Central Bank Independence and Low Inflation: Who Leads the Dance?

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Abstract

One strand of empirical literature finds that central bank independence (CBI) lowers inflation. Another strand of literature finds that low inflation is a key determinant of reform towards increased CBI. This paper investigates whether either variable can be identified as a first instigator. Using the largest CBI dataset to date, this paper applies rolling balanced-panel Granger causality tests between CBI reform and changes in inflation. For advanced economies, CBI reform is found to significantly lead disinflation, while there is no Granger causality in the opposite direction. Instead, among emerging and developing economies, CBI reforms tend to follow quickly upon disinflation episodes, while the lags from CBI reform to disinflation are long. An interpretation is that in emerging and developing economies CBI reform often followed on crises that involved high inflation, whereas in various advanced economies a shift in thinking about central banking first triggered CBI reform.

Keywords: Central bank independence; Monetary reform; Price stability; Granger causality.

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Central bank independence (CBI) is widely regarded as a pillar of effective monetary policy frameworks.[1] Indeed, this notion of effectiveness is borne out by a sizeable empirical literature, documenting the impact of CBI on a country's ability to attain price stability: most studies find that CBI significantly lowers inflation.[2] However, a higher degree of central bank independence does not arise in isolation. What determines whether a country undertakes reforms towards increased CBI? Here, another strand of empirical literature shows that low inflation is itself a key determinant of CBI.[3]

These strands of the literature point at the potential for positive reinforcement: a virtuous cycle between CBI and price stability. But this begs the question which variable is the first instigator. Do steps towards increased CBI lead to lower inflation, which subsequently strengthens the initial political impetus towards CBI? Or is CBI the crowning achievement of a successful disinflation program, an achievement that in turn further reduces inflation down the road?

This question centers not on the causality between CBI and inflation, since the existing literature has already found confirming evidence in both directions, but rather on leads and lags. Can either variable be said to lead the other? Put differently, this is a matter of Granger causality: does one variable dominate the other in a time-series sense? This question is novel to the literature, probably because assessing it requires long time series, which until quite recently were not available for CBI for a large sample of countries. However, Garriga (2016) codes CBI for 182 countries, starting at the earliest in 1970 and ending in 2012. Her dataset includes 382 identified instances of CBI reform, of which 276, 50 and 56 instances, respectively, resulted in higher, unchanged, and lower CBI.[4] With this data in hand, we possess variation over a long enough horizon to apply a Granger causality analysis on CBI and inflation.

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[1] See, e.g., de Haan and Eijffinger (2018), Goodhart and Lastra (2018), Laurens et al. (2015), and Masciandaro and Romelli (2015).

[2] See the overviews of the literature in Berger et al. (2001), Garriga and Rodriguez (2020), and Klomp and de Haan (2010).

[3] See, e.g., Agur (2018, 2019), Dincer and Eichengreen (2014), and Garriga (2016).

[4] Garriga (2016) applies the most common CBI index methodology, developed by Cukierman et al. (1992). This index measures *de jure* independence. While this does not always translate into *de facto* independence, *de jure* independence of a central bank is often a prerequisite for *de facto* independence and successful monetary reform more broadly (Cukierman, 2008).

To this end, we use the Granger causality test for panel data developed by Dumitrescu and Hurlin (2012).[5] This test requires a balanced panel, however, while various countries enter the CBI sample of Garriga (2016) in different years (for example, former Soviet states in the 1990s). Our approach is to use rolling starting years. That is, whenever a new country enters the data, we run a new panel Granger causality test for the sample from that point on. This is seen in Table 1, which splits results between advanced and emerging/developing economies.[6]

In this table, the columns "Starting year" and "# Countries" refer to the starting year of a given balanced panel, and the number of countries included in it. Thus, for advanced economies, there are 27 countries from 1971 onwards; in 1994, an additional country is added to the sample, and a new balanced-panel Granger causality test is run for this sample. Instead, for emerging and developing economies, the number of changes to the sample over time is much larger, as the sample gradually grows from 38 to 66 countries, and we conduct a total of 11 balanced sample tests with different starting years. The column "# Obs" gives the number of observations contained in each balanced sample.

