Online Appendix

This is the online appendix that accompanies the paper, "The Limits of Central Bank Independence for Inflation Performance." It includes:

- Additional details regarding the dataset, including construction details and sources (Section A.1);
- Preliminary statistical tests of the data (Section A.2);
- Additional tables, including summary statistics and sample coverage (Section A.3);
- Historical case studies (Section A.4);
- Replications of the fixed-effect benchmark (Section A.5);
- Regressions with a decomposition of the independence measure into subcomponents (Section A.6);
- Regressions with the variability of inflation as the dependent variable (Section A.7).

A.1 Details on data

A.1.1 Data construction

Central bank *independence* data were constructed by Garriga (2016), building on the work of Cukierman *et al.* (1992). The four dimensions used to code greater levels of (*de jure*) central bank independence are:

- Insulation of central bank officials from political influence regarding appointment and tenure;
- Freedom from government interference in policy conduct, and from decisions being overturned;
- Inclusion of a price stability goal (whether solely or as one of several objectives) in the central bank's legal mandate; and
- Financial independence that imposes restrictions that limit lending to the government.

For *inflation*, data for a number of country-years within the main data frame were not available (Congo in 1997 and 1998, Jordan in 1986). These were linearly interpolated.

For *democracy*, interregna years were dropped (as discussed in Section 4.3 of the main text). For the *polity* data (used in robustness checks), the values for the previous year were used to replace missing data (Kuwait in 1990, Solomon Islands in 2003).

For *turnovers* (used in robustness checks), turnovers coded as "no central bank exists" (-999) or "indefinite term of office" (-666) were recoded as missing, while all other nonstandard identifiers—for instance, first governor after unavailable data (-991), or nth reappointment (-771—774)—were recoded as zero.

On data transforms: in general, the algorithm used to transform variables was that any measure that included zeros or negative values were transformed via the inverse hyperbolic sine transformation, otherwise they were transformed using the natural logarithm. Exceptions to transforms were made when a transform would be excessively distort the original cardinal scale (this applied, in particular, to the democracy and polity measures, which ranged from 0–10 and -10–10, respectively).

For the five-year averaged data, we took consecutive five-year averages between 1970 and 2012. For countries where doing so would result in the inclusion of observations from less than five years, the average was taken over the available years.

A.1.2 Definitions and sources

Table A.1: Definitions and sources of variables

Variable	**Definition and construction**	**Data source(s)**[†]
	Main dependent variable and alternatives	
Inflation	Annual change in the consumer price index (2010=100)	IFS/WDI
WPI inflation	Annual change in the wholesale price index (2010=100)	IFS/WDI
GDP deflator	Annual change in the GDP deflator (2010=100)	WDI
	Main independent variables and alternatives	
Independence	Weighted central bank independence constructed on 4 dimensions	Garriga (2016)
Alt. independence	Weighted central bank independence constructed on 4 dimensions	Bodea & Hicks (2015)
Democracy	Institutionalized democracy conceived along 3 dimensions	Polity IV
Alt. democracy	Political constraints across 5 government branches with veto power over policy	Henisz (2000)
Pol. constraints	Machine learning-based democracy index	Gründler & Krieger (2016)
Spatial democ.	Unweighted average of democratic development among geographical neighbors	Bjørnskov & Rode (2019)
	Additional controls	
Per capita income	Gross domestic product per capita in constant 2010 USD	WDI
Real growth	Annual change in GDP in constant 2010 USD	WDI
Gov consumption	General government final consumption expenditure in 2010 USD	WDI
Exchange rate change	Change in nominal exchange rate relative to USD	WDI
Exchange rate regime	Extent of fixity of exchange rate regime	Ilzetzki, Reinhart & Rogoff (2019)
Dependency ratio	Age dependency ratio as share of working age population	WDI
Public debt	Central government debt as share of GDP	WDI
Interest rate	Real interest rate	IFS/WDI
Unemployment rate	Unemployment as share of labor force	WDI
Enrollment	Gross school enrollment in secondary education	WDI
Commodity prices	Nominal energy/food/metals commodity index (2010=100)	WBCD
Transparency	Degree of information disclosure along 5 dimensions	Dincer & Eichengreen (2014)
Turnover	Number of actual turnovers of the central bank governor	Dreher *et al.* (2008)

[†] IFS = International Financial Statistics, WDI = World Development Indicators, WBCD = World Bank Commodity Database

A.2 Details on preliminary tests

We test for stationarity in the data using Fisher-type panel unit root tests (Choi 2001), which automatically account for the presence of cross-sectional dependency. Table A.2 includes test statistics for the both the inverse χ^2 as well as the inverse normal Z; the latter are suitable for panels with $N \Rightarrow \infty$, which may or may not be the case for our application ($N = 149$). For all three variables of interest, we include tests when only the constant is included (upper panel), as well as when there is both a constant and trend (lower panel).

By and large, the tests suggest that the panel is stationary. However, for both independence and democracy, the inverse normal statistic fails to reject the null of a unit root when only a constant is included. We conclude that accounting for time effects is important for our analysis, and we further consider the explicit inclusion of a trend as a control in our robustness checks.

