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**Stepping up during elections:
Independent central banks and inflation**

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Abstract: It has been argued that elections should affect inflation, but evidence thus far has not incontrovertibly shown such an effect. We argue that monetary institutions offset inflationary pressures originated by the electoral cycle. Delegation of monetary policy to independent central banks curbs politically induced inflationary pressures. The anti-inflationary effects of central bank independence depend on the governments' incentives to boost the economy, a root of inflationary pressures. Those incentives are stronger in election years, especially when there is uncertainty about the electoral results. Independent central banks are better suited to counter inflation under those circumstances. Statistical analyses on a sample of 143 developing countries between 1980 and 2012 show that the anti-inflationary effects of central bank independence are larger during election years, and when elections are more contested. These results are robust to alternative model specifications and estimation techniques.

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In developing countries, governments are often reproached for their pre-electoral behavior that results in higher inflation. Electorally motivated fiscal spending, vote buying, or simply money printing (Pourcelot 2015) originate inflationary pressures on central banks pursuing monetary stability. For example, Myanmar's rising deficit and inflation were directly blamed on the 2015 election needs of the incumbent. This worried IMF economists regarding the central bank's ability to moderate the inflationary splurge (Kyaw 2015). The Financial Times reported that 2011 elections in Thailand increased inflation, forcing the central bank to move "aggressively to keep it under control" (Johnston 2011). Similarly, the Central Bank of Kenya had to "mop excess cash in the economy" because of formal and informal spending – voter bribing – related to the elections (Ramogi 2017). Beyond anecdotes, it is assumed that incumbents will use all the tools at their disposal to win elections, and those tools are likely to generate inflation. However, there is little evidence regarding any effect of opportunistic electoral behavior on inflation. In this paper, we analyze to what extent independent central banks are successful in countering inflationary pressures originated in election years.

Does central bank independence offset inflationary pressures originated by the electoral cycle? The ability of the central bank to design and implement monetary policy free from political influences – central bank independence – is a key instrument devised to control inflation (Goodfriend 2007). Shielded from political pressures, central bankers can pursue more conservative policies. Thus, independent central banks should be better equipped to smooth politically-induced inflationary cycles. In this paper we show this effect: during election times, when incumbents have increased incentives to enact policies with inflationary effects, central bank independence has stronger anti-inflationary effects.

Our paper addresses two important discussions in the literature: the effects of central bank independence, and the existence and extent of opportunistic political cycles. On the one hand, the literature suggests that delegation of monetary policy to an independent central bank

should solve the time-inconsistency problem, and curb politically induced inflationary pressures (Barro 1986, Barro and Gordon 1983a, b, Kydland and Prescott 1977, Rogoff 1985). However, there is mixed evidence regarding the existence and magnitude of such effects, especially in developing countries. On the other hand, the literature on the political business cycle expects electorally-induced inflation cycles (Nordhaus 1975). However, there is weak evidence regarding inflationary cycles associated with elections (Abrams and Iossifov 2006, Funashima 2016, Lewis-Beck 1988).¹

We argue that these inconsistencies between theoretical expectations and evidence may result both from an incomplete consideration of the governments' *incentives* and *ability* to use monetary policy, and from a selection bias associated with the sample size. This article deals with both issues. First, on the theory side, we analyze the effect of elections on inflation within the framework of domestic and international constraints to the government's *ability* to affect monetary outcomes. We argue that independent central banks curb directly and indirectly the inflationary effects of political decisions. Independent central banks directly limit the government's ability to use monetary policy – and thus, inflation – and, indirectly, they can counter fiscal policy's inflationary effects. Independent central banks' anti-inflationary effects should especially make a difference when governments have more *incentives* to enact monetary or fiscal policies that generate inflation. In election years, and particularly, when there is more uncertainty about the election's results, incumbents are more inclined to boost the economy, even if that generates inflation. In those circumstances central bank independence should matter more, smoothing electorally-induced inflation cycles. This would explain why analyses that do consider central bank independence fail to find opportunistic inflationary cycles, and why studies

¹ As discussed below, there is evidence of an opportunistic cycle in the use of monetary and fiscal instruments, not in inflation as an outcome.

that do not accounting for electoral incentives find weak effects of central bank independence on inflation.

Second, on the empirical side, we test our argument on a sample of 143 developing countries between 1980 and 2012. This is the largest sample used in studies of the anti-inflationary effects of central bank independence thanks to new data on central bank independence (Garriga 2016), on a country-year basis.² This sample allows us to test the general relationship between central bank independence and inflation with reduced concerns regarding selection bias, and permits analyzing this relationship during election and non-election years.

Our findings contribute to three literatures. First, they extend the literature on political business cycles, suggesting the need to account for monetary constraints to the incumbents' ability to manipulate the economy to identify inflationary cycles. Second, they contribute to the literature on the effects of central bank independence. We show that delegation to central banks has different effects depending on governments' incentives to use monetary policy for electoral purposes. Furthermore, our findings broaden the scope of application of the literature on central bank independence. We find that, although institutional constraints affect the anti-inflationary effects of central bank independence, these effects exceed a small group of democracies. Monetary commitments seem to tame inflationary incentives in an important group of non-democratic regimes. Third, our research speaks not only to the literature on delegation and central bank independence, but also to the literature on the effects of institutions in authoritarian regimes.

² The largest study published on this matter covered 72 countries, between 1972 and 2008 (Bodea and Hicks 2015b).

Central bank independence and inflation

There is a prevalent policy consensus around the convenience of granting independence to central banks to control inflation. The theoretical framework for this policy advice comes mainly from the work of Kydland and Prescott (1977), who propose delegation of monetary decisions to central banks as a solution to the time consistency problem. Price stability commitments are time-inconsistent because once nominal wages are set, governments may benefit from using monetary policy to produce short-term increases in employment and output, generating inflationary pressures. These attempts raise inflation but are ineffective in terms of employment (Rogoff 1985). The “rules versus discretion” literature (Barro 1986, Barro and Gordon 1983a, b, Rogoff 1985) suggests that politicians delegate the decision-making power on monetary issues to independent agents – that is, central bankers. The agents’ independence is guaranteed by shielding their survival and decisions from political pressures. In this way, distributional or electoral considerations should not drive monetary policy decisions.

The evidence supporting this widespread policy advice, however, is not robust. Although several studies find a negative relationship between central bank independence and inflation (Bodea and Hicks 2015b, Cukierman, et al. 2002, Persson and Tabellini 1990, Rogoff 1985), others question actual impact of central bank independence on inflation (Campillo and Miron 1997, Forder 1998, Mas 1995, Oatley 1999, Posen 1993), especially for developing countries (Crowe and Meade 2007, Cukierman 1992, Cukierman, et al. 1992, Klomp and De Haan 2010).³ Furthermore, the results seem to be very sensitive to the sample used for the empirical test (Garriga 2016, Klomp and De Haan 2010).

Franzese (1999) makes a general case for how the broader political-economic environment should affect the anti-inflationary effect of central bank independence. Several

³ For a review of this literature, see de Haan and Eijffinger (1996), and Alesina and Stella (2010).

studies follow the suggestion of more complex – interactive – models to assess the effects of this independence. For example, some show that the effect of central bank independence on inflation depends on the government’s partisanship (Clark and Arel-Bundock 2013, Franzese 1999), on labor-market regimes (Acocella, et al. 2008, Franzese 2001, Hall and Franzese 1998), or on international exposure (Franzese 1999). In spite of the advancement of the theory, these studies tend to focus on developed democracies, whose institutional commitments are generally stable and credible.

More recent studies stress that the effect of delegation to central banks on economic outcomes depends, precisely, on the credibility of the government’s commitment to respect independence. The literature suggests that the strength of political institutions affects the credibility of central bank independence and its inflationary-curbing effects. Empirical evidence suggests that those effects only occur in democracies (Bodea and Hicks 2015b, Bodea and Higashijima 2015). However, to our knowledge, there is no research on whether the anti-inflationary effects of central bank independence also vary through time.

Opportunistic cycles and inflation

The literature on political business cycles stresses the varying incentives politicians face throughout their tenure, starting from two assumptions: the short-term tradeoff between inflation and unemployment, and voters’ ignorance of the structure of the economy (Nordhaus 1975:172).⁴ Voters prefer both low inflation and low unemployment, but the effects of higher unemployment on the voter’s income are more apparent than the effects of more inflation. “In the absence of convincing explanations, a deterioration in the level (or growth) of real income will be blamed on the party in power,” and voters will punish the incumbent (Nordhaus

⁴ The latter assumption is contested in the literature (Nordhaus 1989, Rogoff and Sibert 1988).

1975:173). Additionally, individuals vote assessing their immediate economic experience – they heavily discount the past. Voters’ wellbeing improvement or deterioration should affect politicians’ survival more when it happens closer to elections (Kiewiet 1983, Lewis-Beck 1988). Because incumbents want to retain power, they will try to manipulate the economy to generate short-term welfare improvements especially before elections.⁵

Although there is no doubt that elections are crucial times for politicians’ survival, the existence and effects of opportunistic political business cycles is still a matter of debate.⁶ Although the evidence linking elections and policy instruments is extensive,⁷ that is not the case for macroeconomic outcomes. In particular, empirical evidence of opportunistic cycles on inflation is weak (Lewis-Beck 1988) or mixed (Abrams and Iossifov 2006, Funashima 2016). Furthermore, in most OECD countries the evidence points in the opposite direction: there are monetary expansions before elections, and inflation escalations after elections (Alesina, et al. 1992), but this effect has not been observed in the U.S. since 1979 (Drazen 2001:85).

The scarce evidence showing opportunistic cycles affecting inflation may result from insufficient attention to the context in which politicians operate, particularly, the monetary

⁵ Nordhaus (1989) summarizes other approaches to the study of political cycles.

⁶ We understand survival broadly, including both power retention by the ruler, personally – reelection – or by the ruler’s party.

