This confirms anecdotal evidence that central bank legislative reforms were often one of the conditions imposed by the IMF or the World Bank for the disbursement of loans ([Gutierrez, 2003](#)). The new index built in this paper provides systematic evidence of the importance of these international institutions in influencing institutional reforms over a large period of time.<sup>19</sup> The results in Column (1) also confirm the positive relationship between reforms in CBI and joining monetary unions, which is mainly driven by countries joining the European Monetary Union.

Column (2) considers the effect of crises. I find no evidence suggesting that periods of distress in the financial sector, currency crises or sovereign debt crises drive reforms in central banking. However, the inflationary episodes dummy is positive and significant, suggesting reforms in CBI follow periods characterized by high inflation rates. This provides the first piece of evidence on the endogeneity of the evolution of central bank design and suggests that central banks are made more independent as a response to high rates of inflation. Column (3) adds the full set of politico-economic characteristics. These additional controls have little explanatory power in the reform process of central banks, with the exception of the change in the index of economic globalization, which suggests countries that become more globalized are more likely to also increase their level of CBI.<sup>20</sup>

In Columns (4) and (5) in [Table 3](#), the sample is split between advanced and developing countries, following the OECD classification. This distinction is useful in

18 The Durbin–Watson statistic generalized by [Bhargava et al. \(1982\)](#) for fixed effects model in [Table III](#), Column (3) is 1.97, which suggests that there is little evidence of serial correlation when I cluster the standard errors at the country level.

19 [Berggren et al. \(2016\)](#), on the other hand, find that obtaining an IMF loan increases the time it takes to reform. Their dependent variable is the number of years between 1980 and a reform year, where the reform year is self-reported by central banks through a survey. It is not clear, however, whether this self-reported measure captures the date of the largest reform or the latest reform. It also does not capture the magnitude of reforms as done in this paper.

20 In [Online Appendix Table D.3](#), I include in separate regressions all the various subcomponents of the KOF index of globalization. These additional results suggest that only reforms related to economic globalization, that is, financial globalization and not other dimensions of the KOF index such as social or political globalization, are related to reforms in central bank design.

**Table 3. Drivers of reforms in central bank design**

	(1)	(2)	(3)	(4) Advanced	(5) Developing
Status quo	-0.039*** (0.014)	-0.038*** (0.014)	-0.056*** (0.018)	-0.218** (0.089)	-0.038* (0.020)
Regional pressure	0.045*** (0.017)	0.046*** (0.017)	0.042* (0.022)	-0.137 (0.088)	0.080*** (0.023)
IMF programmes	0.004*** (0.001)	0.003*** (0.001)	0.004*** (0.002)	0.007 (0.004)	0.004** (0.002)
Monetary Union	0.044*** (0.006)	0.045*** (0.006)	0.042*** (0.006)	0.044*** (0.009)	0.022 (0.014)
Financial crisis		-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.004)	0.001 (0.003)
Currency crises		-0.001 (0.002)	-0.001 (0.002)	0.008 (0.010)	-0.001 (0.003)
Sovereign debt crisis		0.006 (0.005)	0.008 (0.006)	0.006 (0.006)	0.008 (0.006)
Inflationary episodes		0.003** (0.001)	0.005** (0.002)	-0.008 (0.005)	0.005* (0.003)
Cabinet change			0.004 (0.003)	0.013* (0.007)	0.002 (0.004)
Government crisis			0.002 (0.002)	0.001 (0.003)	0.004 (0.002)
Polity <sub><i>i,t-1</i></sub>			0.001 (0.000)	-0.002 (0.002)	0.001 (0.000)
Constitution <sub><i>i,t-1</i></sub>			-0.009 (0.006)		-0.008 (0.007)
Government fractionalization			0.002 (0.004)	-0.017* (0.010)	0.009** (0.005)
GDP growth dummy			0.002 (0.002)	0.005* (0.003)	0.001 (0.002)
$\Delta$ Econ. globalization <sub><i>i,t-1</i></sub>			0.001** (0.000)	-0.001 (0.001)	0.001** (0.000)
Debt to GDP <sub><i>i,t-1</i></sub>			-0.001 (0.000)	0.001 (0.000)	-0.001 (0.000)
Observations	5,592	5,592	3,886	1,044	2,842
Number of countries	151	151	133	33	108
R-squared	0.099	0.101	0.118	0.315	0.107

*Notes:* The dependent variable is  $\Delta$ CBIE<sub>*i,t*</sub>. Status quo is the lag of the dependent variable, while 'Regional pressure' is computed as the average level of CBIE in the region minus the country's level. *IMF Programmes* is a dummy equal to 1 in the two years following an IMF loan program. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. *Financial*, *Currency* and *Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year *t*. *Cabinet change* is a dummy that takes the value of 1 if a change of president or prime minister, or a replacement of at least 50% of the ministers takes place in year *t*. *Government crisis* is a dummy equal to 1 if a situation that threatens to bring the downfall of the present government happens in year *t*. *Polity* is the Polity2 index of democracy. *Constitution* is a dummy equal to 1 if CBI is entrenched in the country's constitution. *Government Fractionalization* is a measure of the fragmentation of the government. *GDP Growth dummy* is a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years.  *$\Delta$ Econ. Globalization* is the change in the KOF Economic Globalization Index. *Debt to GDP* is the Debt-to-GPD ratio of a country. In Columns (4) and (5), the sample is restricted to advanced and developing countries, respectively. Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

understanding whether the results obtained are driven by a specific cluster of countries. Several important differences emerge from this split sample analysis. First, among advanced economies, changes in government seem to matter in the reform process, while the strong effects of regional pressure and IMF loan programmes appear driven mainly by developing economies (see Column (5)). Second, reforms that increase the level of CBI follow periods of high economic growth in developed countries. Together with the low explanatory power of the crisis proxies, this evidence provides support for the argument that periods of boom foster reforms in advanced economies as richer countries might have more resources to compensate the potential losses from the reform (Giuliano *et al.*, 2013). Finally, the statistically significant effect of inflationary episodes or changes in economic globalization is driven by the sample of developing countries.

Overall, the evidence presented in Table 3 points to a strong effect of status quo, external factors and inflation crises in explaining reforms in central bank design, with macroeconomic or political conditions playing a lesser role. Moreover, a split sample analysis by the level of development shows important differences between advanced and developing countries in the drivers of the reform process in central bank design.

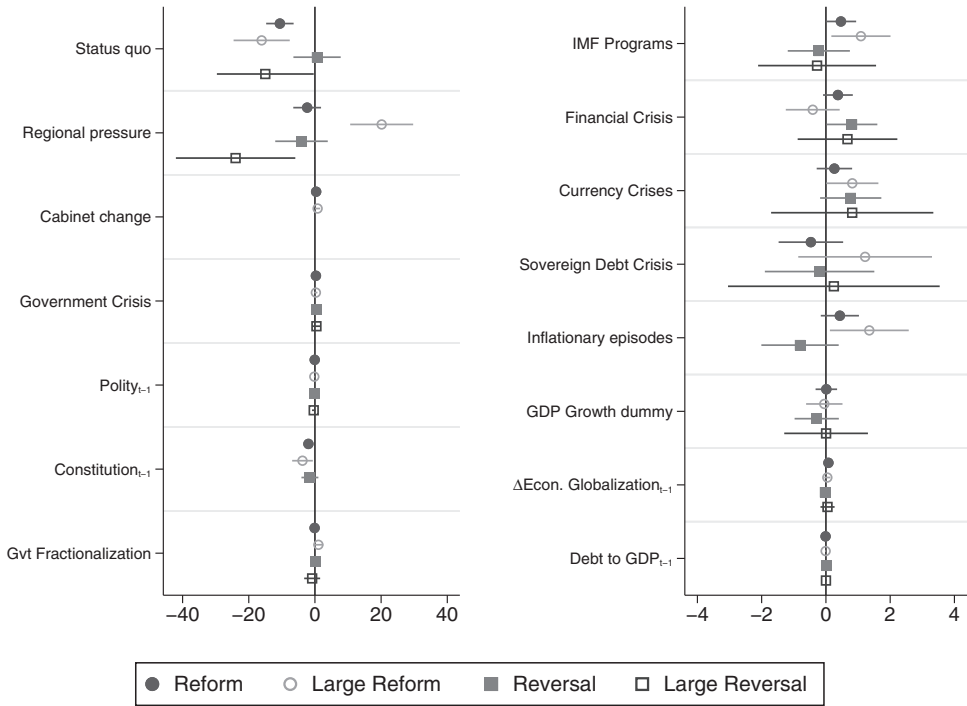
#### 4.1. Direction and magnitude of reforms

The extended index of CBI constructed in this paper allows us to identify the exact magnitude and direction of reforms at each moment the central bank legislation is amended. As such, a natural question is whether the determinants of reforms, as previously identified, can explain both reforms that increase as well as those that decrease the level of independence. This section investigates the probability of adopting a positive or a negative reform by constructing dummy variables equal to 1 in years when  $\Delta\text{CBIE}$  is positive or negative, respectively. Furthermore, as not all reforms constitute large changes in CBI, additional dummy variables capturing large reforms and large reversals are constructed, taking the value of 1 if the change in CBIE is larger than the median increase/decrease of the index among regional peers. The model estimated is as follows:

$$\text{Prob}(\text{Reform}_{i,t} = 1) = F(\beta_1 \text{Status quo}_{i,t-1} + \beta_2 \phi^{\text{External pressure}} + \beta_3 \phi^{\text{Crisis}} + \beta_4 \phi^{\text{Politics}} + \beta_6 \phi^{\text{Economic}} + \epsilon_{i,t}), \quad (2)$$

where  $\text{Reform}_{i,t}$  is a reform dummy as defined above. The methodology to estimate Equation (2) is determined by the shape of the cumulative distribution function,  $F(\cdot)$ . Under a standard logit estimation,  $F(\cdot)$  is the cumulative logistic distribution,  $F(z) = \exp(z)/(1 + \exp(z))$ . However, since episodes of reforms occur irregularly (95% of the sample is zero),  $F(\cdot)$  is asymmetric. As such, a complementary logarithmic (or cloglog) framework is most appropriate by assuming that  $F(\cdot)$  is the cumulative distribution function of the extreme value distribution:  $F(z) = 1 - \exp[-\exp(z)]$ .

Figure 6 shows the coefficient estimates for the cloglog model in Equation (2) for each type of reform dummy. The results when looking at the probability of



**Figure 6. Sign and magnitude of reforms**

*Notes:* The figure shows the coefficient of the estimates of Equation (2), where the dependent variable is an indicator variable equal to 1 in years in which the CBIE index changes. Reform refers to the model where the dependent variable is equal to one in the years where the CBIE index increases, while Large Reform includes only increases in the degree of CBI greater than the median increase in a sample of peer countries. Reversal refers to reforms that decreased the level of the CBIE index, while Large Reversal is a dummy that takes the value 1 in years where reversals are greater than the median reversal in independence among peer countries. See [Online Appendix Table D.1](#) for the details of the estimations. Ninety percent confidence intervals are shown.

implementing positive and large reforms are broadly consistent with the baseline estimations in [Table 3](#). This is expected given the overall trend towards increasing the level of CBI across the world documented in [Section 2.2](#). Furthermore, as expected, the coefficient of the lagged value of the index is much larger in magnitude when I look at large reforms, suggesting these are disproportionately less likely in countries already characterized by high levels of independence. At the same time, regional pressure and inflationary episodes seem to matter less when I only look at the probability of adopting positive reforms, while countries with high levels of democracy (captured by the Polity index) are less likely to further increase their degree of CBI. In addition, I find a negative and statistically significant effect of the Constitution dummy for both positive and large reforms, suggesting that changes to central bank design are less likely in countries where the concept of CBI is entrenched in the Constitution.