As Granger causality tests rely on stationary time series, while both the CBI index and inflation are nonstationary variables for many countries in our sample, we take the first differences of both series. That is, we consider Granger causality between changes in CBI and changes in inflation.[7]

Another central choice in conducting a Granger causality analysis is the selection of lag lengths. Here, we wish to cast a wide net, and proceed in two steps. These two steps are designed to capture the full span of significant lag lengths, from the longest lag length that is optimal according to an established criterion, to the shortest lag length that retains statistical significance. In the first step, we use the AIC criterion to determine the optimal lag length for a given balanced sample. The AIC criterion is known to select relatively long lags, and the interplay between CBI and inflation could plausibly take many years to fully materialize.[8]

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[5] See also Lopez and Weber (2017).

[6] Advanced economies are defined as countries that are members of the OECD by the end of the sample period.

[7] The inflation data (based on annual, end-of-period CPI indices) is sourced from IMF-WEO and IMF-IFS.

[8] We also check outcomes with Hannan-Quinn (HQC) and Bayesian (BIC) information criteria. The HQC gives the same results as the AIC for all our (sub)samples. Instead, the BIC always selects a single lag, which is not economically meaningful here, leaving too little time for the interaction between CBI and inflation to play out.

In the next step, we then trim the lag length, finding the shortest lag length (if any) for which Granger causality remains significant at 5%. For instance, in Table 1, the balanced sample starting in 1971 for advanced economies indicates (column "dCBI→dInf") that CBI Granger causes inflation at 1% significance when using the AIC lag length, while the "Shortest lag" column shows that this direction of Granger causality remains significant at 5% when shortening the lag length to 6 (but not for shorter lag lengths). Instead, the "X" in the "dInf→dCBI" column means that inflation here does not Granger cause CBI reform for any of the lag lengths in the two-step procedure.

Overall, Table 1 shows that in advanced economies CBI reform led inflation. Instead, in emerging and developing economies, Granger causality runs both ways. Nevertheless, by looking at the outcomes for lag lengths for these countries, we see an important difference between the two directions of Granger causality. In emerging and developing economies inflation Granger causes CBI reform quickly (at shorter lags) than vice versa, particularly when looking at the longer (pre-1990 starting date) samples.

An interpretation of these findings is that in advanced economies, in general, CBI reform initially came about from an ideological shift in thinking about central banking, rather than emanating from economic turbulence.[9] Instead, in various emerging and developing economies, CBI reform followed upon the resolution of crises. The exit from a crisis, including a successful disinflation program, could see increased CBI enshrined as a next step, a commitment device to help prevent future inflationary episodes.[10] With a longer lag, such CBI reform would subsequently lead to a further reduction in inflation.

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[9] See, for instance, Goodhart and Lastra (2018) who discuss the relation between changing socio-political attitudes in advanced economies and the degree of independence granted to the central bank. Seminal early contributions that affected the discourse on politics and central banking, and thereby the attitude towards CBI, include Barro and Gordon (1983) and Rogoff (1985).

[10] For example, Abiad and Mody (2005) find that in developing countries, financial sector reform often followed on crises, and that reform is path dependent, with an initial impetus triggering further steps.

Table 1 also reports the results for all countries combined, as well as separating countries according to whether they are inflation targeters.[11] The results are all similar to those for emerging and developing countries, due to this group's preeminence in our sample.[12]

Table 2 conducts our first robustness exercise. For various developing countries, Garriga (2016) codes the direction of CBI reform (up; neutral; down), but not the exact level of the CBI index. Table 2 reports the same rolling balanced-panel Granger causality tests using the direction dummy variable rather than the change in the CBI index. While the number of developing countries in the sample rises considerably, the results remain in line with Table 1.

Our second robustness exercise considers the turnover of central bank governors, documented by Dreher et al. (2010), as an alternate measure of CBI.[13] Turnover of central bank governors outside of normal (re-)appointment windows is often indicative of political interference, and hence reduced CBI. Table 3 shows our outcomes when using the dummies for irregular turnover of Dreher et al. (2010). For advanced economies, the outcomes resemble Table 1. For emerging and developing countries, a more regular turnover also Granger causes inflation deceleration. However, for these countries, the result that lower inflation Granger causes higher CBI is less clear (differs by sample length) when using the turnover measure.

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[11] Identified using the IMF AREAER database, and applied to the most recent sub-sample, as inflation targeting only gained prominence in the 1990s.