⁷ For example, in developed countries, there is evidence of an opportunistic cycle in fiscal policy (Alt and Lassen 2006, Klomp and De Haan 2013), public employment (Aaskoven 2016), and other policies (Alesina, et al. 1997). In developing countries, there is evidence of electoral cycles in fiscal policy (Gonzalez 2002), privatizations (Lami, et al. 2016), debt interest payments (Sáez 2016), and exchange rate regimes (Schuknecht 1999), among other policies (Ames 1987, Remmer 1993). Dubois (2016) cites more examples.

institutional framework. Models studying opportunistic cycles rarely account for the government's ability to affect monetary policy, that is, whether the central bank is independent, *and* to what extent said independence is credible. For example, the literature on context-dependent opportunistic cycles (Clark 2003, Clark and Reichert 1998, Franzese 2002) focuses on prior institutional choices – namely, exchange rate regime and central bank independence – that limit the control elected officials can have on the inflation rate. According to this literature, in the presence of international capital mobility, we should observe two kinds of opportunistic cycles: monetary cycles should happen only in countries with floating exchange rates and dependent central banks, and fiscal cycles in countries with fixed exchange rates, regardless of the central bank's powers (Clark 2003:89, Clark and Hallerberg 2000).⁸ Empirical tests on monetary and fiscal instruments – money supply and gross debt – and on some outcomes – growth and unemployment – provide support for this argument (Clark 2003:90, Clark and Hallerberg 2000). Yet, the effect of elections on inflation is not tested.

To study inflation, we build on the literature on context-dependent opportunistic cycles. However, we focus on the role of central banks and depart from this literature in two important ways. First, this literature predicts inflationary pressures coming from monetary policy during elections under three conditions – capital mobility, dependent central banks, and floating exchange rates. However, fiscal cycles can plausibly generate inflation during election years. Consequently, central bank independence should still matter to explain inflationary outcomes. Second, the effects of central bank independence are a function of this institutional commitment's credibility. Although said credibility can be assumed for advanced democracies, to build a general explanation we factor in that the commitment to central bank independence can be more or less credible.

⁸ Countries with floating exchange rates and central bank independence should not exhibit fiscal or monetary cycles.

Central bank independence and inflationary opportunistic cycles

The idea that independent central banks are anti-inflationary institutions relies on the assumption that central bankers and incumbents have contrasting preferences. Central bankers prefer price stability to other goals towards which monetary policy could be used – they are more conservative than incumbents. Politicians may desire price stability, but their most important motivation is to retain power – their political survival (Ames 1987, Bueno de Mesquita, et al. 2003). All other policy goals – including price stability – depend on politicians having the power to rule and enact policies. Because politicians are always tempted to use all instruments to secure their survival, protections on central bankers' decisions should reduce inflationary pressures on monetary policy, increasing price stability.

We argue that inflationary pressures on monetary policy are not constant through time. In particular, there are stronger incentives to enact inflationary policies in election years. Facing election, incumbents may generate inflationary pressures through demands for the central bank to loosen the monetary policy, or through an expansionary fiscal policy (Bodea and Higashijima 2015, Brender and Drazen 2005, Clark and Hallerberg 2000, Treisman and Gimpelson 2001). However, the effect of political pressures on inflation should be a function of the central bank's ability to resist or counter these pressures. Protections to central banks' decision-making should matter more during election years because in those years central banks need to weather stronger attempts to affect monetary outcomes. In fact, elections may test the extent of independence that central banks enjoy. We argue that previous studies do not generally find inflationary opportunistic cycles precisely because they do not account for central bank independence having stronger inflation-curbing effects during elections.

The distinctive role of central banks during election and non-election years may seem uncontroversial. In fact, economists state that “the most obvious advantage a fully independent central bank has is that of not being influenced by electoral deadlines” (Muscatelli 1998:503).

However, the effect of elections on the behavior of central banks is still not clear. Some research finds that central banks do not alter their policy during elections (Alesina and Stella 2010, Allen and McCrickard 1991, Beck 1987, Leertouwer and Maier 2002). Others show that central banks accommodate to pressures from the executive during elections, suggesting that central bank independence matters *less* in those times (Abrams and Iossifov 2006, Clark and Arel-Bundock 2013, Funashima 2013, Woolley 1984). Finally, the few studies suggesting that central bank independence should matter *more* during election years either restrict this effect to democracies (Franzese 1999:681), or do not analyze developing countries (Clark 2003). These qualifications are important for our argument for two reasons.

First, elections are crucial times not only in democracies. Many authoritarian regimes organize more or less transparent elections, and these elections open the possibility of political realignments and, sometimes, of government turnover. In election times, economic performance may affect the incumbents' likelihood of retaining power (Haggard and Kaufman 1995, 1997, Soh 1988:272), or alter the incumbents' bargaining power inside the ruling coalition or with other groups (Greene 2010, Magaloni 1999, 2006). Thus, less democratic incumbents should also have incentives to manipulate the economy to win elections (Levitsky and Way 2002, Schedler 2006, 2009).⁹

We expect increased inflationary pressures when autocrats face elections with some probability of adverse electoral results, and we posit that independent central banks can curb those inflationary pressures too. Although the role of monetary commitments in less democratic countries is not widely studied, recent research shows that institutions also matter in authoritarian regimes (Boix and Svobik 2013, Gandhi 2008, Gandhi and Przeworski 2007). Furthermore, an

⁹ In fact, there is some evidence of fiscal business cycles in authoritarian regimes (Blaydes 2011, Guo 2009, Pepinsky 2007).

incipient research suggests that central bank independence may be credible in autocracies under certain circumstances (Bodea, et al. 2016, Garriga and Meseguer 2017, Johnson 2016).

Second, developing countries are of especial interest for our theory. In developing countries, weaker institutional controls should make it easier for politicians to manipulate monetary and fiscal policy (Schuknecht 1996, Shi and Svensson 2006). Relatively weak institutions also result in “*vastly greater* levels of uncertainty” for developing democracies, increasing incentives to influence electoral results (Lupu and Riedl 2013:1344, 1348). Remarkably, the same reasons that make opportunistic cycles more likely in developing countries should also make institutional constraints – and thus, central bank independence – less effective, and this should be particularly important in the case of election years. (This would make developing countries a “hard case” to test our theory, because central banks’ protections should be less effective in less democratic contexts.)

Second, developing countries are of especial interest for our theory. Political parties have “*vastly greater* levels of uncertainty in developing democracies” (Lupu and Riedl 2013:1344, 1348). This uncertainty should increase the incumbent’s incentives to influence electoral results. Additionally, in these countries, relatively weaker institutional controls make it easier for politicians to manipulate monetary and fiscal policy (Schuknecht 1996, Shi and Svensson 2006). Remarkably, the same reasons that make opportunistic cycles more likely in developing countries should also make institutional constraints – and thus, central bank independence – less effective, and this should be particularly important in the case of election years. (This would make developing countries a “hard case” to test our theory, because central banks’ protections should be less effective in less democratic contexts.)

Although it seems counterintuitive, developing countries have reasons to respect central bank independence *especially* when it is very costly – that is, during elections. In these countries, compromising central bank independence entails important reputational and signaling

considerations. First, violating institutional commitments can generate audience costs – and not only in democracies (Weeks 2008).¹⁰ Second, and more importantly, central bank independence is a “good signal” to international markets, and it is associated with more investment and better credit conditions (Bodea and Hicks 2015a, Maxfield 1997, Polillo and Guillén 2005). Because developing countries are more vulnerable to international markets distrust, governments have additional incentives to respect central bank independence, even when the electoral cycle may pose incentives in the opposite direction. Based on these considerations, we expect a stronger anti-inflationary effect of central bank independence in election years in developing countries.¹¹ Thus, we test the following hypothesis:

Hypothesis 1: *The anti-inflationary effect of central bank independence is stronger in election years, contingent on democracy.*

For reasons mentioned above, we follow the literature and condition the magnitude of the anti-inflationary effect of central bank independence on democracy, as a proxy for both the credibility of institutional constraints, and of the probability of losing elections.¹²

¹⁰ Consider, for example, domestic and international reactions to attempts to restrict CBI in Venezuela or Poland (“Foreign Economists Concerned over Attacks on Central Bank Independence” 2006, Rozlall 2009).

¹¹ Alpanda and Honig (2010) use the behavior of central banks during election years as an indicator of de facto central bank independence.

¹² Even if there are nominal elections in fully authoritarian regimes, we expect to observe an opportunistic cycle – and thus, a larger effect of central bank independence – on inflation, when there is some probability that the incumbents lose elections.

Not all incumbents have the same incentives to manipulate the economy for electoral purposes (Schultz 1995). The incentives to use monetary policy to generate opportunistic cycles should be stronger when there is more uncertainty about the electoral result. There is evidence that the electoral margin of victory affects the opportunistic behavior of incumbents (Aidt, et al. 2011), the economy in general (Fowler 2006), and exchange rate depreciations (Stein, et al. 2005). Furthermore, anecdotal evidence suggests that tight elections affect central banks decisions (Erlam 2017, Koranyi and Canepa 2017), suggesting that close elections are a serious threat to central bank independence (Daily Nation 216, Ren 2014). Our theory suggests that if central bank independence is an effective tool to counter political pressures, its effects should be more pronounced when these pressures are more intense. Therefore, we expect the inflation-curbing effects of central bank independence to be a stronger in more contested elections. This expectation is consistent with the idea that independence should have “little further anti-inflationary impact” where the political and economic structure would lead governments to produce low inflation anyway (Franzese 1999:625). Thus, we test the following hypothesis:

Hypothesis 2: *The anti-inflationary effect of central bank independence is stronger in contested elections.*

Empirical analysis

Data description

Our dataset covers 143 developing (non-OECD) countries between 1980 and 2012. Appendix A lists the countries included. The main dependent variable is *Inflation*, measured as the logarithm of the average twelve-month growth rate of the consumer price index, and taken from the International Financial Statistics from the IMF.

To measure central bank independence (*CBI*), we use the most comprehensive dataset on *de jure* central bank independence available to the date (Garriga 2016).¹³ This dataset follows Cukierman, et al.'s (1992) criteria, and codes 16 written legal variables related to the chief executive officer of the bank (appointment, dismissal, and term of office), policy formulation attributions (who formulates and has the final decision in monetary policy, and the role of the central bank in the budget process), central bank's objectives, and central bank's limitations on lending to the public sector. The scores are combined in a single index that ranges from 0 (lowest) to 1 (highest independence). We prefer this widely used indicator of statutory independence over other *de facto* measures for several reasons (Garriga 2016). First, compared with *de facto* measures based on questionnaires (e.g., Blinder 2000, Cukierman, et al. 1992, Fry, et al. 1996), *de jure* measures have better coverage and cross-country comparability than that of *de facto* indicators. Furthermore, *de jure* indicators exhibit more within-country variation. Finally, the alternative form of measuring *de facto* independence – the turnover rate of central bankers (Cukierman and Webb 1995, Cukierman, et al. 1992, de Haan and Siermann 1996) has been shown to be endogenous to inflation (Dreher, et al. 2008).