However, the most important differences emerge when restricting the attention to episodes that decrease the degree of CBI. First, the lagged value of the index is not significant for reversals and only marginally significant for large reversals. This implies that the internal pressure to reform is mainly driving legislative changes that increase the

level of independence. Second, the variable capturing regional pressure loses its significance for reversals, but becomes negative and statistically significant for large reversals, suggesting that large reversals are less likely in countries with levels of independence far from regional peers. In addition, neither obtaining an IMF loan nor joining a monetary union is associated with decreases in CBI. Finally, financial crises, which had little impact on increasing the level of independence, do seem to influence the probability of reversals in CBI. This is in line with the findings in [Masciandaro and Romelli \(2018\)](#), who show that crises increase the likelihood of assigning the responsibility of financial sector supervision to central banks, which, in the CBIE index, would correspond to a reduction in independence.

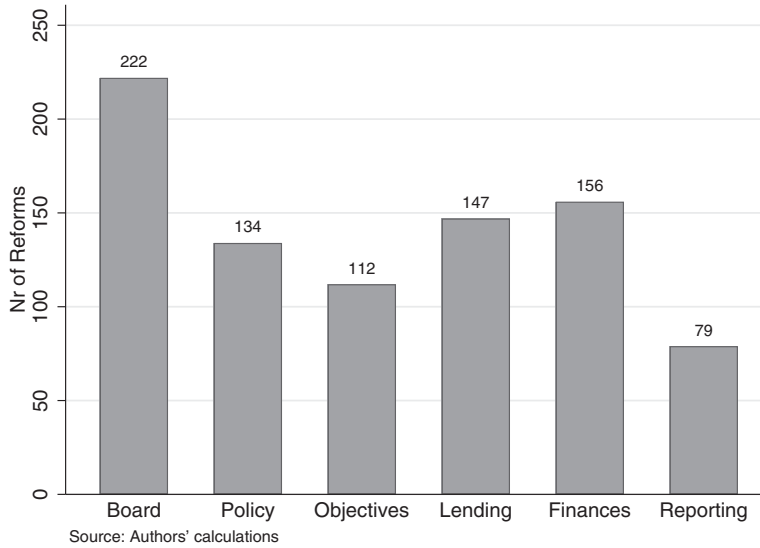
Overall, these results stress the richer implications derived when looking at the size and sign of reforms. The next section takes the analysis further by looking at amendments adduced to specific sections of the central bank charter.

## 4.2. Types of reforms

The construction of a dynamic index of CBI has highlighted the large number of changes to the design of these institutions over the past five decades. However, one might wonder whether reforms shape all aspects of the institutional framework of central banks or are mainly focused on a particular function. I explore this possibility by looking at the drivers of reforms along the six categories of the CBIE index: (1) governor and central bank board, (2) monetary policy and conflict resolution, (3) objectives, (4) limitations on lending to the government, (5) financial independence and (6) reporting and disclosure. I first compute the independence score for each of these six dimensions and normalize it between 0 and 1. Then, similar to the baseline analysis, the dependent variable is the change in the level of CBI between years  $t$  and  $t-1$  in country  $i$ , for each dimension  $d$  of the CBIE index.

[Figure 7](#) displays the distribution of reforms across the six dimensions of the index over the period 1972–2017. Reforms related to central bank governance (Governor and central bank board) are the most common, while those related to reporting and disclosure are the least common. Moreover, out of the 42 questions codified in the construction of the index, the one that has been modified the most is the one on the objectives of monetary policy. This suggests that the reforms captured modify significant aspects of the functioning of central banks and confirms the increasing focus on the goal of price stability over the past five decades.

The results pertaining to the OLS model in [Equation \(1\)](#) for each dimension of the CBIE index are presented in [Table 4](#). To obtain consistent econometric tests, I also recompute the proxy for regional pressure for each dimension. The proxy for status quo is still strongly significant across all specifications. The results for the other covariates are broadly similar to the ones obtained for the aggregated CBIE index in [Table 3](#), with a few notable differences. First, the regional pressure proxy seems to mainly boost reforms related to monetary policy and conflict resolutions and conditions on lending to the



**Figure 7. Legislative reforms by dimensions (1972–2017)**

*Notes:* Each bar indicates the number of reforms undertaken for the different dimensions of the CBIE index. *Board* relates to governor and central bank board; *Policy*: monetary policy and conflict resolution. *Objectives*: monetary policy objectives. *Lending*: limitations on lending to the government. *Finances*: financial independence. *Reporting*: reporting and disclosure.

government, that are among the dimensions that have been characterized by the highest improvements in the last five decades (see Figure 5). Obtaining an IMF loan matters for reforms related to monetary policy and lending, but not for the two new categories added by the CBIE index, that is, finances and reporting. This might be related to the set of guidelines used by the IMF to provide technical assistance to countries, where marginal importance is assigned to financial independence and reporting and disclosure (Lybek, 1999). Second, in previous sections, financial crises were shown to increase the likelihood of reducing the degree of CBI. This is confirmed in Column (5) that shows that financial crises are likely to be followed by reductions in financial independence. These reforms mainly concern the increase in the distribution of profits to the Government, which are likely to decrease the degree of independence on the central bank. While much anecdotal evidence discusses these trends in central bank design following financial crises, this is the first paper to document these empirical patterns in a large cross-section of countries. Finally, periods of high inflation are followed by reforms related to the board composition, objectives and lending to the government, but, surprisingly, not those related to the conduct of monetary policy.

### 4.3. Democratization and reforms

Previous studies have documented how structural reforms and democratization sometimes come in waves (see Giavazzi and Tabellini, 2005; Giuliano *et al.*, 2013; Acemoglu



**Table 4. Drivers of reforms by sub-categories**

	(1) $\Delta$ Board	(2) $\Delta$ Mon. Policy	(3) $\Delta$ Objectives	(4) $\Delta$ Lending	(5) $\Delta$ Financial Ind.	(6) $\Delta$ Reporting
Status quo	-0.059*** (0.018)	-0.066*** (0.021)	-0.065*** (0.024)	-0.051** (0.021)	-0.024** (0.012)	-0.030** (0.011)
Regional pressure	0.005 (0.017)	0.034* (0.020)	0.038 (0.025)	0.060** (0.025)	-0.002 (0.013)	0.010 (0.012)
IMF programmes	0.002 (0.002)	0.005** (0.002)	0.007 (0.005)	0.010*** (0.003)	-0.001 (0.001)	0.001 (0.001)
Monetary Union	0.054*** (0.006)	0.033*** (0.006)	0.049*** (0.009)	0.060*** (0.012)	0.007 (0.004)	0.002 (0.006)
Financial crisis	0.001 (0.003)	-0.003 (0.002)	-0.003 (0.005)	0.001 (0.005)	-0.002** (0.001)	0.002 (0.002)
Currency crises	-0.001 (0.002)	-0.003 (0.002)	-0.007 (0.005)	0.003 (0.006)	0.001 (0.001)	0.004 (0.002)
Sovereign debt crisis	0.006 (0.006)	0.005 (0.004)	0.018 (0.012)	0.009 (0.011)	-0.001 (0.002)	-0.001 (0.002)
Inflationary episodes	0.007*** (0.002)	0.002 (0.002)	0.009* (0.005)	0.008* (0.004)	0.001 (0.001)	-0.001 (0.002)
Cabinet change	0.004 (0.004)	0.004 (0.003)	0.006 (0.006)	0.005 (0.006)	-0.001 (0.001)	-0.001 (0.001)
Government crisis	0.001 (0.002)	0.005** (0.002)	-0.001 (0.004)	0.004 (0.004)	-0.002** (0.001)	-0.001 (0.001)
Polity <sub><i>i,t-1</i></sub>	-0.001 (0.000)	0.001 (0.000)	-0.001 (0.001)	0.001* (0.000)	0.001*** (0.000)	-0.001 (0.000)
Constitution <sub><i>i,t-1</i></sub>	-0.013** (0.006)	-0.005 (0.010)	-0.011 (0.016)	-0.013** (0.006)	-0.004*** (0.001)	-0.001 (0.002)
Government fractionalization	0.002 (0.004)	0.001 (0.003)	0.011 (0.009)	0.003 (0.009)	0.001 (0.001)	-0.002 (0.003)
GDP growth dummy	-0.001 (0.002)	0.001 (0.002)	0.003 (0.004)	0.005 (0.003)	-0.001 (0.001)	0.002* (0.001)
$\Delta$ Econ. Globalization <sub><i>i,t-1</i></sub>	0.001 (0.000)	0.001 (0.000)	0.002*** (0.001)	0.001 (0.001)	0.001 (0.000)	0.001 (0.000)
Debt to GDP <sub><i>i,t-1</i></sub>	-0.001 (0.000)	-0.001** (0.000)	-0.001* (0.000)	-0.001 (0.000)	0.001** (0.000)	0.001 (0.000)
Observations	3,886	3,886	3,886	3,886	3,886	3,886
Number of countries	133	133	133	133	133	133
R-squared	0.114	0.095	0.098	0.100	0.042	0.041

*Notes:* The dependent variable is the change in dimension  $d$  of the CBIE index,  $\Delta$ CBIE<sub>*d,i,t*</sub>. *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF programmes* is a dummy equal to 1 in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. *Financial*, *Currency* and *Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year  $t$ . *Cabinet change* is a dummy that takes the value of 1 if a change of president or prime minister, or a replacement of at least 50% of the ministers takes place in year  $t$ . *Government crisis* is a dummy equal to 1 if a situation that threatens to bring the downfall of the present government happens in year  $t$ . *Polity* is the Polity2 index of democracy. *Constitution* is a dummy equal to 1 if CBI is entrenched in the country's constitution. *Government Fractionalization* is a measure of the fragmentation of the government. *GDP growth dummy* is a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years.  $\Delta$ Econ. *Globalization* is the change in the KOF Economic Globalization Index. *Debt to GDP* is the Debt to GDP ratio of a country. Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

*et al.*, 2019, among others). The results presented so far do not show a strong effect of democracy, as captured by the Polity2 index. However, the ordinal nature of this index does not reflect a clear distinction between authoritarian regimes and democracies. To overcome this issue, I follow [Giavazzi and Tabellini \(2005\)](#) and create a democracy dummy variable that takes the value of 1 for strictly positive values of the Polity2 score.

The results using this alternative definition of democracy are presented in [Table 5](#), Column (1) for the full sample, and Column (2) for the sample of developing countries, respectively. While the effect of the other covariates remains robust to the inclusion of this alternative measure, the democracy dummy variable in Columns (1) and (2) is still not statistically significant.

An alternative approach is to analyse whether episodes of democratization are followed by changes in the institutional design of central banks. To do so, I create a dummy variable that takes the value of 1 in the first year in which a country moves from an autocracy (corresponding to a polity2 value lower or equal to 0) to a democracy (strictly positive values of polity2).

The results employing this alternative proxy of democracy are presented in Columns (3) and (4), for the full sample and developing countries, respectively. The positive and statistically significant sign of the democratic reform dummy variable across all specifications implies that the process of democratization is accompanied by reforms in central bank institutional design. This suggests that the degree of independence of monetary policy institutions is an important aspect of the process towards a full democracy.