[12] While most emerging and developing countries are not inflation targeters, enough of them are that they constitute a slight majority of the inflation targeting group too.

[13] An updated version of their dataset is available at kof.ethz.ch/en/data/data-on-central-bank-governors.html. Also note that in Table 3 there are fewer advanced economies than in Table 1, because there is no governor turnover data available for Euro Area countries after the formation of EMU.

Table 1: Rolling panel Granger causality tests between CBI index and inflation (both in first differences).

Significance: ***=1%; **=2%; *=10%; X = not statistically significant. Shortest lag: see main text.

	Advanced economies						Emerging and Developing countries					
Starting year	# Countries	# Obs	dCBI->dInf	Shortest lag	dInf->dCBI	Shortest lag	# Countries	# Obs	dCBI->dInf	Shortest lag	dInf->dCBI	Shortest lag
1971	27	1134	***	6	X	None	38	1596	***	4	***	1
1976							40	1480	***	3	***	1
1980							41	1353	***	3	***	1
1981							42	1344	***	4	***	1
1982							45	1395	***	6	***	1
1983							47	1410	***	5	***	1
1984							48	1392	***	4	***	1
1987							49	1274	***	3	***	1
1992							54	1134	***	1	***	1
1993							60	1200	***	1	***	1
1994	28	532	***	1	X	None	66	1254	***	1	***	1

	All countries					
Starting year	# Countries	# Obs	dCBI->dInf	Shortest lag	dInf->dCBI	Shortest lag
1971	65	2730	***	5	***	1
1976	67	2479	***	5	***	1
1980	68	2244	***	3	***	1
1981	69	2208	***	3	***	1
1982	72	2232	***	3	***	1
1983	74	2220	***	3	***	1
1984	75	2175	***	3	***	1
1987	76	1976	***	3	***	1
1992	81	1701	***	2	***	1
1993	87	1740	***	1	***	1
1994	94	1786	***	1	***	1

	Inflation targeters						Countries that are not inflation targeters					
Starting year	# Countries	# Obs	dCBI->dInf	Shortest lag	dInf->dCBI	Shortest lag	# Countries	# Obs	dCBI->dInf	Shortest lag	dInf->dCBI	Shortest lag
1994	26	494	***	1	***	1	68	1292	***	1	***	1

Table 2: Rolling panel Granger causality tests between CBI reform direction and inflation changes

| | Advanced economies | | | | | | Emerging and Developing countries | | | | | |
Starting year	# Countries	# Obs	dir->dInf	Shortest lag	dInf->dir	Shortest lag	# Countries	# Obs	dir->dInf	Shortest lag	dInf->dir	Shortest lag
1971	27	1134	***	4	X	None	51	2142	***	4	***	1
1973							52	2080	***	4	***	1
1974							56	2184	***	5	***	1
1975							58	2204	***	4	***	1
1976							63	2331	***	7	***	1
1977							65	2340	***	6	***	1
1979							66	2244	***	6	***	1
1981							67	2144	***	6	***	1
1982							70	2170	***	6	***	1
1983							71	2130	***	6	***	1
1991							73	1606	***	2	***	1
1992							78	1638	***	2	***	1
1993							81	1620	***	1	***	1
1994	28	532	***	1	X	None	86	1634	***	1	***	1

Table 3: Rolling panel Granger causality tests between irregular central bank governor turnover and inflation changes

| | Advanced economies | | | | | | Emerging and Developing countries | | | | | |
Starting year	# Countries	# Obs	turn>dInf	Shortest lag	dInf->turn	Shortest lag	# Countries	# Obs	turn->dInf	Shortest lag	dInf->turn	Shortest lag
1971	18	756	***	3	X	None	39	1638	***	6	***	7
1972							42	1722	***	6	***	7
1973							45	1800	***	6	***	6
1974							48	1872	***	4	***	6
1975							52	1976	***	4	***	5
1976							55	2035	***	4	***	5
1977							56	2016	***	5	***	5
1979							57	1938	***	4	X	None
1980							59	1947	***	4	X	None
1981							60	1920	***	3	X	None
1982							62	1922	***	3	X	None
1983							63	1890	***	3	X	None
1993							64	1280	***	2	X	None
1994	18	342	***	3	X	None	68	1292	***	2	X	None

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