We proxy *Democracy* using Polity2, that ranges from -10 to 10 (Marshall and Jaggers 2012). Alternatively, we use the average of a country's political rights and civil liberties score from Freedom House (2012). We identify election years following the Database of Political Institutions (DPI) (Cruz, et al. 2016). We code two sets of dichotomous variables: *Executive election* and *Legislative election* equal 1 to indicate the occurrence of an election for the executive or legislative branches, respectively, in a given year. *Both elections* indicate the concurrence of elections for both branches in the same year. Alternatively, *Any election* is coded 1 in years in which an election for executive, legislative or both branches, and zero otherwise. To test

¹³ The complete dataset includes 182 countries, from 1970 to 2012, on a country-year basis.

hypothesis 2, we include *Margin of majority*, the fraction of seats held by the government as the result of the election, also from the DPI.

Our baseline model includes controls for other factors known to affect inflation such as real *GDP per capita*, *Trade openness*, the sum of exports plus imports as a share of GDP, and *World Inflation*, measured as the annual change of the average consumer price index in the rest of the world. These variables come from the World Development Indicators (World Bank 2015). *Fiscal balance* is the difference between revenues and expenditures as a share of the GDP, and comes from the World Economic Outlook (International Monetary Fund 2015). *Peg* captures the existence of a fixed exchange rate regime based on the *de facto* exchange rate regime classification by Reinhart & Rogoff (2004, 2009). This dichotomous variable equals 1 when there is no separate legal tender, when there is a pre-announced peg or currency board arrangement, when there is a pre-announced horizontal band that is narrower than or equal to $\pm 2\%$, or when there is a *de facto* peg, and zero otherwise. Finally, we also include time and country dummies.

As part of the robustness checks, we also control for political instability – Banks and Wilson’s (2016) weighted measure of the number of assassinations, strikes, guerrilla warfare, major crises, purges, riots, revolutions, and anti-government demonstrations in a particular country and year – and for *Capital Openness*, Chinn and Ito’s (2008) index of the extensity of capital account controls, based on the information from the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions.¹⁴ Finally, we control for the executive’s partisanship

¹⁴ Following Clark and Hallerberg (2000), our main models assume capital mobility after the end of the Bretton Woods system. However, we test whether our results are robust to variance in capital controls.

using the DPI's variable EXECLCR. *Left* is a dichotomous variable coded 1 for left-leaning executives (EXECLCR=3), and zero otherwise. Appendix B presents descriptive statistics.¹⁵

Estimation Strategy

Based on the panel structure of the data, where subscripts i and t represent country and time period respectively, our benchmark specification can be represented by

$$y_{it} = \varphi y_{it-1} + \beta_1 CBI_{it} + \beta_2 Dem_{it} + \beta_3 CBI_{it} * Dem_{it} + \delta X_{it-1} + \xi_t + \eta_i + \varepsilon_{it} \quad (1)$$

where y_{it} and y_{it-1} are the logarithm of the inflation rate for country i at time t and time $t-1$, respectively; CBI_{it} is our measure of central bank independence; Dem_{it} is a proxy for democracy; X_{it-1} represents a vector of lagged time-varying control variables; ξ_t is a period-specific constant to account for common shocks; η_i is an unobserved county-specific effect that captures all time-invariant factors that affect the outcome; and ε_{it} is the error term. The inclusion of the interaction term enables the analysis of both the direct and indirect effects of CBI and democracy on inflation.

To estimate our benchmark specification we use a dynamic panel model with fixed effects. The inclusion of a lagged dependent variable in this type of setup could introduce a bias (Nickell 1981). In particular, when the number of time-series observations (T) is small this problem is nontrivial since shocks to fixed effects do not diminish over time (Wooldridge 2002). However, Beck and Katz (2011) and Beck et al. (2014) argue that when T is 30 or 40 – in our case is 32 – the bias is significantly reduced.¹⁶ Interestingly enough, Beck and Katz (2011)

¹⁵ Several studies of opportunistic political business use country-quarter as unit of analysis. Arguably, that unit of analysis is appropriate to observe finer changes in inflation levels as the election-day approaches. However, that unit of analysis is not appropriate for our analysis because all other control variables are registered yearly.

¹⁶ In Beck et al. (2014) for $T=40$ and $N=200$ the bias in their point estimate is only -0.01.

conclude that regardless of the number of cross-sectional units (N) – in our case is between 119 and 143 – with a reasonable T , the Nickel bias is trivially small.

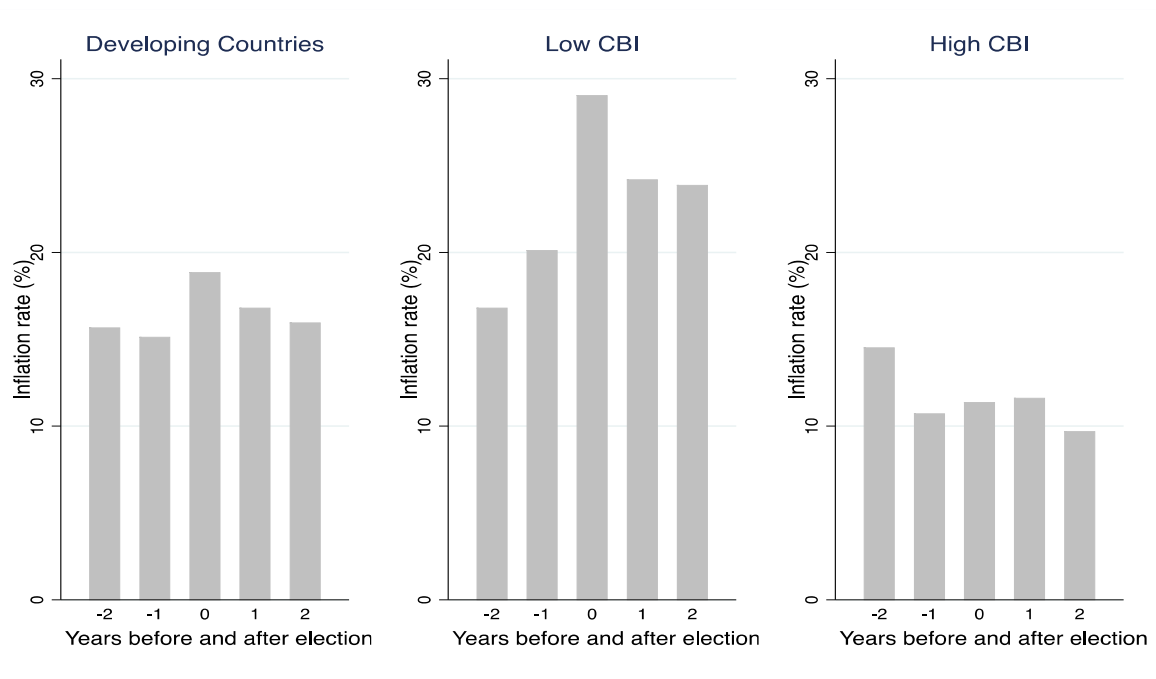
Results

Hypothesis 1 states that the negative relationship between CBI and inflation should be stronger during election years, when incumbents have more incentives to manipulate the economy.

Descriptive data suggest the plausibility of this hypothesis. Excluding outliers, the sample mean for *Inflation* is 17.2%.¹⁷ However, the mean inflation rate is higher in subsamples of election than in non-election years (18.8% and 16.7%, respectively). Figure 1 shows a clearer image of the relationship between election years and inflation. It plots the mean inflation rate in election years (year=0) and the years before and after elections in all developing countries in our sample (left-side panel). On average, in developing countries the inflation rate is higher in election years. The center and right-side panels show the same data in subsamples of countries with low and high central bank independence (we use $CBI=.5$ as cut-point), and highlight two interesting points. First, higher CBI is associated with lower inflation. After removing outliers, the mean inflation rate is 25% for countries with low CBI, and 11% for countries with high CBI. Second, the pattern along the electoral cycle is sharper for countries with low CBI than in the whole sample, but the “cycle” disappears for countries with high CBI. Appendix C shows the mean inflation in election and non-election years, depending on the level of central bank independence, through time.

¹⁷ We exclude observations with annual inflation larger than 1,000%.

Figure 1. Inflation mean and election years. Developing countries, 1980-2012



Although suggestive, these data do not control for confounding factors. As preliminary analyses, we run naïve tests of the effect of elections on inflation, just controlling for the occurrence of elections in a given year. In these models, neither *Any election*, nor the set of variables indicating different kinds of elections (*Executive*, *Legislative*, and *Both elections*) is statistically significant – consistent with other studies (Bodea and Hicks 2015b). See Tables D1 (Polity2) and D2 (Freedom House) in appendix D.¹⁸ In all these models, *CBI* is negatively associated with inflation (both when interacted with the Democracy variables and in models without interactions). The coefficients associated with *Peg* and *Fiscal balance* are negative and statistically significant. The lagged dependent variable and *GDP per capita* are positive and statistically significant. Overall, the effects of the control variables are consistent across models.

These preliminary tests seem to indicate the absence of election-induced inflationary cycles. We argue, however, that these models do not provide an appropriate test for our

¹⁸ Tables D1 and D2 show models without *CBI*, with *CBI*, and interacting *CBI* with *Democracy*.

hypotheses. Our theory states that central bank independence matters differently in election and non-election years. Thus, the inclusion of controls for election years should not capture the effect of independent central banks facing stronger inflationary pressures. We therefore divide the sample in election and non-election years, depending on the occurrence of national executive or legislative elections in a given year. Splitting the sample avoids triple interactions, and allows for the possibility that the determinants of inflation have differential effects during election and non-election years. We include models on the full sample as a baseline for comparison. Table 1 shows the results for hypothesis 1. Models 1 to 3 (4 to 6) are run on the full sample, and on subsamples of non-election and election years, respectively. Models 1 to 3 proxy *Democracy* with Polity2, and Models 4 to 6 with Freedom House.