Furthermore, the emergence of populist parties in recent years has brought, once again, monetary policy and the role of central banks to the centre of the political debate ([The Economist, 2019](#)). To test whether nationalistic political parties might affect the degree of independence of their central bank, I employ a measure that captures changes in the degree of countries' nationalism orientation following [Agur \(2018\)](#).  $\Delta$ Nationalism Index in Columns (5) and (6) of [Table 5](#) represents the change in the Nationalist Index from the World Bank Database of Political Institutions. The negative and statistically significant sign of this populism proxy confirms the idea that populist waves may undermine the degree of CBI (see [Masciandaro and Passarelli, 2019](#); [Binder, 2021](#), among others).

#### 4.4. Robustness tests

This section presents several robustness tests of the main results in the previous sections. First, [Appendix Figure C.1](#) shows that the main results do not hinder on the construction of the dependent variable by considering alternative aggregation methods to construct the CBIE index. Specifically, instead of the equal weights for the six dimensions employed in the main analysis, weights are assigned based on (i) propensity score matching and (ii) the weighting scheme proposed in [Jacome and Vazquez \(2008\)](#). The results in [Appendix Figure C.1](#) are not sensitive to the weighting scheme and suggest the same drivers of reforms in central bank design.

**Table 5. Central bank design and democracy**

	(1)	(2)	(3)	(4)	(5)	(6)
		Developing		Developing		Developing
Status quo	-0.057*** (0.018)	-0.039* (0.020)	-0.057*** (0.018)	-0.035* (0.020)	-0.065*** (0.022)	-0.065*** (0.024)
Regional pressure	0.042* (0.022)	0.080*** (0.023)	0.041* (0.022)	0.083*** (0.023)	0.042 (0.026)	0.073*** (0.027)
IMF programmes	0.004*** (0.002)	0.004** (0.002)	0.005*** (0.002)	0.005** (0.002)	0.006*** (0.002)	0.006** (0.003)
Monetary Union	0.042*** (0.006)	0.022 (0.014)	0.042*** (0.006)	0.022 (0.014)	0.041*** (0.006)	0.024 (0.015)
Financial crisis	-0.001 (0.002)	0.001 (0.003)	-0.001 (0.002)	0.001 (0.003)	-0.001 (0.003)	0.004 (0.003)
Currency crises	-0.001 (0.002)	-0.001 (0.003)	-0.001 (0.002)	-0.001 (0.003)	-0.002 (0.003)	-0.003 (0.003)
Sovereign debt crisis	0.008 (0.006)	0.008 (0.006)	0.007 (0.006)	0.007 (0.006)	0.009 (0.008)	0.010 (0.008)
Inflationary episodes	0.005** (0.002)	0.005* (0.003)	0.005** (0.002)	0.004* (0.002)	0.007** (0.003)	0.007** (0.004)
Cabinet change	0.004 (0.003)	0.002 (0.004)	0.005 (0.003)	0.002 (0.004)	0.007* (0.004)	0.004 (0.005)
Government crisis	0.002 (0.002)	0.004 (0.002)	0.001 (0.002)	0.003 (0.002)	0.001 (0.002)	0.003 (0.002)
Democracy <sub><i>i,t</i></sub>	0.003 (0.004)	0.003 (0.004)				
Democratic reform <sub><i>i,t</i></sub>			0.029** (0.014)	0.029** (0.014)		
ΔNationalist index					-0.017** (0.007)	-0.022** (0.009)
Constitution <sub><i>i,t-1</i></sub>	-0.009 (0.006)	-0.008 (0.007)	-0.008 (0.006)	-0.007 (0.007)	-0.006 (0.009)	-0.003 (0.010)
Government fractionalization	0.002 (0.004)	0.009* (0.005)	0.003 (0.004)	0.010** (0.004)	-0.001 (0.005)	0.008 (0.006)
GDP growth dummy	0.002 (0.002)	0.001 (0.002)	0.002 (0.002)	0.001 (0.002)	0.003* (0.002)	0.004 (0.002)
ΔEcon. Globalization <sub><i>i,t-1</i></sub>	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Debt to GDP <sub><i>i,t-1</i></sub>	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)
Observations	3,883	2,839	3,882	2,838	3,151	2,127
Number of countries	133	108	133	108	124	99
R-squared	0.118	0.107	0.124	0.115	0.128	0.123

*Notes:* The dependent variable is  $\Delta\text{CBIE}_{i,t}$ . *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF Programmes* is a dummy equal to one in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. *Financial*, *Currency* and *Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year *t*. *Cabinet change* is a dummy that takes the value of 1 if a change of president or prime minister, or a replacement of at least 50% of the ministers takes place in year *t*. *Government crisis* is a dummy equal to 1 if a situation that threatens to bring the downfall of the present government happens in year *t*. *Democracy* is a dummy that takes value 1 if a country is a democracy. *Democratic Reform* is a dummy equal to 1 in the year in which a country becomes a democracy. *ΔNationalist Index* is a measure of the increase in the Nationalist Index. *Constitution* is a dummy equal to 1 if CBI is entrenched in the country's constitution. *Government Fractionalization* is a measure of the fragmentation of the government. *GDP growth dummy* is a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years. *ΔEcon. Globalization* is the change in the KOF Economic Globalization Index. *Debt to GDP* is the Debt-to-GDP ratio of a country. In Columns (2), (4) and (6), the sample is restricted to developing countries. Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

Furthermore, the results are also robust to employing alternative definitions of CBI. In particular, [Appendix Table C.3](#) re-estimates the baseline results using restricted versions of the CBIE index. First, Columns (1)–(3) exclude the new dimensions on financial independence and disclosure, focusing therefore on the characteristics typically employed in previous literature such as governance, objectives and lending to the government. This robustness test ensures that the main results are not driven by reforms along the new elements of central bank design included in the CBIE index.<sup>21</sup> Second, Columns (4)–(6) show the robustness of our results when excluding the information related to the degree of central bank involvement in banking supervision. The construction of the CBIE index follows GMT who assume that the involvement of the central bank in banking supervision decreases its independence. However, as discussed in [Masciandaro and Romelli \(2018\)](#), two conflicting views on the impact of the involvement of central banks in supervision exist in the literature. On the one side, the integration view recognizes the informational advantages and economies of scale derived from bringing all functions under the authority of the central bank ([Peek \*et al.\*, 1999](#)). On the other hand, the separation argument highlights the higher risk of policy failure, as financial stability concerns might impede the implementation of optimal monetary policies ([Ioannidou, 2005](#)). Under this second argument, being responsible for banking supervision decreases independence, as central banks involved in both monetary policy and supervision might face a conflict of interest, which could affect the optimal conduct of monetary policy. While the construction of the CBIE follows this separation argument, Columns (4)–(6) of [Appendix Table C.3](#) show that our results are qualitatively the same when central bank involvement in supervision is excluded from the index.

In a final robustness check with regards to the definition of independence, I recalculate the indices of CBI in GMT, [Cukierman \(1992\)](#), [Jacome and Vazquez \(2008\)](#) and [Dincer and Eichengreen \(2014\)](#) employing the dataset constructed in this paper for the entire sample of countries and an extended time period. [Appendix Table C.4](#) shows that the main results are robust using these alternative indices, which suggests that the drivers of reforms identified correspond to important changes in central bank design that are also captured in other indices proposed in the literature.

Next, throughout the analysis, higher levels of CBI were robustly related to the probability and magnitude of subsequent reforms. It might be the case that other determinants of reforms also depend on past levels of independence. To check this hypothesis, Columns (1)–(3) of [Table C.5](#) include interaction terms between the lagged level of the CBIE index and the external inducement variables. These interaction terms are negative and statistically significant, suggesting that the external pressure to reform is important at lower levels of independence and less so when CBI is already high. Similarly, and in spite of the limited role played by the Polity index in driving reforms, the level of

21 [Online Appendix Table D.2](#) replicates the results in [Figure 6](#) that looks at the magnitude of reforms using this restricted CBIE index.

democracy of a country might have an indirect effect through the other drivers of reforms.<sup>22</sup> To control for this, in [Appendix Table C.5](#), Columns (4)–(6), I introduce an interaction term between the Polity index and the main drivers of reforms. Interestingly, the coefficients for the regional pressure and IMF programmes remain positive and statistically significant, while the interaction terms between these variables and the Polity index are not statistically different from zero. The dummy for Monetary Union is negative and the interaction term is positive. These results suggest that the effect of joining a currency union on central bank design is strongest among the most democratic countries. Again, this result is most likely driven by countries joining the European Union.

The results are also robust to the inclusion of the size of the IMF loan relative to GDP as opposed to a dummy variable (see [Table C.6](#)). Furthermore, while the results do not point to a strong effect of financial, currency or sovereign debt crises, a potential concern is that the proxy for IMF programmes may capture these effects, as IMF interventions are likely to follow these crisis episodes. I check if this is the case through a placebo test that assigns a random date for IMF programmes. Columns (3) and (4) in [Table C.6](#) show that the randomized IMF programmes are not significant, confirming the importance of the external inducement played by the IMF. At the same time, the significance of the crises proxies remains unchanged.<sup>23</sup>

The literature on the drivers of reforms has also suggested that reforms often come together. For example, [Rode and Gwartney \(2012\)](#) show how transitions to democracy are associated with improvements in economic liberalization. Similarly, [Mierau \*et al.\* \(2007\)](#) show that improvements in the economic freedom of a country increase the likelihood of gradual fiscal policy adjustments. Similarly, [Lavigne \(2011\)](#) finds that, in advanced economies, institutional quality as captured by the rule of law favours the implementation of larger and more persistent fiscal policy adjustments. In addition, as noted in [Obstfeld \*et al.\* \(2010\)](#), reserve accumulation is a key tool for managing domestic financial instability as well as exchange rates in a world of increasing financial globalization. In such a setting, the level of international reserves to GDP might act as an additional proxy for the economic environment of a country and pressure to reform. [Appendix Figure C.2](#) shows the robustness of our baseline results to the inclusion of additional control variables employed in the literature on reform processes. These include: the rule of law, reserve-to-GDP ratio and change in the economic freedom index from the Fraser Institute. I present the results for the full sample, a subset of developing countries as well as a subsample that excludes the countries which joined the euro area and which had, in most cases, to undertake reforms which improved the degree of

22 For example, [Bodea and Hicks \(2015b\)](#) investigate the effect of democracy on money supply and inflation and find that the effect of CBI on inflation expectations is unlikely to hold in nondemocratic countries.

23 In robustness checks, I also follow [Gokmen \*et al.\* \(2021\)](#) and combine the three measures of crises, that is, financial, currency and sovereign debt crises, into a single crisis measure. The results are unchanged using this alternative definition and are available upon request.

independence of their monetary policy institutions. The additional controls are not significant in explaining the reform process in central bank design. At the same time, our baseline results remain unchanged when I exclude the sample of Euro area countries.

Finally, a last robustness check considers alternative econometric approaches to our baseline investigation of the drivers of reforms in central bank institutional design. First, since regional pressure is important in the reform process, I employ the dynamic spatial panel data model proposed in [Elhorst \*et al.\* \(2013\)](#), which stresses the importance of taking into account spatial spillovers when estimating peer effects in financial liberalization reforms.

We follow their approach and first test for the stability of the system, through a joint test on the coefficients of the lagged dependent variable and those of the regional pressure proxies. The  $p$ -value of these tests is shown in [Table C.7](#), Columns (1)–(3). These columns use different definitions for the regional pressure matrix, based on inverse distances with a cut-off point of 2,000 in Column (1), 4,000 km in Column (2) and 6,000 km in Column (3), respectively. As the null hypothesis of the joint test of the coefficients cannot be rejected, the model is spatially cointegrated. After confirming the spatial cointegration among peer countries, I proceed to estimating a first difference model in Columns (4)–(6). The results under this more demanding econometric setting confirm our initial findings. The coefficients of the dependent variables in space  $W CBIE_t$  are positive and significant in the spatial first-differenced model. Similar to [Elhorst \*et al.\* \(2013\)](#), I consider the coefficient  $W CBIE_t$  as the impact of the regional pressure effect. This result is consistent regardless of the definition of the spatial weights. In addition, the effect of both the IMF programmes dummy and the Monetary Union one is still significant.

One final concern with the estimation in [Table 3](#) is that the change in CBIE does not occur frequently, and, in fact, some countries do not change their independence over the entire period of our analysis. The linear specification in [Table 3](#) includes both groups in which reforms occur and those where they do not and estimates the average marginal effect of a covariate as a linear combination of zero (countries with no reform that have slope coefficients of zero) and the estimated coefficient of the group of countries which have reformed ([Beck, 2020](#)). While employing cloglog estimations in Section 4.1 partly mitigates this concern, a more stringent approach is to employ a fixed effects logit model that drops cross-sections where the dependent variable does not change (see [Allison, 2009](#)). I therefore check the robustness of the baseline results in [Appendix Table C.8](#) using a fixed effects logit model in Columns (1)–(3) and complementary logarithmic estimations in Columns (4)–(6), respectively. Our main results remain robust to the adoption of these alternative econometric approaches. In particular, the coefficient for the status quo variable is negative and statistically significant across all estimations. The IMF programmes variable is positive and significant at the 10% level for the full sample and the subset of developing countries, while the results for the Monetary Union dummy remain significant for the full sample and for advanced economies, in line with the baseline results in [Table 3](#). Interestingly, the regional pressure variable and the

dummy for inflationary episodes lose significance while the one for financial crisis becomes significant across all estimations. These results are in line with the estimations presented in Figure 6, where financial crises play an important role in driving reversals in the CBIE index, while regional pressure and inflationary episodes mainly increase the probability of large reforms.

## 5. CONCLUDING REMARKS

This paper investigates the drivers of reforms in central bank design in a set of 154 countries over the period 1972–2017. Employing a comprehensive survey of central bank design, it documents 2,490 legislative changes over this time frame. Yet, to gauge whether these reforms had a significant impact on the design of central banks, I restrict the analysis to reforms that modify the degree of CBI, which has long been considered the optimal institutional setting of monetary policy authorities. I propose a new index of *de jure* CBI that incorporates and extends previous indices by including new information on central bank financial independence and disclosure.

Employing this new dynamic index, I document several new stylized facts about the evolution of central bank design, including an increase in the average level of independence across time, several waves of reforms such as the ones that followed the 2008 global financial crisis as well as a still significant cross-country variation in the level of CBI.

Looking at the determinants behind the many reforms central banks have implemented over the past five decades, I find that both internal and external factors matter. Countries with lower levels of CBI or those experiencing high inflation are more likely to enhance their independence. Reforms are also influenced by international pressures to reform coming from regional peers, IMF loans or joining a monetary union. At the same time, economic and political factors have a heterogeneous impact depending on the level of development. For example, reforms are more likely following cabinet changes or periods of high economic growth in advanced economies, while in developing countries democratic reforms go hand in hand with central bank reforms. Looking at the direction and magnitude of the reform also reveals important heterogeneities in the reform process. For instance, financial crises are followed by reforms that decrease CBI, while regional pressure is more likely to result in large reforms.

The empirical investigation proposed in this paper, while focused on central bank reforms, contributes to a broader political economy literature on the endogenous evolution of political institutions. The results obtained reinforce some widely held conclusions, such as the importance of external inducements in reforming central banks, and also shed light on some ambiguities in the literature such as the role of crises. The new index constructed not only sheds light on the endogenous evolution of central banks, but also provides a useful time-varying instrument of institutional design.

The endogenous evolution of central bank design is an ongoing process and the index and methods proposed in this paper can be useful in identifying how new challenges

faced by central banks will affect their independence. For example, the results in Section 4.3 show that an increase in nationalistic political parties is likely to be followed by reforms that decrease CBI. This increased political pressure faced by many central banks due to the rise of populist movements across the world could further threaten the hard won independence of these policy institutions. A second challenge faced by central banks nowadays can arise from the extensive asset purchase programmes undertaken to respond to the 2008 global financial crisis and, more recently, the Covid-19 global pandemic. The large amounts of government debt held by many central banks increase the risk of fiscal dominance, that is, situations in which monetary policy could be undermined and interest rates pegged at low levels to reduce the costs of servicing sovereign debt. Finally, the highly debated impact of climate change on the institutional design of central banks might influence reforms in the years to come. As noted by [Lagarde \(2021\)](#):

climate change [has] macroeconomic and financial implications and [have] consequences for [the European Central Bank's] primary objective of price stability, other areas of competence including financial stability and banking supervision, as well as for the Eurosystem's own balance sheet.

So far, no central bank around the world has formally changed their statute to include environmental and climate goals. However, governments are pressuring central banks to take actions in this direction. For example, in March 2021, Rishi Sunak, the Chancellor of the Exchequer, stated that the Bank of England will have to support the government's efforts to make the UK economy greener and achieve zero greenhouse gas emissions by 2050. While reaffirming the Bank of England's longstanding inflation target, Rishi Sunak also said that monetary policy should now 'also reflect the importance of environmental sustainability and the transition to net zero' ([Hodgson et al., 2021](#)). To incorporate such pressures, future work can extend the de jure index proposed in this paper with elements of de facto independence by analysing, for example, media coverage and governors' speeches to capture the role of political pressures in central bank policies.

## APPENDIX

**Table A.1. Analysed countries**

Countries, year of first analysed legislation and regional clusters					
Afghanistan	2003	MENA	Dominica	1983	LAC
Albania	1992	EECA	Dominican Republic	1959	LAC
Algeria	1962	MENA	Ecuador	1957	LAC
Angola	1997	AFR	Egypt	1957	MENA
Anguilla	1987	LAC	Equatorial Guinea	1972	AFR
Antigua and Barbuda	1983	LAC	Estonia	1993	EECA
Argentina	1935	LAC	Ethiopia	1994	AFR

(continued)



**Table A.1. Continued**

Countries, year of first analysed legislation and regional clusters

Australia	1959	WEOD	Finland	1966	WEOD
Austria	1955	WEOD	France	1936	WEOD
Azerbaijan	1996	EECA	Gabon	1972	AFR
Bahrain	1973	MENA	Gambia	1971	AFR
Bangladesh	2003	SA	Georgia	1995	EECA
Belarus	1990	EECA	Germany	1957	WEOD
Belgium	1948	WEOD	Ghana	1975	AFR
Benin	1956	AFR	Greece	1959	WEOD
Bolivia	1945	LAC	Grenada	1983	LAC
Bosnia and Herzegovina	1997	EECA	Guatemala	1959	LAC
Botswana	1975	AFR	Guinea-Bissau	1956	AFR
Brazil	1964	LAC	Guinea	1994	AFR
Brunei	1984	EAP	Haiti	1979	LAC
Bulgaria	1991	EECA	Hungary	1991	EECA
Burkina Faso	1956	AFR	Iceland	1966	WEOD
Burundi	1965	AFR	India	1934	SA
Cambodia	1954	EAP	Indonesia	1953	EAP
Cameroon	1972	AFR	Iran	1972	MENA
Canada	1954	WEOD	Iraq	1964	MENA
Central AFRn Republic	1972	AFR	Ireland	1942	WEOD
Chad	1972	AFR	Italy	1948	WEOD
Chile	1953	LAC	Ivory Coast	1956	AFR
China	1995	EAP	Jamaica	1992	LAC
Colombia	1923	LAC	Japan	1957	WEOD
Comoros	1987	AFR	Jordan	1971	MENA
Costa Rica	1953	LAC	Kazakhstan	1993	EECA
Croatia	1991	EECA	Kenya	1984	AFR
Cuba	1959	LAC	Kuwait	1968	MENA
Cyprus	1963	WEOD	Kyrgyzstan	1992	EECA
Czech Republic	1991	EECA	Laos	1995	EAP
Democratic Republic of the Congo	1993	AFR	Latvia	1992	EECA
Denmark	1942	WEOD	Lebanon	1969	MENA
Liberia	1974	AFR	Saint Kitts and Nevis	1983	LAC
Libya	1996	MENA	Saint Lucia	1983	LAC
Lithuania	1994	EECA	Saint Vincent and the Grenadines	1983	LAC
Luxembourg	1983	WEOD	Saudi Arabia	1957	MENA
Macao S.A.R	2000	EAP	Senegal	1956	AFR
Macedonia	1992	EECA	Seychelles	1986	AFR
Malawi	1989	AFR	Sierra Leone	1963	AFR
Malaysia	1982	EAP	Singapore	1991	EAP
Maldives	1982	SA	Slovakia	1992	EECA
Mali	1984	AFR	Slovenia	1991	EECA
Malta	1994	WEOD	Somalia	1960	AFR
Mauritania	1956	AFR	South AFR	1956	AFR
Mauritius	1966	AFR	South Korea	1950	EAP

*(continued)*

**Table A.1. Continued**

Countries, year of first analysed legislation and regional clusters

Mexico	1960	LAC	Spain	1962	WEOD
Moldova	1992	EECA	Sri Lanka	1953	SA
Mongolia	1996	EAP	Sweden	1966	WEOD
Montenegro	2005	EECA	Switzerland	1953	WEOD
Morocco	1959	MENA	Taiwan	1979	EAP
Myanmar	1952	EAP	Thailand	1942	EAP
Namibia	1990	AFR	The Bahamas	1974	LAC
Nepal	1955	SA	Togo	1956	AFR
Netherlands	1948	WEOD	Trinidad and Tobago	1964	LAC
New Zealand	1933	WEOD	Tunisia	1958	MENA
Niger	1956	AFR	Turkey	1970	EECA
Nigeria	1969	AFR	Turkmenistan	1994	EECA
Norway	1966	WEOD	Uganda	1966	AFR
Oman	2000	MENA	Ukraine	1991	EECA
Pakistan	1972	SA	United Arab Emirates	1980	MENA
Panama	1941	LAC	United Kingdom	1946	WEOD
Paraguay	1952	LAC	United Republic of Tanzania	1966	AFR
Peru	1962	LAC	United States of America	1951	WEOD
Philippines	1948	EAP	Uruguay	1938	LAC
Poland	1997	EECA	Uzbekistan	2000	EECA
Portugal	1962	WEOD	Venezuela	1939	LAC
Qatar	1993	MENA	Vietnam	1990	EAP
Republic of Congo	1972	AFR	Yemen	1971	MENA
Romania	1991	EECA	Zambia	1971	AFR
Russia	1992	EECA	Zimbabwe	1956	AFR
Rwanda	1997	AFR			

*Notes:* The table reports information on the list of analysed countries, the year of the first analysed legislation and the regional clusters. AFR, Africa; EAP, East Asia and the Pacific; EECA, Eastern Europe and Central Asia; LAC, Latin America and the Caribbean; MENA, Middle East and the North of Africa; SA, South Asia and WEOD, Western Europe and other developed countries.