Table 1: Effect of CBI on inflation conditioned by democracy, 1980-2012.

	Polity2			Freedom House		
	Full sample	Non- election years	Election years	Full sample	Non- election years	Election years
	(1)	(2)	(3)	(4)	(5)	(6)
CBI	-0.571** (0.279)	-0.435 (0.332)	-0.954** (0.409)	-0.986 (0.656)	-0.831 (0.724)	-1.461* (0.810)
Democracy	0.021 (0.017)	0.019 (0.020)	0.020 (0.026)	-0.065 (0.082)	-0.038 (0.092)	-0.133 (0.107)
CBI*Democracy	-0.031 (0.033)	-0.034 (0.042)	-0.026 (0.043)	0.067 (0.150)	0.043 (0.179)	0.148 (0.172)
Inflation _{<i>t-1</i>}	0.334*** (0.051)	0.340*** (0.049)	0.392*** (0.105)	0.306*** (0.048)	0.300*** (0.045)	0.397*** (0.101)
GDP per capita _{<i>t-1</i>}	0.332*** (0.125)	0.287** (0.141)	0.633* (0.328)	0.373*** (0.127)	0.353** (0.138)	0.605* (0.307)
Trade openness _{<i>t-1</i>}	0.000 (0.001)	0.002* (0.001)	-0.003 (0.002)	0.001 (0.001)	0.002* (0.001)	-0.002 (0.002)
Peg	-0.278*** (0.073)	-0.161* (0.083)	-0.613*** (0.128)	-0.313*** (0.073)	-0.217*** (0.082)	-0.605*** (0.129)
World Inflation _{<i>t-1</i>}	-0.007 (0.015)	-0.016 (0.021)	-0.015 (0.033)	-0.004 (0.015)	-0.012 (0.020)	-0.008 (0.032)
Fiscal Balance _{<i>t-1</i>}	-0.005*** (0.001)	-0.004*** (0.001)	-0.012** (0.005)	-0.005*** (0.002)	-0.005*** (0.001)	-0.012** (0.005)
Total Effect of CBI ($\beta_1 + \beta_3$)	-0.601** (0.277)	-0.468 (0.323)	-0.981** (0.404)	-0.919* (0.526)	-0.788 (0.571)	-1.314** (0.662)
R ²	0.220	0.211	0.339	0.178	0.158	0.338
N. observations	1833	1326	507	2109	1570	539
N. of countries	126	125	119	143	142	128

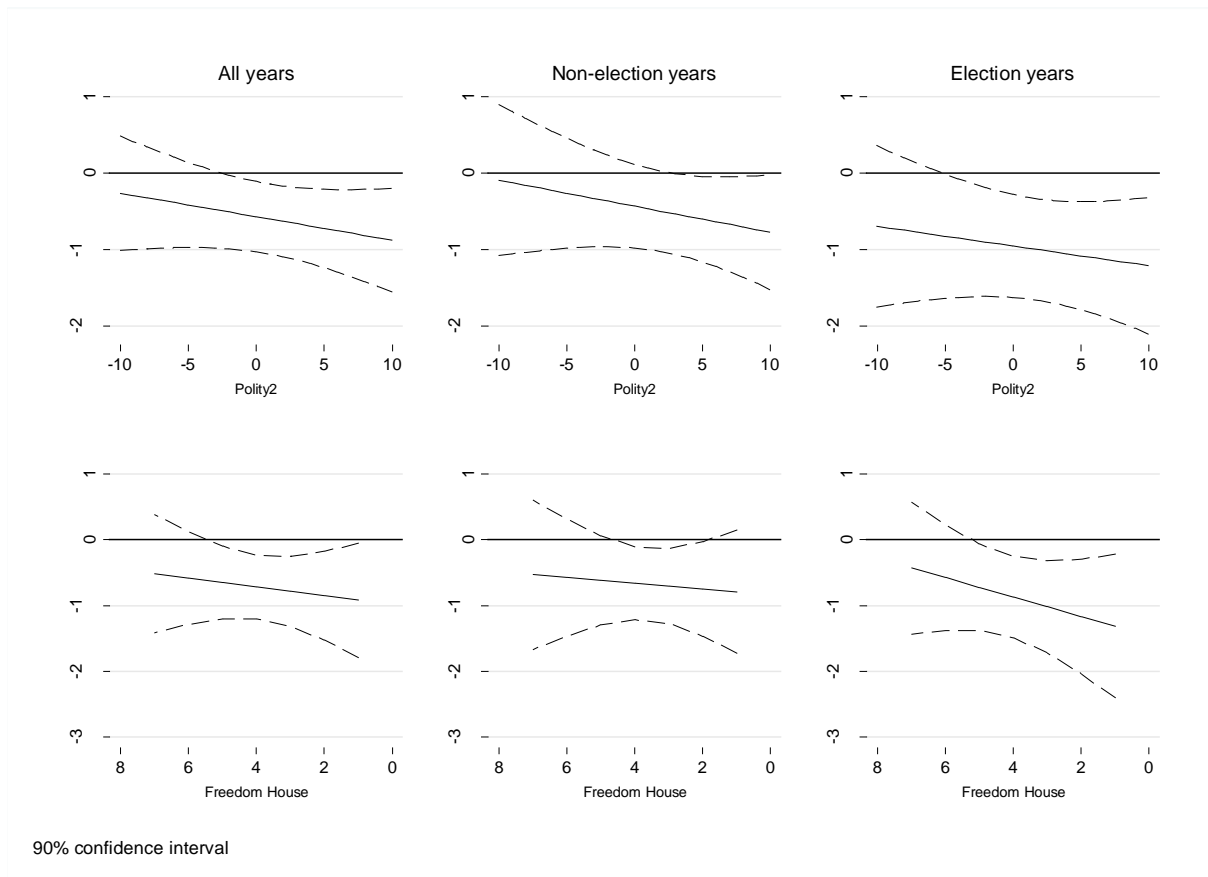
Note: Estimation: Fixed Effects with robust standard errors. Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects (not reported). * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Given the inclusion of interactive terms, the coefficients are not informative of the effect of *CBI* at different levels of *Democracy*. Figure 2 shows the joint effect of these variables, and allows a proper interpretation of the results (Brambor, et al. 2006). In the full sample, *CBI* is significantly negatively associated with inflation (at .05 level) when Polity2 is ≥ 1 , that is, even for authoritarian regimes.¹⁹ Similarly, the negative association is significant when Freedom House is ≤ 5 .²⁰ These findings contrast with prior studies showing that *CBI* has anti-inflationary effects only in democracies (Bodea and Hicks 2015b, Bodea and Higashijima 2015). The credibility of institutional constraints, however, seems to matter. The anti-inflationary effect of *CBI* is stronger in more democratic contexts. For the most autocratic countries in which this relationship is significant (Polity2=1), an increase in *CBI* from its minimum to its maximum is associated with a 1.8–point drop in the inflation rate. For the most democratic countries (Polity2=10), this drop equals 2.4 points. Using Freedom House scores, the same increase in *CBI* is associated with decreases of 2.0 and 2.3 points in the inflation rate (Freedom House=4 and 2, respectively). This is consistent with the idea that domestic institutions’ strength matters.

¹⁹ We use a conservative approach for the substantive interpretation, discussing results that are significant at least at .05 level. *CBI* is significantly negatively associated with inflation (at .1 level) when Polity2 is ≥ -1 .

²⁰ The marginal effect is significant at the .05 level when Freedom House is between 2 and 4 (at the .1 level when Freedom House=1 and 5).

Figure 2: Marginal effects of *Central bank independence* on *Inflation*, at different levels of *Democracy*

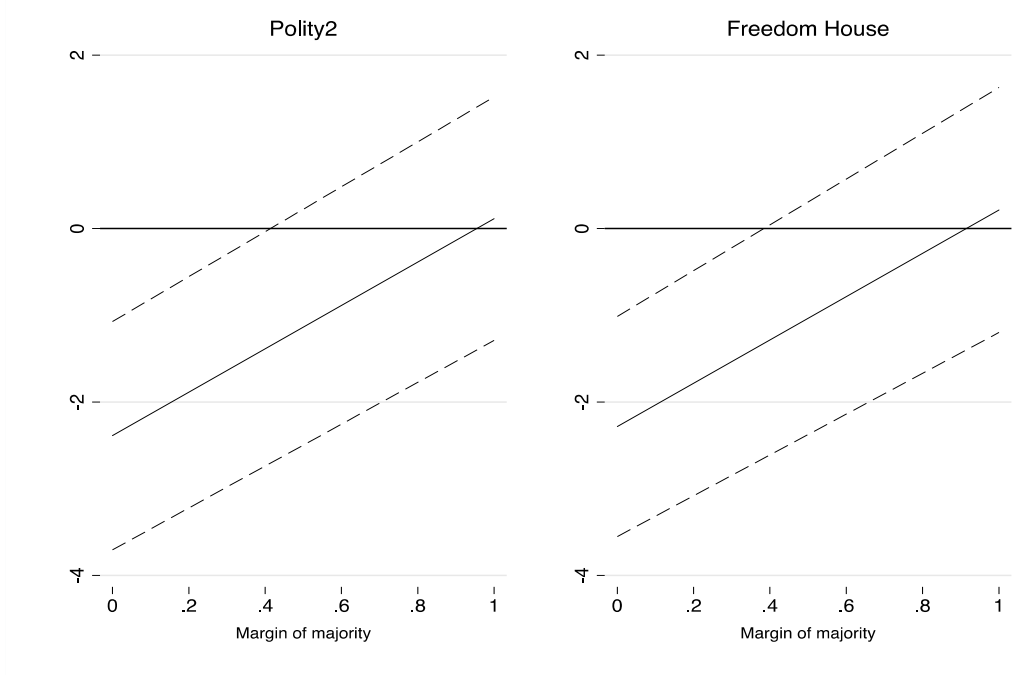


Note: For comparison purposes, the *x*-axis is reversed in the Freedom House graphs

However, the analyses on split samples show that the effect of central bank independence on inflation is significantly larger in election years than in non-election ones, both for democracies and electoral authoritarianisms. During election years, an increase in CBI from its minimum to its maximum in authoritarian countries (Polity2=-2) is associated with a 2.5-point drop in the inflation rate, and with a 3.6-point drop in the most democratic countries (Polity2=10). In non-election years, the magnitude of the inflationary-curbing effect is smaller, and only significant at the .1 level. We obtain similar results using Freedom House: holding everything else constant, the same change in CBI is associated with a 2.4 and 3.7 (Freedom House=4 and 1, respectively). These results provide support for hypothesis 1, stating that the

negative relationship between central bank independence and inflation rates is stronger during electoral years.

Figure 3: Marginal effects of *Central bank independence* on *Inflation* in election years, conditional on *Margin of majority*.



Hypothesis 2 expects the anti-inflationary effect of central bank independence to be stronger in contested elections because the incentives to manipulate the economy should grow as the risk of losing power increases – therefore, central bank independence should matter more when the electoral result is less certain. Figure 3 plots the marginal effect of *CBI* on inflation, conditional on the margin of majority, during election years – using different measures of *Democracy* as controls.²¹ Using either measure of *Democracy* as control, central bank independence’s inflationary-curbing effect is the strongest when elections are decided by a minimum margin.

²¹ For the full models, see appendix E.

However, this effect becomes smaller and insignificant when elections are less competitive (when *Margin of majority* > 50%). Substantively, an increase of CBI from its minimum to its maximum is associated with a 9.6-point drop in inflation in election years in which the election is decided by a 5% margin. If the electoral margin is 20% – arguably, a less competitive election – the expected effect of the same increase in central bank independence is associated with 6.6-point drop in inflation. If the margin is 45%, the expected reduction in inflation is 3.6 percent points.

Robustness Checks

Our results are robust to changes in the model specification and the estimation methodology. First, we control for political instability and capital account openness (see appendix F). As expected, the coefficients associated with *Instability* and with *Capital Openness* are positive and negative, respectively, but only *Capital Openness* is statistically significant. In other words, more capital controls are associated with higher inflation. Our main results remain stable and significant, as shown in appendix F.

Second, the literature on context-dependent political business cycles suggest in a context of capital mobility, the exchange rate regime should affect the ability of governments to influence monetary outcomes (Clark 2003, Clark and Hallerberg 2000, Clark and Reichert 1998). In particular, fixed exchange-rate regimes together with high levels of capital mobility “denies policymakers the degree of national monetary policy autonomy required to manipulate macroeconomic outcomes for electoral purposes” (Clark and Reichert 1998:88). In those cases, central bank independence should be irrelevant. In our main models, we control for the exchange rate regime (Peg). However, an interaction between CBI and Peg allows us to determine whether central bank independence has an anti-inflationary effect even in the presence of a fixed exchange rate. Appendix G shows that in non-election years, CBI does not have a significant effect on inflation when there is a fixed exchange rate. However, in election years, central bank independence has inflation-curbing effects *even* in the presence of a fixed exchange

rate. This suggests that independent central banks may be countering the inflationary effects of fiscal expansions (Clark and Hallerberg 2000). Finally, we control for partisanship. *Left* does not achieve statistical significance, and our results hold (see Appendix H).

We also use alternative estimation methodologies. The inclusion of lagged independent variables may not eliminate potential endogeneity and reverse causation problems. If CBI is correlated with regressors from equation (1), the main result may not hold. More importantly, inflation rates may affect the level of independence granted to the central bank. To account for these potential effects we perform an instrumental variable (IV) approach where CBI is treated as an endogenous variable. Bodea and Hicks (2015a) show that central bank reform is mainly driven by diffusion. Thus, we instrument CBI_i for country i with the regional average of CBI (excluding country i). Past levels of this instrument are relevant in predicting country i 's current CBI (correlation is 0.52) and it is unlikely to be determined by country i 's inflation rate (Bodea and Hicks 2015a).

Given that CBI has direct and indirect effects on inflation rate, in the context of an IV approach we need a second instrument. We use the interaction between the regional average of CBI (excluding country i) and the level of democracy (as suggested by Wooldridge 2002).²² Table 2 shows the main results. The IV approach produces results qualitatively similar to those found in the main models. In all cases, the joint F-statistics of the first stage of the IV regressions show that the instruments are relevant and greater than Staiger and Stock's (1997) rule of thumb of 10.²³

²² The drawback of this approach is that the collinearity of both instruments can affect the standard errors and significance of the instruments considered.

²³ As expected, one of the instruments is strongly significant and captures most of the variation of the first stage.

Table 2: Effect of CBI on inflation conditioned by democracy, 1980-2012. Instrumental variables with robust standard errors

	Polity2			Freedom House		
	Full sample	Non-election years	Election years	Full sample	Non-election years	Election years
CBI	-1.408** (0.696)	-0.883 (0.729)	-2.945** (1.334)	-2.178*** (0.824)	-1.696 (1.035)	-4.076*** (1.563)
Democracy	0.041 (0.026)	0.045 (0.028)	0.048 (0.051)	-0.021 (0.104)	0.006 (0.116)	-0.190 (0.211)
CBI*Democracy	-0.070 (0.059)	-0.091 (0.064)	-0.055 (0.103)	-0.061 (0.219)	-0.082 (0.255)	0.196 (0.395)
Inflation _{<i>t-1</i>}	0.318*** (0.041)	0.327*** (0.043)	0.361*** (0.093)	0.284*** (0.037)	0.283*** (0.039)	0.356*** (0.090)
GDP per capita _{<i>t-1</i>}	0.396*** (0.137)	0.300 (0.178)	0.945*** (0.347)	0.508*** (0.127)	0.454*** (0.156)	0.945*** (0.323)
Trade openness _{<i>t-1</i>}	0.001 (0.001)	0.002 (0.001)	-0.001 (0.003)	0.002 (0.002)	0.003** (0.001)	-0.000 (0.003)
Peg	-0.303*** (0.077)	-0.174** (0.087)	-0.707*** (0.150)	-0.343*** (0.078)	-0.232*** (0.087)	-0.711*** (0.153)
World Inflation _{<i>t-1</i>}	-0.006 (0.017)	-0.014 (0.019)	-0.014 (0.035)	-0.002 (0.016)	-0.012 (0.018)	-0.006 (0.034)
Fiscal Balance _{<i>t-1</i>}	-0.005*** (0.002)	-0.004** (0.002)	-0.017*** (0.006)	-0.007*** (0.002)	-0.005*** (0.002)	-0.017*** (0.005)
R ²	0.207	0.205	0.283	0.149	0.142	0.265
N. of observations	1800	1305	487	2076	1549	520
N. of countries	121	121	108	138	138	118
<i>First-stage regression</i>						
Instruments:						
CBI regional	1.134*** (0.105)	1.175*** (0.127)	1.123*** (0.209)	1.128*** (0.138)	1.075*** (0.163)	1.245*** (0.307)
CBI regional *Democracy	0.011 (0.009)	0.009 (0.012)	0.004 (0.021)	-0.008 (0.033)	0.012 (0.039)	-0.034 (0.076)
<i>First-stage F-Statistic</i>	72.16	52.52	19.74	74.40	53.45	20.31

Note. Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects (not reported). * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Finally, we consider other estimation strategies. Previous studies use panel-corrected standard errors (PCSE) to deal with a lagged dependent variable (Arnone and Romelli 2013, Bodea and Hicks 2015b). Nevertheless, PCSE is not appropriate for our analyses because the number of cross-sectional units is greater than the number of time-series observations, what could bias t-statistics. We pursue two alternative methodologies. First, we remove the lagged dependent variable and estimate equation (1) using fixed effects (Klomp and De Haan 2010). We do not use this estimation in the main models because the dynamic nature of the panel is especially relevant: current inflation is affected by its past values. The methodological drawback is that point estimates would be less precise since the variance tends to be higher when omitting the lag – due to a specification error (Mizon 1995). Second, the standard solution to avoid Nickell bias is to use GMM dynamic panel data estimators (Arellano and Bond 1991, Arellano and Bover 1995, Blundell and Bond 1998). This approach addresses the issues of joint endogeneity of all explanatory variables in a dynamic formulation, and mitigates potential biases induced by fixed effects. However, the instrument count can easily grow large relative to the sample size (Roodman 2009). The danger associated with having too many instruments relative to observations is that they can overfit endogenous variables, failing to expunge their endogenous components and biasing coefficient estimates. Appendix I shows that our results hold with these two alternative estimation techniques.

Conclusions

The main goal of central bank independence is to contain the inflationary effects of political pressures – otherwise, the advice should be limited to enacting conservative monetary policies, and not necessarily granting independence to the central bank. This paper studies the extent and some of the conditions under which central bank independence has anti-inflationary effects. In general, we find that delegation to central banks is associated with lower inflation rates

in most developing countries – including not only democracies, as previous studies suggest, but also many authoritarian regimes. This finding is important for the literature on the political economy of central bank independence, and also for a growing literature examining the role of institutions in authoritarian regimes.

The core of our study is to disentangle whether the anti-inflationary effects of central bank independence vary depending on the incumbents' incentives to manipulate macroeconomic outcomes, particularly during election years. We argue that if delegation of monetary policy to central banks is a means to curb politically-induced inflationary pressures, these curbing effects should be especially evident when incumbents have more incentives to manipulate macroeconomic outcomes. We assume said incentives to peak during election years, and especially when there is uncertainty regarding the electoral outcome. We show that central bank independence has stronger inflation-curbing effects during election years, and we find that these effects are also observed in non-democratic elections – the magnitude of the effect is smaller for autocracies, but it is still significant. We attribute this result to the existence of incentives for developing countries – including some authoritarian countries – to rely on institutional mechanisms to increase their macroeconomic credibility, and their willingness to respect central bank independence when that respect is the costliest. In very authoritarian contexts, in which elections are a mere facade, we observe no anti-inflationary effects.

Our analyses also show that electoral uncertainty affects central bank independence's effects on inflation. Inflationary pressures seem to be higher when there is more electoral competition, making central bank independence even more relevant as electoral uncertainty increases. This finding, along with the finding regarding election years, increases our confidence in the likelihood that the relationship between central bank independence and inflation varies depending on the political incentives to boost the economy as we suggest, and it is not a spurious correlation.

While our findings are suggestive of the existence opportunistic business cycle, more research is needed to determine the extent of these cycles when monetary policy is under direct control of the executive branch. Still, our results may help understanding why there is little evidence of said cycles. As Krause (2005:78) stated, “failure to incorporate incumbents’ re-election odds” – proxied here as electoral competition – “is one plausible explanation why [political business cycles] are not observed regarding macroeconomic outcomes.”