**Table B.1. Data and data sources**

Variable	Definition	Data sources
Dependent variables		
$\Delta$ CBIE	The change in the CBIE index between year $t$ and $t-1$ : $\Delta$ CBIE $_t = \text{CBIE}_{t,t} - \text{CBIE}_{t,t-1}$ .	Authors
Reform	Dummy variable that takes the value 1 if $\Delta$ CBIE $_t > 0$ and zero otherwise.	Authors
Large reform	Dummy variable that takes the value of 1 if country $i$ is experiencing a reform that increases the level of the CBIE index by a value higher than the median increases in CBI in a country's region.	Authors
Reversal	Dummy variable that takes the value 1 if $\Delta$ CBIE $_t < 0$ .	Authors
Large reversal	Dummy variable that takes the value 1 if the reform that decreases the level of the CBIE index is higher than the median reduction in the CBIE index in a country's region.	Authors
$\Delta$ CBIE $_d$	The change in each of the six dimensions ( $d$ ) of the CBIE index.	Authors
$\Delta$ GMT/ $\Delta$ CWN/ $\Delta$ ACWNE/ $\Delta$ ACBIU	Variable that captures the change in the degree of CBI as defined in GMT, CWN, Jacome and Vazquez (2008) and Dincer and Eichengreen (2014), respectively.	Authors
Explanatory variables		
Status quo	Lagged level of the CBIE index	Authors
Regional pressure	Variable capturing the difference between the average level of CBIE in the region minus the country $i$ 's level of CBI. Regions are defined following Acemoglu <i>et al.</i> (2019).	Authors
IMF programmes	Dummy variable that takes the value 1 in the two years following an IMF loan programme.	Authors following Dreher (2006)
IMF credit/GDP	Variable capturing the average ratio of IMF loans to GDP in years $t$ , $t-1$ and $t-2$ .	Authors
Random IMF programmes	Dummy variable that takes the value 1 in the two years following a randomly assigned date of an IMF loan programme.	Authors
Monetary union	Dummy variable that takes the value of 1 in the five years prior to joining a currency union.	Authors
Financial crisis	Dummy variable that takes the value of 1 in the two years following a systemic banking crisis.	Authors following Laeven and Valencia (2020)
Currency crisis	Dummy variable that takes the value of 1 in the two years following a systemic sovereign debt crisis.	Authors following Laeven and Valencia (2020)
Sovereign debt crisis	Dummy variable that takes the value of 1 in the two years following a systemic sovereign debt crisis.	Authors following Laeven and Valencia (2020)
Inflationary episodes	Dummy variable that takes the value 1 in the two years following an inflation rate higher than 20%.	Authors following Reinhart and Rogoff (2004)
Cabinet change		Banks and Wilson (2021)

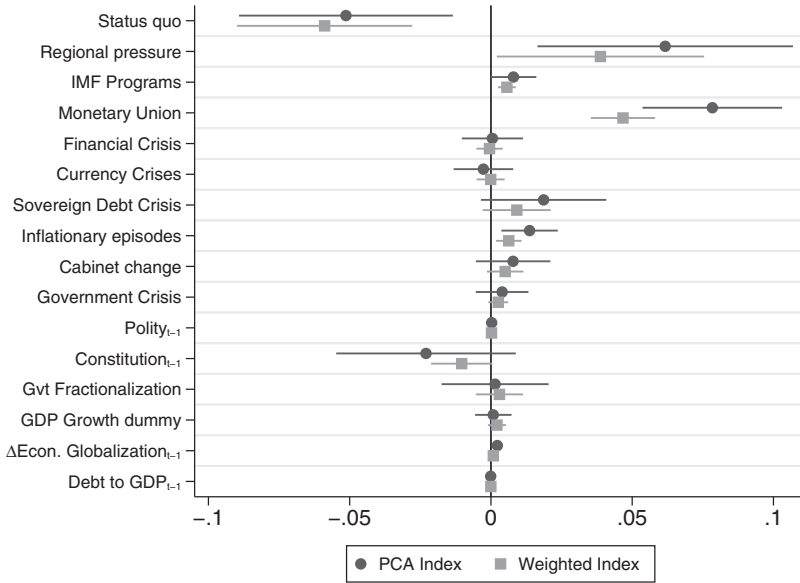
(continued)

Table B.1. Continued

Variable	Definition	Data sources
Government crisis	Dummy that takes the value of 1 if a change of president or prime minister takes place, or at least 50% of the ministers of a cabinet are replaced.	Banks and Wilson (2021)
Government fractionalization	Dummy that takes the value of 1 if a situation which could lead to the downfall of the ruling government takes place in a country.	Cruz <i>et al.</i> (2021)
Polity	Variable that measures the probability that two deputies picked at random from among the government parties will be of different parties.	PolityIV (2018)
Democracy	Index that measures the difference between the democratic and the autocratic score of a country, ranging from +10 (strongly democratic) to -10 (strongly autocratic). Dummy that signals whether country $i$ is a democracy or not (democracy = 1 if Polity has positive values, =0 otherwise).	Authors following Giavazzi and Tabellini (2005) Authors
Democratic reform	Dummy that signals whether country $i$ became a democracy in the current year (where democracy $_t$ = 1 and democracy $_{t-1}$ = 0).	Authors following Agur (2018)
ANationalist index	Variable that captures increases in the Nationalist Index between year $t$ and $t-1$ . The data for the construction of the Nationalist Index are from the World Bank's Database of Political Institutions (DPI) database that identifies a party as nationalist if the 'primary component of its platform is the creation or defence of a national or ethnic identity'. This index is computed as the sum of the following three nationalism dummy variables: 'nationalist chief executive', 'nationalist largest government party' and 'nationalist largest opposition party'.	Authors
Constitution	Dummy that takes the value of 1 if the degree of independence of the central bank is entrenched in the constitution.	Authors
GDP growth dummy	Dummy variable that takes the value of 1 if GDP growth in the last two years has exceeded the average over the last 10 years.	Gygli <i>et al.</i> (2019)
Δ Econ. Globalization	Variable that captures the changes in the KOF Economic Globalization Index between year $t$ and $t-1$ . This index measures the economic, social and political dimensions of globalization.	Abbas <i>et al.</i> (2010) and authors
Debt to GDP	Variable that captures level of gross government debt-to-GDP. Following Abbas <i>et al.</i> (2010), I have updated this measure up until 2017 using the data on Debt to GDP provided in the IMF World Economic Outlook (WEO).	Gwartney (2017) Kaufmann <i>et al.</i> (2010)
ΔEconomic Freedom Rule of law	First difference of the economic freedom index of the Frazer Institute. Variable that reflects perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence.	IMF International Financial Statistics
Reserves to GDP	Variable that captures ratio of Foreign Exchange Reserves of a country scaled by GDP.	

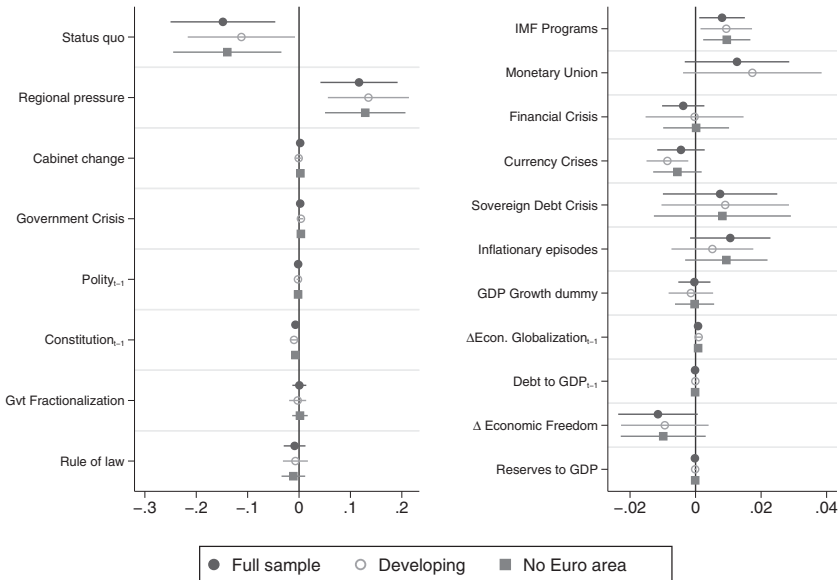
**Table B.2. Summary statistics**

Variable	Number of obs.	Mean	Std. Dev.	Min	Max
CBIE	5,877	0.548	0.173	0.099	0.929
$\Delta$ CBIE	5,801	0.005	0.037	-0.335	0.568
Reform	5,877	0.037	0.189	0	1
Large reform	5,723	0.019	0.138	0	1
Reversal	5,877	0.011	0.105	0	1
Large reversal	5,723	0.005	0.071	0	1
$\Delta$ CBIE board	5,801	0.004	0.041	-0.582	0.809
$\Delta$ CBIE Mon. policy	5,801	0.003	0.041	-0.334	0.8
$\Delta$ CBIE objectives	5,801	0.009	0.08	-0.75	1
$\Delta$ CBIE lending	5,801	0.006	0.065	-0.635	1
$\Delta$ CBIE financial ind.	5,801	0.001	0.016	-0.263	0.472
$\Delta$ CBIE report and disclosure	5,801	0.001	0.024	-0.375	0.5
$\Delta$ GMT	5,801	0.005	0.041	-0.437	0.625
$\Delta$ LVAU	5,801	0.006	0.05	-0.435	0.76
$\Delta$ CWNE	5,801	0.006	0.044	-0.397	0.678
$\Delta$ CBIU	5,801	0.006	0.047	-0.412	0.706
Regional pressure	5,828	0	0.147	-0.395	0.452
Financial crisis	5,877	0.113	0.317	0	1
Currency crises	5,877	0.091	0.287	0	1
Sovereign debt crisis	5,877	0.029	0.167	0	1
Inflationary episodes	5,877	0.143	0.35	0	1
IMF programmes	5,761	0.381	0.486	0	1
Random IMF programmes	5,761	0.311	0.463	0	1
IMF credit/GDP	3,313	0.028	0.044	0	0.47
Monetary union	5,877	0.023	0.149	0	1
Cabinet change	5,514	0.072	0.258	0	1
Government crisis	5,708	0.142	0.434	0	5
Polity	5,355	2.459	7.164	-10	10
Democracy	5,313	0.597	0.491	0	1
Democratic reform	5,296	0.016	0.125	0	1
$\Delta$ Nationalist index	3,716	0.004	0.042	0	0.667
Constitution	5,791	0.079	0.27	0	1
Government fractionalization	4,740	0.214	0.275	0	1
Rule of law	3,197	-0.02	1.027	-2.487	2.06
GDP growth dummy	5,549	0.315	0.464	0	1
$\Delta$ Econ. globalization	5,505	0.547	2.351	-12.816	19.217
Debt to GDP	5,334	55.695	42.633	0.025	523.382
$\Delta$ Economic freedom	2,113	0.02	0.156	-1.331	1.214
Reserves to GDP	5,445	12.102	16.248	0	293.584



**Figure C.1. Drivers of reform: robustness with alternative weights on the CBIE index**

*Notes:* The figure shows the estimated coefficient for regressions run using, as the dependent variable, the changes in a modified version of the CBIE index obtained using two different weighting techniques based on a principal component analysis (PCA Index) and a weighted index (Weighted Index) following [Jacome and Vazquez \(2008\)](#).



**Figure C.2. Additional control variables**

*Notes:* The figure shows the estimated coefficients for regressions run using the changes in the CBIE index as the dependent variable for the full sample of countries (Full sample), developing countries (Developing) only, and excluding countries entering the euro area (No Euro area). Rule of law is the level of the rule of law measure obtained from the World Bank’s Worldwide Governance Indicators. Reserves to GDP is the ratio of a country’s foreign exchange reserves scaled by GDP. ΔEconomic freedom is an index of economic freedom computed by the Fraser Institute.