In all, our results suggest that monetary institutions affect the ability of incumbents to influence macroeconomic outcomes – in this case, inflation. This highlights the importance of accounting for domestic and international monetary constraints to better understand the economic consequences of different policies, even in more authoritarian contexts.

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Appendix A. Countries included in the analyses

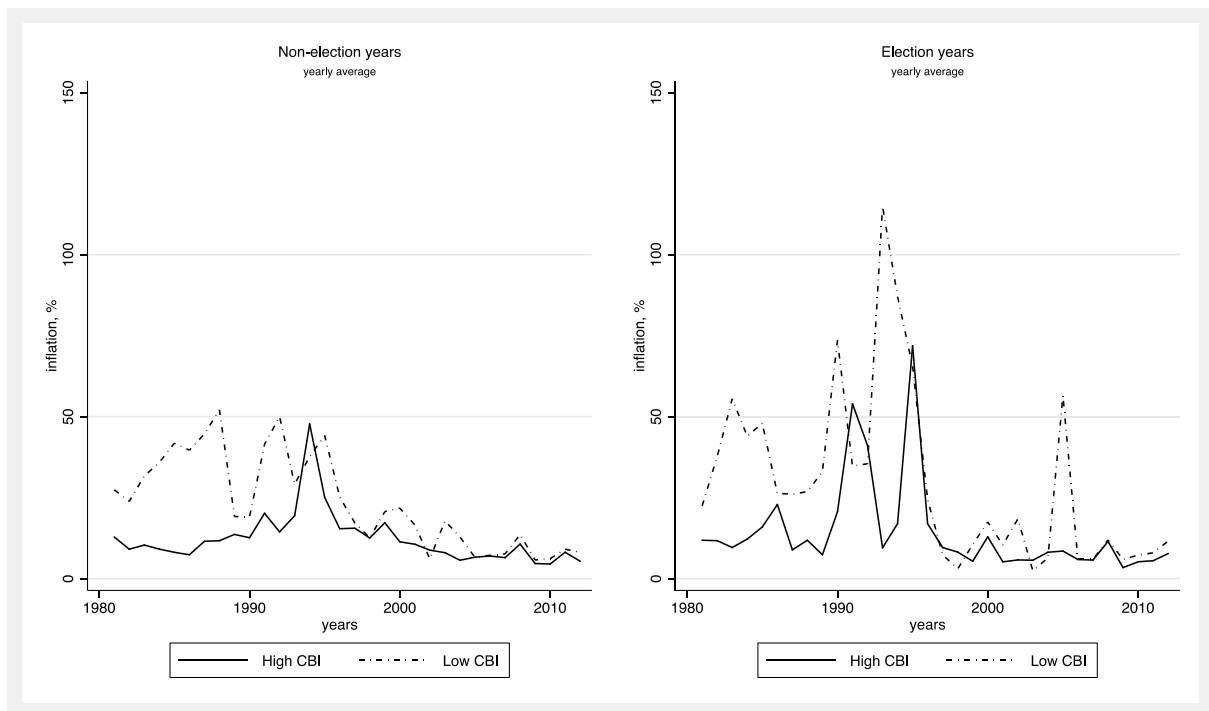
Afghanistan	Cyprus	Kyrgyz Republic	Saudi Arabia
Albania	Djibouti	Liberia	Senegal
Algeria	Dominica	Libya	Serbia
Antigua & Barbuda	Dominican Republic	Lithuania	Seychelles
Argentina	Ecuador	Macedonia, FYR	Sierra Leone
Armenia	Egypt, Arab Rep.	Madagascar	Singapore
Azerbaijan	El Salvador	Malawi	Slovak Republic
Bahamas, The	Equatorial Guinea	Malaysia	Slovenia
Bahrain	Estonia	Maldives	Solomon Islands
Bangladesh	Ethiopia	Mali	South Africa
Barbados	Fiji	Malta	Sri Lanka
Belarus	Gabon	Mauritania	St. Kitts and Nevis
Belize	Gambia, The	Mauritius	St. Lucia
Benin	Georgia	Mexico	St. Vincent & the Grenadines
Bhutan	Ghana	Moldova	Sudan
Bolivia	Grenada	Mongolia	Suriname
Bosnia & Herzegovina	Guatemala	Montenegro	Syrian Arab Republic
Botswana	Guinea	Morocco	Tajikistan
Brazil	Guinea-Bissau	Mozambique	Tanzania
Bulgaria	Guyana	Namibia	Thailand
Burkina Faso	Haiti	Nepal	Timor-Leste
Burundi	Honduras	Nicaragua	Togo
Cabo Verde	India	Niger	Tonga
Cambodia	Indonesia	Nigeria	Trinidad and Tobago
Cameroon	Iran, Islamic Rep.	Oman	Tunisia
Central African Republic	Iraq	Pakistan	Uganda
Chad	Israel	Panama	Ukraine
Chile	Jamaica	Papua New Guinea	United Arab Emirates
China	Jordan	Paraguay	Uruguay
Colombia	Kazakhstan	Peru	Vanuatu
Comoros	Kenya	Philippines	Venezuela, RB
Congo, Dem. Rep.	Kuwait	Qatar	Vietnam
Congo, Rep.	Lao PDR	Romania	Yemen, Rep.
Costa Rica	Latvia	Russia/Russian Fed	Zambia
Cote d'Ivoire	Lebanon	Rwanda	Zimbabwe
Croatia	Lesotho	Samoa	

Appendix B. Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Inflation	2109	29.259	591.198	0.015	24411.030
CBI	2109	0.547	0.189	0.122	0.979
Democracy (Polity2)	1829	3.103	6.065	-10.000	10.000
Democracy (Freedom House)	2109	3.586	1.713	1.000	7.000
GDP per capita	2108	4305.147	6478.553	140.815	61608.110
Trade openness	2099	86.948	50.927	10.079	531.737
Peg	2109	0.688	0.463	0.000	1.000
World inflation	2109	5.127	2.111	2.917	12.738
Fiscal balance	2109	-1.764	13.072	-487.312	44.901
Any election	2109	0.256	0.436	0.000	1.000
Legislative election	1968	0.140	0.347	0.000	1.000
Executive election	1967	0.050	0.219	0.000	1.000
Both elections	2109	0.078	0.268	0.000	1.000
Regional CBI	2079	0.542	0.100	0.292	0.753
Margin of majority	1738	0.641	0.209	0.032	1.000
Capital account openness	2051	0.444	0.345	0.000	1.000
Left	1900	0.196	0.397	0.000	1.000

Appendix C

Figure C1. Inflation mean and election years. Developing countries, 1980-2012



Appendix D

Table D1: Inflation and election years, 1980-2012 (Polity2)

Dependent variable: Inflation rate (log)

Estimation: Fixed Effects with robust standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
CBI			-0.706** (0.312)	-0.699** (0.313)	-0.571** (0.279)	-0.577** (0.280)
Democracy	0.000 (0.007)	0.001 (0.008)	0.007 (0.007)	0.007 (0.007)	0.021 (0.017)	0.020 (0.017)
CBI*Democracy					-0.031 (0.033)	-0.028 (0.033)
Inflation _{<i>t-1</i>}	0.363*** (0.052)	0.356*** (0.052)	0.336*** (0.052)	0.338*** (0.052)	0.334*** (0.051)	0.336*** (0.051)
GDP per capita _{<i>t-1</i>}	0.215* (0.116)	0.237** (0.119)	0.350*** (0.124)	0.351*** (0.124)	0.332*** (0.125)	0.334*** (0.124)
Trade openness _{<i>t-1</i>}	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Peg	-0.253*** (0.070)	-0.265*** (0.071)	-0.278*** (0.074)	-0.278*** (0.073)	-0.278*** (0.073)	-0.278*** (0.073)
World Inflation _{<i>t-1</i>}	-0.001 (0.014)	-0.001 (0.014)	-0.008 (0.015)	-0.008 (0.015)	-0.007 (0.015)	-0.008 (0.015)
Fiscal Balance _{<i>t-1</i>}	-0.004*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
Any election	-0.022 (0.041)		-0.033 (0.042)		-0.033 (0.042)	
Executive election		-0.100 (0.063)		-0.092 (0.068)		-0.091 (0.069)
Legislative election		-0.053 (0.065)		-0.040 (0.069)		-0.040 (0.069)
Both elections		-0.013 (0.055)		-0.000 (0.055)		-0.001 (0.055)
Total Effect of CBI ($\beta_1 + \beta_3$)					-0.601** (0.277)	-0.605** (0.279)
R ²	0.230	0.226	0.220	0.221	0.220	0.222
N of observations	2073	1949	1833	1816	1833	1816
N of countries	128	127	126	124	126	124

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix D (cont.)

Table D2: Inflation and election years, 1980-2012 (Freedom House)

Dependent variable: Inflation rate (log)

Estimation: Fixed Effects with robust standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
CBI			-0.762** (0.311)	-0.735** (0.301)	-0.986 (0.656)	-0.874 (0.665)
Democracy	-0.013 (0.033)	-0.002 (0.034)	-0.033 (0.033)	-0.024 (0.034)	-0.065 (0.082)	-0.043 (0.085)
CBI*Democracy					0.067 (0.150)	0.042 (0.153)
Inflation _{<i>t-1</i>}	0.331*** (0.048)	0.339*** (0.050)	0.307*** (0.048)	0.324*** (0.050)	0.306*** (0.048)	0.324*** (0.050)
GDP per capita _{<i>t-1</i>}	0.268** (0.118)	0.251** (0.117)	0.378*** (0.126)	0.349*** (0.122)	0.373*** (0.127)	0.345*** (0.123)
Trade openness _{<i>t-1</i>}	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)
Peg	-0.284*** (0.070)	-0.288*** (0.071)	-0.314*** (0.074)	-0.299*** (0.073)	-0.313*** (0.073)	-0.298*** (0.072)
World Inflation _{<i>t-1</i>}	0.002 (0.014)	0.003 (0.014)	-0.004 (0.015)	-0.003 (0.015)	-0.004 (0.015)	-0.003 (0.015)
Fiscal Balance _{<i>t-1</i>}	-0.005*** (0.002)	-0.004*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)
Any election	-0.006 (0.039)		-0.018 (0.040)		-0.018 (0.040)	
Executive election		-0.088 (0.062)		-0.073 (0.067)		-0.073 (0.067)
Legislative election		-0.027 (0.060)		-0.016 (0.063)		-0.016 (0.063)
Both elections		-0.008 (0.056)		0.005 (0.055)		0.005 (0.055)
Total Effect of CBI ($\beta_1 + \beta_3$)					-0.919* (0.526)	-0.833 (0.531)
R ²	0.191	0.208	0.177	0.203	0.178	0.203
N of observations	2380	2116	2109	1967	2109	1967
N of countries	146	139	143	135	143	135

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix E

Table E1: Inflation and electoral competition during election years, 1980-2012.

Dependent variable: Inflation rate (log)

Estimation: Fixed Effects with robust standard errors

	Polity2 (1)	Freedom House (2)
CBI	-2.389*** (0.799)	-2.283*** (0.770)
Margin	-1.550* (0.796)	-1.569* (0.816)
CBI*Margin	2.503* (1.296)	2.498* (1.315)
Democracy	0.007 (0.017)	-0.047 (0.067)
Inflation _{<i>t-1</i>}	0.388*** (0.111)	0.393*** (0.106)
GDP per capita _{<i>t-1</i>}	0.659* (0.353)	0.644** (0.325)
Trade openness _{<i>t-1</i>}	-0.003 (0.002)	-0.003 (0.002)
Peg	-0.624*** (0.126)	-0.617*** (0.128)
World Inflation _{<i>t-1</i>}	-0.008 (0.036)	0.001 (0.034)
Fiscal Balance _{<i>t-1</i>}	-0.012** (0.006)	-0.012** (0.005)
R ²	0.347	0.346
N. of observations	467	496
N. of countries	117	126

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix F

Table F1: Effect of CBI on inflation, 1980-2012.

Dependent variable: Inflation rate (log)

Estimation: Fixed Effects with robust standard errors

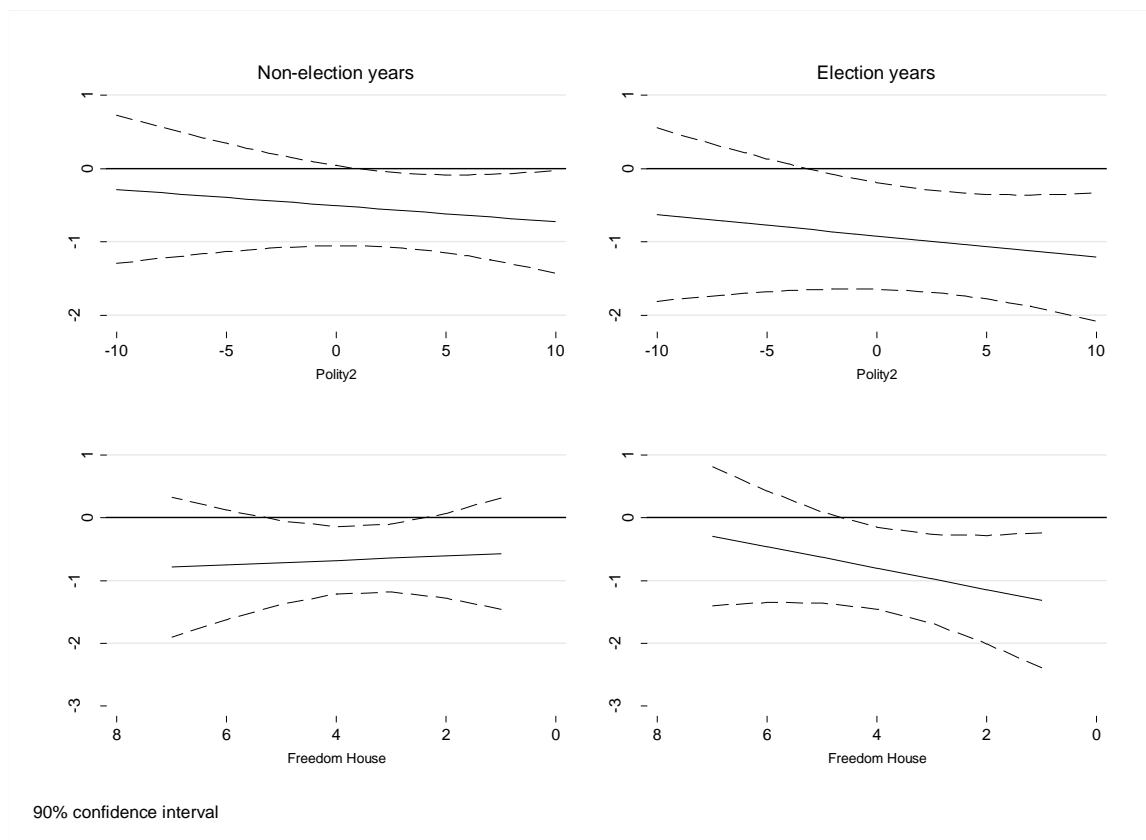
Additional controls: Capital account openness and political instability

Years	Polity2		Freedom House	
	Non- election (1)	Election (2)	Non- election (3)	Election (4)
CBI	-0.506 (0.332)	-0.918** (0.440)	-0.533 (0.685)	-1.486* (0.803)
Democracy	0.013 (0.020)	0.025 (0.028)	-0.006 (0.090)	-0.165 (0.110)
CBI*Democracy	-0.022 (0.041)	-0.029 (0.045)	-0.036 (0.172)	0.171 (0.177)
Inflation _{t-1}	0.328*** (0.048)	0.345*** (0.103)	0.285*** (0.044)	0.351*** (0.101)
GDP per capita _{t-1}	0.341** (0.146)	0.774** (0.321)	0.401*** (0.141)	0.670** (0.308)
Trade openness _{t-1}	0.002* (0.001)	-0.002 (0.002)	0.002* (0.001)	-0.002 (0.002)
Peg	-0.123 (0.089)	-0.575*** (0.130)	-0.166* (0.089)	-0.568*** (0.130)
World Inflation _{t-1}	-0.015 (0.021)	-0.013 (0.032)	-0.008 (0.020)	-0.007 (0.031)
Fiscal Balance _{t-1}	-0.005*** (0.001)	-0.014*** (0.005)	-0.005*** (0.001)	-0.013*** (0.005)
Political Instability	0.014 (0.010)	0.014 (0.014)	0.007 (0.010)	0.015 (0.014)
Capital Openness	-0.383* (0.203)	-0.672** (0.264)	-0.401** (0.183)	-0.538** (0.263)
Total Effect of CBI ($\beta_1 + \beta_3$)	-0.528 (0.319)	-0.947** (0.429)	-0.569 (0.539)	-1.315** (0.655)
R ²	0.217	0.332	0.162	0.324
N. of observations	1295	503	1522	529
N. of countries	121	117	137	126

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix F (cont.)

Figure F1: Marginal effects of *Central Bank Independence* at different levels of *Democracy*.
 Additional controls: Capital account openness and political instability



Appendix G

Table G1: Effect of CBI on inflation, 1980-2012.

Dependent variable: Inflation rate (log)

Estimation: Fixed Effects with robust standard errors

Additional controls: Interaction with exchange rate regime

Years	Polity2		Freedom House	
	Non- election (1)	Election (2)	Non- election (3)	Election (4)
CBI	-0.881* (0.526)	-1.227** (0.616)	-0.902* (0.501)	-1.155* (0.589)
Peg	-0.418 (0.296)	-0.735** (0.337)	-0.395 (0.263)	-0.751** (0.337)
CBI*Peg	0.487 (0.495)	0.223 (0.515)	0.342 (0.450)	0.261 (0.518)
Inflation _{<i>t-1</i>}	0.342*** (0.048)	0.392*** (0.105)	0.300*** (0.0449)	0.397*** (0.101)
GDP per capita _{<i>t-1</i>}	0.317** (0.135)	0.644* (0.328)	0.361*** (0.136)	0.609** (0.305)
Trade openness _{<i>t-1</i>}	0.002* (0.0009)	-0.003 (0.002)	0.002* (0.001)	-0.002 (0.002)
World Inflation _{<i>t-1</i>}	-0.017 (0.020)	-0.016 (0.034)	-0.01 (0.019)	-0.010 (0.032)
Fiscal Balance _{<i>t-1</i>}	-0.004*** (0.001)	-0.0124** (0.005)	-0.005*** (0.001)	-0.012** (0.005)
Democracy	0.004 (0.009)	0.008 (0.016)	-0.019 (0.037)	-0.056 (0.060)
Total Effect of CBI ($\beta_{CBI} + \beta_{CBI*Peg}$)	-0.393 (0.326)	-1.004** (0.422)	-0.056* (.319)	-0.894** (0.416)
R ²	0.211	0.339	0.158	0.338
N. of observations	1,326	507	1,570	539
N. of countries	125	119	142	128

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix H

Table H1: Effect of CBI on inflation, 1980-2012.