**Table C.3. Drivers of reforms: Robustness using restricted versions of the CBIE index**

	(1)	(2)	(3)	(4)	(5)	(6)
		Advanced	Developing		Advanced	Developing
Status quo	-0.059*** (0.018)	-0.200** (0.093)	-0.036* (0.020)	-0.052*** (0.018)	-0.170** (0.083)	-0.031 (0.020)
Regional pressure	0.036* (0.021)	-0.126 (0.092)	0.079*** (0.022)	0.047** (0.023)	-0.096 (0.083)	0.089*** (0.024)
IMF programmes	0.005** (0.002)	0.008* (0.004)	0.004** (0.002)	0.005** (0.002)	0.005 (0.005)	0.004** (0.002)
Monetary union	0.042*** (0.006)	0.046*** (0.008)	0.023* (0.013)	0.043*** (0.006)	0.046*** (0.009)	0.023* (0.014)
Financial crisis	-0.002 (0.003)	-0.001 (0.004)	-0.001 (0.003)	-0.001 (0.002)	0.001 (0.004)	0.001 (0.003)
Currency crises	-0.001 (0.002)	0.008 (0.009)	-0.002 (0.003)	-0.001 (0.002)	0.006 (0.010)	-0.001 (0.003)
Sovereign debt crisis	0.009 (0.006)	0.006 (0.006)	0.009 (0.006)	0.009 (0.006)	0.004 (0.006)	0.009 (0.006)
Inflationary episodes	0.006** (0.002)	-0.006 (0.005)	0.005* (0.003)	0.005** (0.002)	-0.007 (0.004)	0.005* (0.003)
Cabinet change	0.005 (0.003)	0.013* (0.007)	0.002 (0.004)	0.004 (0.003)	0.014* (0.007)	0.002 (0.004)
Government crisis	0.002 (0.002)	0.001 (0.003)	0.004 (0.002)	0.002 (0.002)	0.001 (0.003)	0.004 (0.002)
Polity <sub><i>i,t-1</i></sub>	0.001 (0.000)	-0.002 (0.002)	0.001 (0.000)	0.001 (0.000)	-0.001 (0.002)	0.001 (0.000)
Constitution <sub><i>i,t-1</i></sub>	-0.010 (0.007)		-0.009 (0.008)	-0.009 (0.007)		-0.008 (0.007)
Government fractionalization	0.003 (0.004)	-0.015 (0.009)	0.010** (0.005)	0.002 (0.004)	-0.017* (0.010)	0.009* (0.005)
GDP growth dummy	0.001 (0.002)	0.004 (0.003)	0.001 (0.002)	0.002 (0.002)	0.005* (0.003)	0.001 (0.002)
ΔEcon. Globalization <sub><i>i,t-1</i></sub>	0.001** (0.000)	-0.001 (0.001)	0.001** (0.000)	0.001** (0.000)	-0.001 (0.001)	0.001** (0.000)
Debt to GDP <sub><i>i,t-1</i></sub>	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)	0.001 (0.000)	-0.001 (0.000)
Observations	3,886	1,044	2,842	3,886	1,044	2,842
Number of countries	133	33	108	133	33	108
R-squared	0.118	0.336	0.106	0.116	0.307	0.106

*Notes:* The dependent variable is the change in the indices of CBI,  $\Delta\text{CBI}_{i,t}$ . In Columns (1)–(3), I focus on a restricted version of the CBIE index which only employs the first four dimensions of the index, that is, board, monetary policy, objectives and lending. In Columns (4)–(6), the CBIE index is recomputed excluding the sub-category of the degree of central bank involvement in banking supervision. *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF programmes* is a dummy equal to 1 in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. *Financial, Currency and Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year  $t$ . *Cabinet change* is a dummy that takes the value of 1 if a change of president or prime minister, or a replacement of at least 50% of the ministers takes place in year  $t$ . *Government crisis* is a dummy equal to 1 if a situation that threatens to bring the downfall of the present government happens in year  $t$ . *Polity* is the Polity2 index of democracy. *Constitution* is a dummy equal to 1 if CBI is entrenched in the country's constitution. *Government Fractionalization* is a measure of the fragmentation of the government. *GDP growth dummy* is a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years. *ΔEcon. globalization* is the change in the KOF Economic Globalization Index. *Debt to GDP* is the Debt-to-GPD ratio of a country. In Columns (2) and (5), the sample is restricted to advanced economies, while it focuses on developing countries in Columns (3) and (6). Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

**Table C.4. Drivers of reforms: Robustness using alternative CBI indices**

	(1) GMT	(2) CWN	(3) CWNE	(4) CBIU
Status quo	-0.044** (0.017)	-0.049** (0.021)	-0.053*** (0.018)	-0.049** (0.020)
Regional pressure	0.041** (0.020)	0.053** (0.024)	0.045** (0.022)	0.051** (0.023)
IMF programmes	0.006*** (0.002)	0.008*** (0.002)	0.006*** (0.002)	0.007*** (0.002)
Monetary union	0.052*** (0.007)	0.053*** (0.009)	0.049*** (0.007)	0.051*** (0.008)
Financial crisis	-0.002 (0.003)	-0.001 (0.004)	0.001 (0.003)	-0.001 (0.003)
Currency crises	0.001 (0.003)	0.001 (0.004)	-0.001 (0.003)	0.001 (0.004)
Sovereign debt crisis	0.007 (0.006)	0.009 (0.009)	0.009 (0.007)	0.008 (0.008)
Inflationary episodes	0.005** (0.003)	0.008** (0.003)	0.005** (0.003)	0.007** (0.003)
Cabinet change	0.004 (0.003)	0.005 (0.005)	0.004 (0.004)	0.005 (0.004)
Government crisis	0.002 (0.002)	0.004 (0.003)	0.002 (0.002)	0.004 (0.002)
Polity <sub><i>i,t-1</i></sub>	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Constitution <sub><i>i,t-1</i></sub>	-0.016*** (0.004)	-0.010* (0.006)	-0.010 (0.007)	-0.010* (0.006)
Government fractionalization	0.001 (0.005)	0.003 (0.006)	0.002 (0.005)	0.003 (0.006)
GDP growth dummy	0.002 (0.002)	0.003 (0.002)	0.002 (0.002)	0.003 (0.002)
$\Delta$ Econ. Globalization <sub><i>i,t-1</i></sub>	0.001 (0.000)	0.001 (0.000)	0.001* (0.000)	0.001 (0.000)
Debt to GDP <sub><i>i,t-1</i></sub>	-0.001* (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)
Observations	3,886	3,886	3,886	3,886
Number of countries	133	133	133	133
R-squared	0.117	0.106	0.115	0.108

*Notes:* The dependent variable is the change in the indices of CBI,  $\Delta$ CBI<sub>*i,t*</sub>. These alternative measures are the GMT (Grilli *et al.*, 1991), CWN (Cukierman, 1992), CWNE (Jacome and Vazquez, 2008) and CBIU (Dincer and Eichengreen, 2014) indices of CBI. *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF programmes* are a dummy equal to 1 in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. *Financial*, *Currency* and *Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year *t*. *Cabinet change* is a dummy that takes the value of 1 if a change of president or prime minister, or a replacement of at least 50% of the ministers takes place in year *t*. *Government crisis* is a dummy equal to 1 if a situation that threatens to bring the downfall of the present government happens in year *t*. *Polity* is the Polity2 index of democracy. *Constitution* is a dummy equal to 1 if CBI is entrenched in the country's constitution. *Government Fractionalization* is a measure of the fragmentation of the government. *GDP growth dummy* is a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years.  $\Delta$ Econ. Globalization is the change in the KOF Economic Globalization Index. *Debt to GDP* is the debt-to-GPD ratio of a country. Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.



**Table C.5. Drivers of reforms in central bank design: Robustness with interaction terms**

	(1)	(2)	(3)	(4)	(5)	(6)
			Developing			Developing
Status quo	-0.030** (0.013)	-0.046*** (0.017)	-0.021 (0.025)	-0.020 (0.020)	-0.019 (0.026)	-0.021 (0.027)
Polity <sub>i,t-1</sub> × Status quo				-0.002 (0.002)	-0.003 (0.002)	-0.004 (0.003)
Regional pressure	0.086*** (0.023)	0.091*** (0.029)	0.138*** (0.039)	0.059*** (0.022)	0.078*** (0.029)	0.089*** (0.029)
Status quo × Regional pressure	-0.081*** (0.027)	-0.099*** (0.036)	-0.104** (0.044)			
Polity <sub>i,t-1</sub> × Regional pressure				-0.001 (0.002)	-0.003 (0.003)	-0.001 (0.004)
IMF programmes	0.013*** (0.005)	0.020*** (0.006)	0.017** (0.008)	0.004*** (0.001)	0.005** (0.002)	0.004* (0.002)
Status quo × IMF programmes	-0.018*** (0.007)	-0.028*** (0.009)	-0.024* (0.012)			
Polity <sub>i,t-1</sub> × IMF programmes				0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Monetary union	0.168*** (0.028)	0.153*** (0.025)	0.475*** (0.120)	-0.163* (0.090)	-0.169 (0.117)	-0.251*** (0.090)
Status quo × Monetary union	-0.186*** (0.035)	-0.167*** (0.031)	-0.565*** (0.145)			
Polity <sub>i,t-1</sub> × Monetary union				0.021** (0.009)	0.022* (0.012)	0.029*** (0.010)
Polity <sub>i,t-1</sub>				0.001 (0.001)	0.002 (0.001)	0.002 (0.001)
Controls						
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
$\phi^{Crisis}$		Yes	Yes		Yes	Yes
$\phi^{Politics}$		Yes	Yes		Yes	Yes
$\phi^{Economic}$		Yes	Yes		Yes	Yes
Observations	5,592	3,886	2,842	5,115	3,886	2,842
Number of countries	151	133	108	137	133	108
R-squared	0.115	0.132	0.129	0.102	0.121	0.111

Notes: The dependent variable is  $\Delta CBIE_{i,t}$ . *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF programmes* is a dummy equal to 1 in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. The  $\phi^{Crisis}$ ,  $\phi^{Politics}$  and  $\phi^{Economic}$  controls refer to the crisis, political and economic control variables, respectively. In Columns (3) and (6), the sample is restricted to developing countries only. Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

**Table C.6. Drivers of reforms in central bank design: Size of IMF loan to GDP**

	(1)	(2) Developing	(3)	(4) Developing
Status quo	-0.037 (0.024)	-0.037 (0.027)	-0.054*** (0.018)	-0.037* (0.020)
Regional pressure	0.086*** (0.027)	0.084*** (0.029)	0.043* (0.022)	0.080*** (0.023)
IMF credit/GDP	0.085*** (0.032)	0.085*** (0.032)		
Random IMF programmes			0.001 (0.002)	0.001 (0.002)
Monetary union			0.041*** (0.006)	0.021 (0.014)
Financial crisis	0.002 (0.003)	0.001 (0.003)	-0.001 (0.002)	0.002 (0.003)
Currency crises	0.001 (0.003)	0.001 (0.003)	-0.001 (0.002)	-0.001 (0.003)
Sovereign debt crisis	0.010 (0.007)	0.010 (0.007)	0.009 (0.006)	0.009 (0.006)
Inflationary episodes	0.006** (0.003)	0.006** (0.003)	0.005** (0.002)	0.005* (0.003)
Cabinet change	0.002 (0.004)	0.001 (0.004)	0.005 (0.003)	0.002 (0.004)
Government crisis	0.005* (0.002)	0.005* (0.003)	0.002 (0.002)	0.004 (0.002)
Polity <sub><i>i,t-1</i></sub>	-0.001 (0.000)	-0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Constitution <sub><i>i,t-1</i></sub>	-0.007 (0.007)	-0.007 (0.007)	-0.009 (0.006)	-0.008 (0.007)
Government fractionalization	0.010** (0.005)	0.009* (0.005)	0.003 (0.004)	0.010** (0.005)
GDP growth dummy	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
$\Delta$ Econ. Globalization <sub><i>i,t-1</i></sub>	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Debt to GDP <sub><i>i,t-1</i></sub>	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)	-0.001 (0.000)
Observations	2,363	2,314	3,886	2,842
Number of countries	85	84	133	108
R-squared	0.117	0.117	0.117	0.106

*Notes:* The dependent variable is  $\Delta$ CBIE<sub>*i,t*</sub>. *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF credit/GDP* is the average ratio of IMF loans over the last two years over GDP. *Random IMF programmes* is a dummy that takes the value 1 in the two years following a randomly assigned date of an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. *Financial*, *Currency*, *Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year *t*. *Cabinet change* is a dummy that takes the value of 1 if a change of president or prime minister, or a replacement of at least 50% of the ministers takes place in year *t*. *Government crisis* is a dummy equal to 1 if a situation that threatens to bring the downfall of the present government happens in year *t*. *Polity* is the Polity2 index of democracy. *Constitution* is a dummy equal to 1 if CBI is entrenched in the country's constitution. *Government Fractionalization* is a measure of the fragmentation of the government. *GDP growth dummy* is a dummy equal to 1 if GDP growth in the last two years has exceeded the average over the last 10 years.  *$\Delta$ Econ. Globalization* is the change in the KOF Economic Globalization Index. *Debt to GDP* is the debt-to-GDP ratio of a country. In Columns (2) and (4), the sample is restricted to developing countries only. Country- and year-fixed effects are included. Robust standard errors in parentheses, adjusted for clustering by country. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

**Table C.7. Drivers of reforms in a dynamic spatial panel estimation**

	Level model: $CBIE_{it}$			Spatial first-difference		
				$\Delta CBIE_{it}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$CBIE_{i,t-1}$	1.028*** (0.006)	1.012*** (0.006)	1.023*** (0.006)	-0.025 (0.016)	-0.025 (0.016)	-0.025 (0.016)
$W CBIE_t$	4.186*** (0.166)	2.463*** (0.169)	3.847*** (0.181)	0.395** (0.166)	0.402** (0.169)	0.517*** (0.182)
$W CBIE_{t-1}$	-2.053*** (0.112)	-1.208*** (0.109)	-1.710*** (0.111)	0.057 (0.111)	0.061 (0.108)	0.066 (0.110)
IMF programmes	0.003 (0.002)	0.003* (0.002)	0.003 (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)
Monetary union	0.056*** (0.004)	0.055*** (0.004)	0.055*** (0.004)	0.057*** (0.004)	0.057*** (0.004)	0.056*** (0.004)
Financial crisis	-0.004** (0.002)	-0.004* (0.002)	-0.005** (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.003 (0.002)
Currency crises	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
Sovereign debt crises	0.008** (0.003)	0.007* (0.003)	0.008** (0.003)	0.005 (0.004)	0.005 (0.004)	0.005 (0.004)
Inflationary episodes	0.004** (0.002)	0.004* (0.002)	0.005** (0.002)	0.003 (0.002)	0.003 (0.002)	0.003 (0.002)
Observations	3,740	3,740	3,740	3,740	3,740	3,740
Number of countries	85	85	85	85	85	85
$p$ -Value of Wald-test for spatial unit root	0.00	0.00	0.00	NR	NR	NR

*Notes:* The dependent variable is the  $CBIE_{i,t}$  index in Columns (1)–(3) and  $\Delta CBIE_{i,t}$  in (4)–(6).  $W$  is a spatial weight matrix based on inverse distances with a cut-off point at 2,000 in Columns (1) and (4), 4,000 km in Columns (2) and (5) and 6,000 km in Columns (3) and (6), respectively. Regional pressure variables in Columns (4)–(6) are in first difference. *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of  $CBIE$  in the region minus the country's level. *Financial*, *Currency* and *Sovereign Debt Crisis* are dummy variables equal to 1 in the two years following a systemic banking, currency or sovereign debt crisis. *Inflationary episodes* is a dummy equal to 1 if annual inflation rates higher than 20% are registered in the two years prior to a reform in year  $t$ . *IMF programmes* is a dummy equal to 1 in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. Time dummies are included. Standard errors in parentheses. NR, not relevant. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

**Table C.8. Drivers of reforms in central bank design: Logit and cloglog estimations**

	Logit			Complementary logarithmic model		
	(1)	(2) Advanced	(3) Developing	(4)	(5) Advanced	(6) Developing
Status quo	-7.635*** (2.071)	-19.340** (9.456)	-6.830** (3.284)	-7.238*** (1.949)	-16.743** (8.132)	-6.627** (3.028)
Regional pressure	-2.485 (2.131)	-13.188 (9.084)	-1.246 (3.336)	-2.540 (2.020)	-10.914 (7.856)	-1.572 (3.089)
IMF programmes	0.483* (0.252)	-0.090 (0.778)	0.537* (0.299)	0.402* (0.233)	0.042 (0.657)	0.460* (0.276)
Monetary union	1.781*** (0.372)	2.438*** (0.724)	1.140* (0.692)	1.621*** (0.340)	2.315*** (0.632)	0.976 (0.616)
Financial crisis	0.524** (0.243)	0.999* (0.539)	0.595** (0.300)	0.447** (0.225)	0.919* (0.480)	0.561** (0.276)
Currency crises	0.338 (0.299)	-0.188 (1.056)	0.472 (0.324)	0.242 (0.275)	-0.120 (0.972)	0.366 (0.298)
Sovereign debt crisis	-0.385 (0.531)		-0.280 (0.554)	-0.291 (0.487)		-0.169 (0.508)
Inflationary episodes	0.169 (0.313)	-1.169 (1.133)	0.076 (0.367)	0.183 (0.290)	-0.867 (1.021)	0.113 (0.338)
Controls:						
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
$\phi^{\text{Crisis}}$	Yes	Yes	Yes	Yes	Yes	Yes
$\phi^{\text{Politics}}$	Yes	Yes	Yes	Yes	Yes	Yes
$\phi^{\text{Economic}}$	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,202	643	2,142	3,202	643	2,142
Number of countries	151	133	108	137	133	108

*Notes:* The dependent variable is a dummy variable taking value 1 in the year in which a change to the CBIE index took place. *Status quo* is the lag of the dependent variable, while *Regional pressure* is computed as the average level of CBIE in the region minus the country's level. *IMF programmes* is a dummy equal to 1 in the two years following an IMF loan programme. *Monetary union* is a dummy variable that takes value 1 in the five years prior to joining a currency union. The  $\phi^{\text{Crisis}}$ ,  $\phi^{\text{Politics}}$  and  $\phi^{\text{Economic}}$  controls refer to the crisis, political and economic control variables, respectively. In Columns (2) and (5), the sample is restricted to advanced economies, while it focuses on developing countries Columns (3) and (6). Country- and year-fixed effects are included. Robust standard errors in parentheses. \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% levels, respectively.

## SUPPLEMENTARY DATA

Supplementary data are available at *Economic Policy* online.

## CONFLICT OF INTEREST

The author has NO affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

## REFERENCES

- Abbas, S., N. Belhocine, A.A. ElGanainy and M. Horton (2010). 'A Historical Public Debt Database', IMF Working Paper No. 10/245.
- Abiad, A. and A. Mody (2005). 'Financial reform: What shakes it? What shapes it?', *American Economic Review*, 95, 66–88.
- Acemoglu, D., S. Johnson, P. Querubin and J.A. Robinson (2008). 'When does policy reform work? The case of central bank independence', *Brookings Papers on Economic Activity*, 2008, 351–418.
- Acemoglu, D., S. Naidu, P. Restrepo and J.A. Robinson (2019). 'Democracy does cause growth', *Journal of Political Economy*, 127, 47–100.
- Aghion, P., A. Alesina and F. Trebbi (2004). 'Endogenous political institutions', *The Quarterly Journal of Economics*, 119, 565–611.
- Agur, I. (2018). 'Populism and central bank independence: Comment', *Open Economies Review*, 29, 687–93.
- Alesina, A., S. Ardagna and F. Trebbi (2006). 'Who adjusts and when? The political economy of reforms', *IMF Staff Papers*, 53, 1–29.
- Alesina, A. and A. Drazen (1991). 'Why are stabilizations delayed?', *American Economic Review*, 81, 1170–88.
- Alesina, A. and N. Roubini (1992). 'Political cycles in OECD economies', *The Review of Economic Studies*, 59, 663–88.
- Alesina, A. and A. Stella (2010). 'The politics of monetary policy', in B. M. Friedman and M. Woodford (eds.), *Handbook of Monetary Economics*, Vol. 3, pp. 1001–54, Elsevier.
- Alesina, A. and L.H. Summers (1993). 'Central bank independence and macroeconomic performance: Some comparative evidence', *Journal of Money, Credit and Banking*, 25, 151–62.
- Alesina, A.F., D. Furceri, J.D. Ostry, C. Papageorgiou and D.P. Quinn (2020). 'Structural reforms and elections: Evidence from a world-wide new dataset', Technical report, National Bureau of Economic Research.
- Allison, P.D. (2009). *Fixed Effects Regression Models*, SAGE Publications.
- Arnone, M., B.J. Laurens and J.-F. Segalotto (2006). 'The measurement of central bank autonomy: Survey of models, indicators, and empirical evidence', IMF Working Papers 06/227.
- Arnone, M., B.J. Laurens, J.-F. Segalotto and M. Sommer (2009). 'Central bank autonomy: Lessons from global trends', *IMF Staff Papers*, 56, 263–96.
- Arnone, M. and D. Romelli (2013). 'Dynamic central bank independence indices and inflation rate: A new empirical exploration', *Journal of Financial Stability*, 9, 385–98.
- Banks, A.S. and K.A. Wilson (2021). *Cross-National Time-Series Data Archive. Databanks International*, Jerusalem, Israel. see <https://www.cntsdata.com/>.
- Beck, N. (2020). 'Estimating grouped data models with a binary-dependent variable and fixed effects via a logit versus a linear probability model: The impact of dropped units', *Political Analysis*, 28, 139–45.
- Berggren, N., S.-O. Daunfeldt and J. Hellstrom (2016). 'Does social trust speed up reforms? The case of central-bank independence', *Journal of Institutional Economics*, 12, 395–415.
- Bhargava, A., L. Franzini and W. Narendranathan (1982). 'Serial correlation and the fixed effects model', *The Review of Economic Studies*, 49, 533–49.