Dependent variable: Inflation rate (log)

Estimation: Fixed Effects with robust standard errors

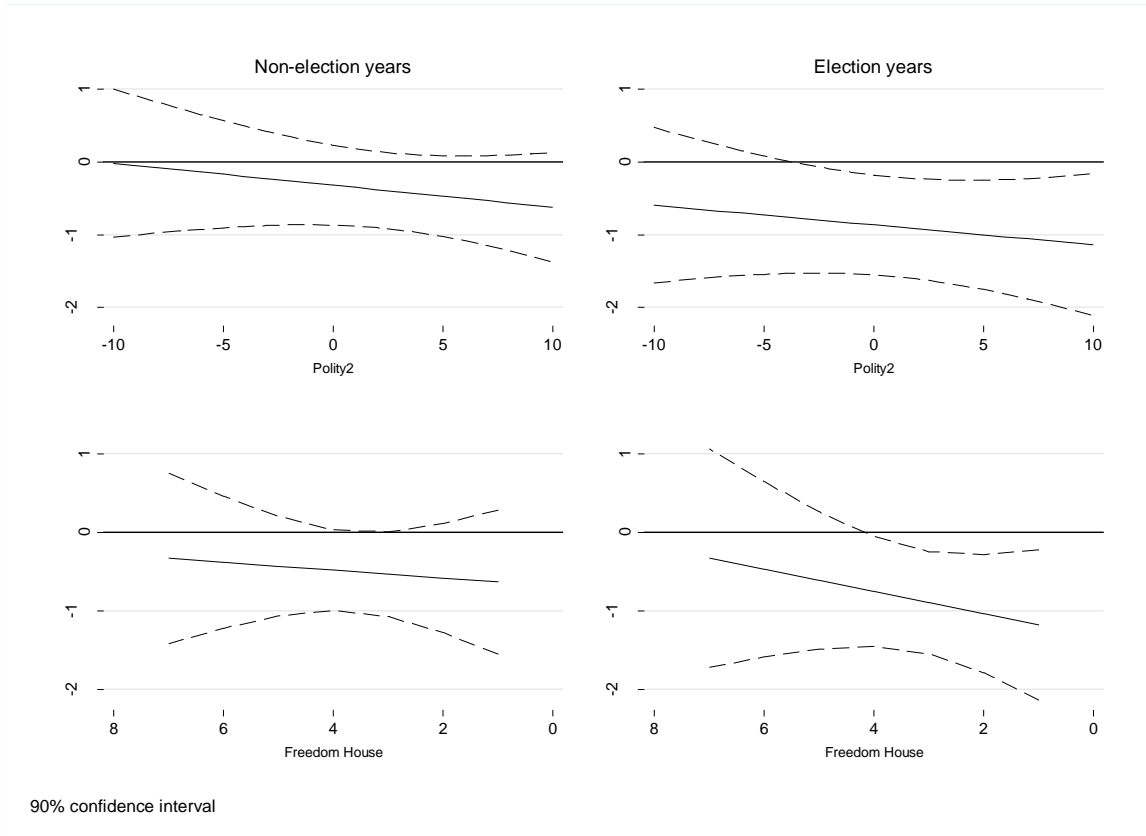
Additional controls: Ideology

	Polity2		Freedom House	
	Non- election years	Election years	Non- election years	Election years
	(1)	(2)	(3)	(4)
CBI	-0.320 (0.332)	-0.866** (0.415)	-0.681 (0.712)	-1.318* (0.737)
Democracy	0.024 (0.022)	0.028 (0.030)	-0.050 (0.095)	-0.157 (0.121)
CBI*Democracy	-0.030 (0.043)	-0.027 (0.046)	0.051 (0.175)	0.142 (0.196)
Inflation _{t-1}	0.319*** (0.048)	0.377*** (0.106)	0.301*** (0.046)	0.376*** (0.044)
GDP per capita _{t-1}	0.262* (0.145)	0.605* (0.328)	0.284** (0.138)	0.533** (0.241)
Trade openness _{t-1}	0.002* (0.001)	-0.003 (0.002)	0.001 (0.001)	-0.003 (0.002)
Peg	-0.170** (0.083)	-0.590*** (0.131)	-0.183** (0.083)	-0.583*** (0.120)
World Inflation _{t-1}	-0.005 (0.019)	-0.012 (0.033)	0.002 (0.020)	-0.005 (0.024)
Fiscal Balance _{t-1}	-0.004*** (0.001)	-0.012** (0.005)	-0.004*** (0.001)	-0.011** (0.005)
Left _{t-1}	-0.193 (0.130)	-0.137 (0.127)	-0.150 (0.105)	-0.146 (0.132)
Total Effect of CBI ($\beta_1 + \beta_3$)	-0.350 (0.321)	-0.893** (0.413)	-0.630 (0.558)	-1.177** (0.581)
R ²	0.201	0.326	0.175	0.324
N. of observations	1262	491	1375	522
N. of countries	120	115	130	124

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Appendix H (cont.)

Figure H1: Marginal effects of *Central Bank Independence* at different levels of *Democracy*.
Additional controls: Ideology



Appendix I

Table I1: Effect of CBI on inflation, 1980-2012.

Dependent variable: Inflation rate (log)

Estimation	Fixed Effects with robust standard errors without <i>lagged DV</i>				Two-step system GMM with Windmeijer (2005) small sample robust correction			
	Polity2		Freedom House		Polity2		Freedom House	
	Non- election (1)	Election (2)	Non- election (3)	Election (4)	Non- election (5)	Election (6)	Non- election (7)	Election (8)
CBI	-0.973** (0.418)	-1.300*** (0.494)	-1.268 (0.940)	-2.345** (1.071)	-0.836 (0.509)	-1.570*** (0.567)	-3.369* (1.885)	-3.880** (1.814)
Democracy	0.029 (0.026)	0.032 (0.034)	-0.033 (0.113)	-0.223 (0.138)	0.004 (0.040)	0.137 (0.103)	-0.180 (0.236)	-0.553* (0.302)
CBI*Democracy	-0.042 (0.052)	-0.041 (0.051)	0.017 (0.217)	0.260 (0.225)	0.013 (0.081)	-0.181 (0.163)	0.387 (0.449)	0.788 (0.541)
Inflation _{t-1}					0.606*** (0.067)	0.611** (0.251)	0.392*** (0.061)	0.458*** (0.147)
GDP per capita _{t-1}	0.344* (0.177)	0.259 (0.268)	0.416** (0.170)	0.254 (0.261)	-0.090* (0.054)	-0.071 (0.152)	-0.202 (0.172)	-0.109 (0.168)
Trade openness _{t-1}	0.002* (0.001)	-0.001 (0.003)	0.003* (0.001)	-0.000 (0.003)	-0.001 (0.001)	-0.003** (0.001)	0.001 (0.002)	-0.002* (0.001)
Peg	-0.261** (0.102)	-0.721*** (0.166)	-0.309*** (0.099)	-0.729*** (0.166)	-0.223*** (0.075)	-0.003 (0.002)	0.002* (0.001)	-0.003 (0.002)
World Inflation _{t-1}	0.047** (0.021)	0.061** (0.031)	0.046** (0.021)	0.071** (0.029)	-0.048*** (0.017)	-0.151** (0.061)	-0.057*** (0.019)	-0.070** (0.028)
Fiscal Balance _{t-1}	-0.005*** (0.001)	-0.002 (0.002)	-0.005*** (0.001)	-0.002 (0.002)	-0.002*** (0.001)	-0.001 (0.005)	-0.003 (0.002)	-0.003* (0.001)
Total Effect of CBI ($\beta_1 + \beta_3$)	-1.015** (0.417)	-1.341*** (0.502)	-1.250 (0.756)	-2.085** (0.879)	-0.823* (0.471)	-1.752*** (0.542)	-2.982* (1.522)	-3.091** (1.375)
R ²	0.109	0.195	0.077	0.189				
N. of observations	1400	527	1658	567	1318	507	1570	539
N. of countries	125	119	142	130	125	119	142	128
<i>Specification tests (p-values)</i>								
Hansen test					0.967	0.563	0.982	0.529
First order serial correlation					0.000	0.080	0.000	0.081
Second order serial correlation					0.057	0.549	0.110	0.736

Robust standard errors in parentheses. All specifications include a constant term, country and decade fixed effects, but we do not report their estimates to preserve space. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Figure I1: Marginal effects of *Central Bank Independence* at different levels of *Democracy*.
 Alternative methodology: Fixed Effects with robust standard errors with *no lag*

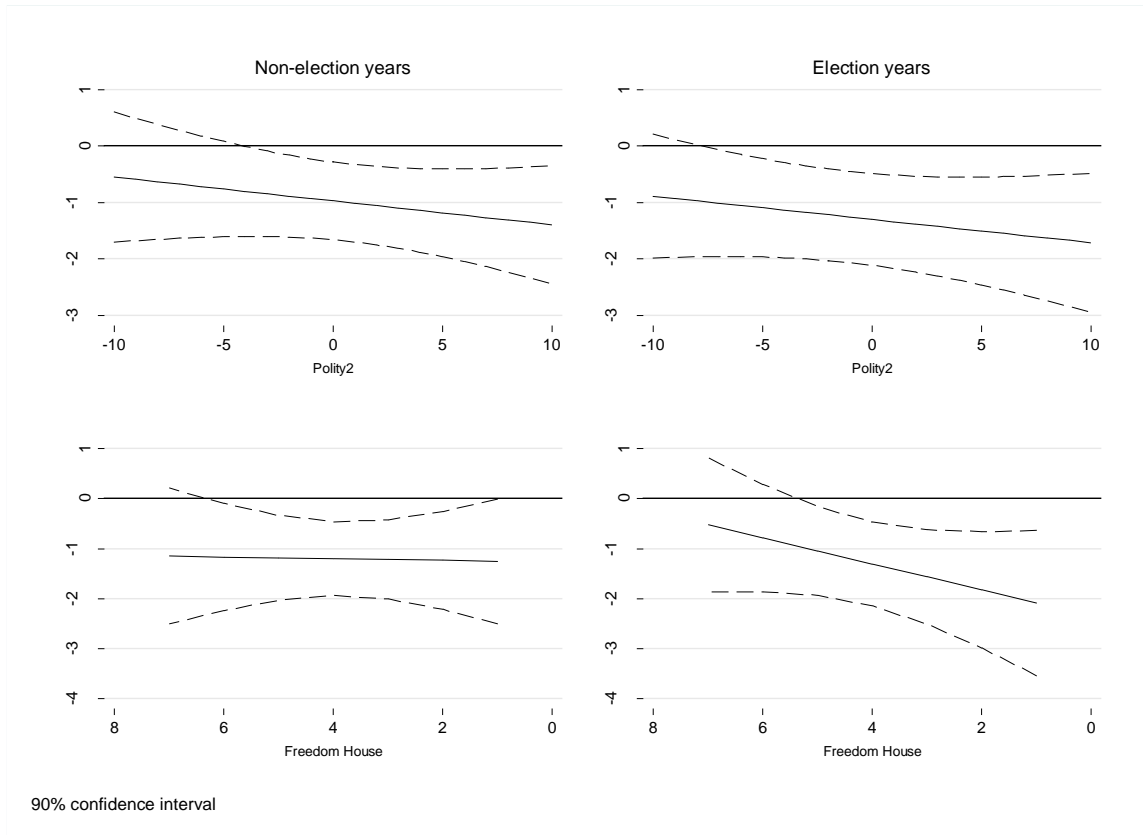


Figure I2: Marginal effects of *Central Bank Independence* at different levels of *Democracy*.
 Alternative methodology: Arellano and Bond (1991) and Arellano and Bover (1995) two-step system GMM.