- Binder, C.C. (2021). 'Political pressure on central banks', *Journal of Money, Credit and Banking*, 53, 715–44.
- Blanchard, O. and J. Pisany-Ferri (2020). Monetisation: Do not panic. VoxEU.org.
- Bodea, C. and R. Hicks (2015a). 'International finance and central bank independence: Institutional diffusion and the flow and cost of capital', *The Journal of Politics*, 77, 268–84.
- (2015b). 'Price stability and central bank independence: Discipline, credibility, and democratic institutions', *International Organization*, 69, 35–61.
- Campillo, M. and J.A. Miron (1997). 'Why does inflation differ across countries?', in C. Romer and D. Romer (eds.), *Reducing Inflation: Motivation and Strategy*, NBER Chapters, pp. 335–62, National Bureau of Economic Research, Inc.
- Crowe, C. and E.E. Meade (2007). 'The evolution of central bank governance around the world', *Journal of Economic Perspectives*, 21, 69–90.
- (2008). 'Central bank independence and transparency: Evolution and effectiveness', *European Journal of Political Economy*, 24, 763–77.
- Cruz, C., P. Keefer and C. Scartascini (2021). 'The database of political institutions 2020', Inter-American Development Bank: Washington, DC, USA.
- Cukierman, A. (1992). *Central Bank Strategy, Credibility, and Independence: Theory and Evidence*, The MIT Press.
- (2008). 'Central bank independence and monetary policymaking institutions—past, present and future', *European Journal of Political Economy*, 24, 722–36.
- Cukierman, A., G.P. Miller and B. Neyapti (2002). 'Central bank reform, liberalization and inflation in transition economies—an international perspective', *Journal of Monetary Economics*, 49, 237–64.
- Cukierman, A., S.B. Webb and B. Neyapti (1992). 'Measuring the independence of central banks and its effect on policy outcomes', *The World Bank Economic Review*, 6, 353–98.
- de Haan, J., C. Bodea, R. Hicks and S.C. Eijffinger (2018). 'Central bank independence before and after the crisis', *Comparative Economic Studies*, 60, 183–202.
- de Haan, J. and S. Eijffinger (2019). 'The politics of central bank independence', in R. D. Congleton, B. Grofman, and S. Voigt (eds.), *The Oxford Handbook of Public Choice*, Oxford University Press.
- de Haan, J. and G. van't Hag (1995). 'Variation in central bank independence across countries: Some provisional empirical evidence', *Public Choice*, 85, 335–51.
- de Jong, E. (2002). 'Why are price stability and statutory independence of central banks negatively correlated? The role of culture', *European Journal of Political Economy*, 18, 675–94.
- Dincer, N.N. and B. Eichengreen (2014). 'Central bank transparency and independence: Updates and new measures', *International Journal of Central Banking*, 10, 189–259.
- Drazen, A. (2000). *Political Economy in Macro Economics*, Princeton University Press.
- Dreher, A. (2006). 'IMF and economic growth: The effects of programs, loans, and compliance with conditionality', *World Development*, 34, 769–88.
- Dreher, A., J.-E. Sturm and J. de Haan (2008). 'Does high inflation cause central bankers to lose their job? Evidence based on a new data set', *European Journal of Political Economy*, 24, 778–87.
- Eijffinger, S. and J. de Haan (1996). 'The political economy of central-bank independence', *International Finance*, 19, 1–92.
- Elhorst, P., E. Zandberg and J. de Haan (2013). 'The impact of interaction effects among neighbouring countries on financial liberalization and reform: A dynamic spatial panel data approach', *Spatial Economic Analysis*, 8, 293–313.
- Fernandez, R. and D. Rodrik (1991). 'Resistance to reform: Status quo bias in the presence of individual-specific uncertainty', *American Economic Review*, 81, 1146–55.
- Forder, J. (1998). 'The case for an independent European central bank: A reassessment of evidence and sources', *European Journal of Political Economy*, 14, 53–71.
- Galí, J. (2020a). 'The effects of a money-financed fiscal stimulus', *Journal of Monetary Economics*, 115, 1–19.
- (2020b). Helicopter money: The time is now. VoxEU.org.
- Garriga, A.C. (2016). 'Central bank independence in the world: A new data set', *International Interactions*, 42, 849–68.
- Giavazzi, F. and G. Tabellini (2005). 'Economic and political liberalizations', *Journal of Monetary Economics*, 52, 1297–330.

- Giesenow, F.M., J. de Wit and J. de Haan (2020). 'The political and institutional determinants of fiscal adjustments and expansions: Evidence for a large set of countries', *European Journal of Political Economy*, 64, 101911.
- Giuliano, P., P. Mishra and A. Spilimbergo (2013). 'Democracy and reforms: Evidence from a new dataset', *American Economic Journal: Macroeconomics*, 5, 179–204.
- Gokmen, G., T. Nannicini, M.G. Onorato and C. Papageorgiou (2021). 'Policies in hard times: Assessing the impact of financial crises on structural reforms', *The Economic Journal*, 131, 2529–52.
- Grilli, V., D. Masciandaro and G. Tabellini (1991). 'Political and monetary institutions and public financial policies in the industrial countries', *Economic Policy*, 6, 342–92.
- Gutierrez, E. (2003). 'Inflation performance and constitutional central bank independence', *IMF Working Papers*, 03.
- Gwartney, J. (2017). *Economic Freedom of the World*, The Fraser Institute.
- Gygli, S., F. Haelg, N. Potrafke and J.-E. Sturm (2019). 'The KOF globalisation index—revisited', *The Review of International Organizations*, 14, 543–74.
- Haan, J., S.C. Eijffinger and S. Waller (2005). *The European Central Bank: Centralization, Transparency, and Credibility*, MIT Press.
- Hayo, B. (1998). 'Inflation culture, central bank independence and price stability', *European Journal of Political Economy*, 14, 241–63.
- Hodgson, C., V. Romei and N. Thomas (2021). *Bank of England Given New Mandate to Buy 'Green' Bonds*. Available online: <https://www.ft.com/content/f436d69b-2bf0-48cd-bb34-644856fba17f>.
- Ioannidou, V.P. (2005). 'Does monetary policy affect the central bank's role in bank supervision?', *Journal of Financial Intermediation*, 14, 58–85.
- Jacome, L. and F. Vazquez (2008). 'Is there any link between legal central bank independence and inflation? Evidence from Latin America and the Caribbean', *European Journal of Political Economy*, 24, 788–801.
- Kaufmann, D., A. Kraay and M. Mastruzzi (2010). 'The worldwide governance indicators: Methodology and analytical issues', Policy Research Working Paper Series 5430, The World Bank.
- Keefer, P. and D. Stasavage (2003). 'The limits of delegation: Veto players, central bank independence, and the credibility of monetary policy', *American Political Science Review*, 97, 407–23.
- Kern, A., B. Reinsberg and M. Rau-Göhring (2019). 'IMF conditionality and central bank independence', *European Journal of Political Economy*, 59, 212–29.
- Klomp, J. and J. de Haan (2010). 'Inflation and central bank independence: A meta-regression analysis', *Journal of Economic Surveys*, 24, 593–621.
- Laeven, L. and F. Valencia (2020). 'Systemic banking crises database II', *IMF Economic Review*, 1–55.
- Lagarde, C. (2021). 'Climate change and central banking'. Technical report, Keynote speech at the ILF conference on Green Banking and Green Central Banking.
- Lavigne, R. (2011). 'The political and institutional determinants of fiscal adjustment: Entering and exiting fiscal distress', *European Journal of Political Economy*, 27, 17–35.
- Lybek, T. (1999). 'Central bank autonomy, and inflation and output performance in the Baltic States, Russia, and other countries of the Former Soviet Union, 1995–1997', *IMF Working Papers*, 99/4.
- Mangano, G. (1998). 'Measuring central bank independence: A tale of subjectivity and of its consequences', *Oxford Economic Papers*, 50, 468–92.
- Masciandaro, D. and F. Passarelli (2019). 'Populism, political pressure and central bank (in) dependence', *Open Economies Review*, 1–15.
- Masciandaro, D., M. Quintyn and M.W. Taylor (2008). 'Inside and outside the central bank: Independence and accountability in financial supervision: trends and determinants', *European Journal of Political Economy*, 24, 833–48.
- Masciandaro, D. and D. Romelli (2015). 'Ups and downs. Central bank independence from the great inflation to the great recession: Theory, institutions and empirics', *Financial History Review*, 22, 259–89.
- (2018). 'Central bankers as supervisors: Do crises matter?', *European Journal of Political Economy*, 52, 120–40.

- (2019). ‘Peaks and troughs: Economics and political economy of central bank independence cycles’, in D. G. Mayes, P. L. Siklos, and J. Sturm (eds.), *Handbook on the Economics of Central Banking*, Oxford University Press, Forthcoming.
- Mian, A., A. Sufi and F. Trebbi (2014). ‘Resolving debt overhang: Political constraints in the aftermath of financial crises’, *American Economic Journal: Macroeconomics*, 6, 1–28.
- Mierau, J.O., R. Jong-A-Pin and J. De Haan (2007). ‘Do political variables affect fiscal policy adjustment decisions? New empirical evidence’, *Public Choice*, 133, 297–319.
- Milton, S. and P. Sinclair (2010). *The Capital Needs of Central Banks*, Routledge.
- Moser, P. (1999). ‘Checks and balances, and the supply of central bank independence’, *European Economic Review*, 43, 1569–93.
- Oatley, T. (1999). ‘Central bank independence and inflation: Corporatism, partisanship, and alternative indices of central bank independence’, *Public Choice*, 98, 399–413.
- Obstfeld, M., J.C. Shambaugh and A.M. Taylor (2010). ‘Financial stability, the trilemma, and international reserves’, *American Economic Journal: Macroeconomics*, 2, 57–94.
- Peek, J., E.S. Rosengren and G.M.B. Tootell (1999). ‘Is bank supervision central to central banking?’, *The Quarterly Journal of Economics*, 114, 629–53.
- Peia, O. and D. Romelli (2019). ‘Central bank reforms and institutions’, Technical report, ifo Institute.
- Polillo, S. and M.F. Guillén (2005). ‘Globalization pressures and the state: The worldwide spread of central bank independence’, *American Journal of Sociology*, 110, 1764–802.
- PolityIV. (2018). *Polity IV Project: Political Regime Characteristics and Transitions, 1800–2017*. Center for Systemic Peace, Vienna.
- Posen, A.S. (1995). ‘Declarations are not enough: financial sector sources of central bank independence’, in *NBER Macroeconomics Annual 1995*, Vol. 10, NBER Chapters, pp. 253–74, National Bureau of Economic Research, Inc.
- Reinhart, C.M. and K.S. Rogoff (2004). ‘The modern history of exchange rate arrangements: A reinterpretation’, *The Quarterly Journal of Economics*, 119, 1–48.
- Reis, R. (2013). ‘Central bank design’, *Journal of Economic Perspectives*, 27, 17–44.
- Rode, M. and J.D. Gwartney (2012). ‘Does democratization facilitate economic liberalization?’, *European Journal of Political Economy*, 28, 607–19.
- Rodrik, D. and W. Bank (2006). ‘Goodbye Washington consensus, hello Washington confusion? A review of the World Bank’s economic growth in the 1990s: Learning from a decade of reform’, *Journal of Economic Literature*, 44, 973–87.
- Schnabel, I. (2020). ‘The shadow of fiscal dominance: Misconceptions, perceptions and perspectives’, Speech at the Centre for European Reform and the Eurofi Financial Forum on “Is the current ECB monetary policy doing more harm than good and what are the alternatives?”
- Siklos, P.L. (2008). ‘No single definition of central bank independence is right for all countries’, *European Journal of Political Economy*, 24, 802–16.
- Simmons, B.A. and Z. Elkins (2004). ‘The globalization of liberalization: Policy diffusion in the international political economy’, *American Political Science Review*, 98, 171–89.
- Smets, F. (2014). ‘Financial stability and monetary policy: How closely interlinked?’, *International Journal of Central Banking*, 10, 263–300.
- Stella, P. (2010). ‘Central bank financial strength and macroeconomics policy performance’, in S. Milton and P. Sinclair (eds.), *The Capital Needs of Central Banks*, Routledge.
- The Economist (2019). *The Independence of Central Banks Is under Threat from Politics*. Available online: <https://www.economist.com/leaders/2019/04/13/the-independence-of-central-bank-sbaban-banks-nks-is-under-threat-from-politics>.
- Walsh, C.E. (2010). ‘Central bank independence’, in S. N. Durlauf and L. E. Blume (eds.), *Monetary Economics*, pp. 21–6, Springer.