Table A.2: Panel unit root tests[†]

	Inflation	Independence	Democracy
	with constant only		
Inverse χ^2	1167.5***	422.1***	582.4***
Inverse normal Z	-20.8***	2.1	-1.3
	with constant and trend		
Inverse χ^2	1046.7***	689.1***	689.6***
Inverse normal Z	-17.5***	-2.6***	-5.0***

[†] The null hypothesis is the existence of a unit root. Variables were demeaned in order to minimize cross-sectional dependence. The augmented Dickey-Fuller test reports both the inverse χ^2 (for finite N) and the inverse normal Z (for N large). * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

We test for weak cross-sectional dependency (rather than full independence) in our application, which is more appropriate given its size (Pesaran 2015). These are reported in Table A.3, with test statistics are adjusted for the unbalanced nature of the panel. The tests all reject the null of weak dependence, indicating the need to account for cross-sectional dependence in our analysis. We therefore cluster errors by year all specifications where clustering is.

In general, the panels were too short to accommodate panel cointegration tests.

Table A.3: Panel cross-sectional dependency tests[†]

	Inflation	Independence	Democracy
Pesaran CD α	38.15^{***}	260.12^{***}	148.09^{***}

[†] The null hypothesis is the existence of only weak cross-sectional dependence in the residuals. The Pesaran test reports the CD statistics using all available observations. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

A.3 Additional tables

Table A.4: Summary statistics for main variables of interest, full panel[†]

Variable	**N**	**Mean**	**Std Dev**	**Min**	**Max**
			Full sample		
Inflation	4,398	2.511	1.413	-3.590	10.769
Independence	4,398	0.497	0.207	0.0167	0.904
Democracy	4,294	5.312	4.098	0.000	10.000
Per capita income	4,242	8.349	1.533	5.102	11.626
Real growth	4,246	1.589	1.538	-4.822	5.704
Gov consumption	3,916	3.356	0.412	0.817	5.218
			High income		
Inflation	1,529	2.191	1.236	-3.564	8.006
Independence	1,529	0.484	0.227	0.097	0.894
Democracy	1,518	7.767	3.727	0.000	10.000
			Developing		
Inflation	2,794	2.641	1.437	-3.590	10.065
Independence	2,794	0.505	0.195	0.017	0.904
Democracy	2,715	3.954	3.644	0.000	10.000

[†] Middle and bottom panels correspond to summary statistics by income group. Summary statistics are for the transformed variables used in the full working sample, but statistics may vary depending on the available sample for a given specification.

Table A.5: Correlation matrix for main variables of interest

	Inflation	Independence	Democracy
Inflation	1.000		
Independence	-0.196	1.000	
Democracy	-0.029	0.151	1.000

Table A.6: Sample of countries[†]

Albania[‡]	Ghana	Nicaragua
Algeria	Greece	Niger
Armenia[‡]	Guatemala	Nigeria
Australia	Guinea	Norway
Austria	Guinea-Bissau	Oman
Azerbaijan	Guyana	Pakistan
Bahrain	Haiti	Panama
Bangladesh	Honduras	Papua New Guinea
Belarus[‡]	Hungary[‡]	Paraguay
Belgium	India	Peru
Benin	Indonesia	Philippines
Bhutan	Iran, Islamic Rep.	Poland[‡]
Bolivia	Iraq	Portugal
Botswana[‡]	Ireland	Qatar
Brazil	Israel	Russian Fed.[‡]
Bulgaria[‡]	Italy	Rwanda
Burkina Faso	Jamaica	Saudi Arabia
Burundi	Japan	Senegal
Cabo Verde	Jordan	Sierra Leone
Cambodia[‡]	Kazakhstan	Singapore
Cameroon	Kenya	Slovak Republic[‡]
Canada	Korea, Rep.	Slovenia[‡]
Cent. Afr. Rep.	Kuwait	Solomon Islands
Chad	Kyrgyz Republic[‡]	South Africa
Chile	Lao PDR[‡]	Spain
China[‡]	Latvia[‡]	Sri Lanka
Colombia	Lebanon	Sudan
Comoros	Lesotho	Suriname
Congo, Rep.	Liberia	Sweden
Costa Rica	Libya	Switzerland
Croatia[‡]	Lithuania[‡]	Syr. Arab Rep.[*]
Cyprus	Luxembourg	Tajikistan[‡]
Czech Republic[‡]	Macedonia, FYR[‡]	Tanzania
Côte d'Ivoire	Madagascar	Thailand
Denmark	Malawi	Togo
Djibouti[*]	Malaysia	Trin. and Tob.[*]
Dominican Rep.	Mali	Tunisia
Ecuador	Mauritania	Turkey
Egypt, Arab Rep.	Mauritius	Uganda
El Salvador	Mexico	Ukraine[‡]
Equatorial Guinea	Moldova[‡]	Utd. Arab Emr.
Estonia[‡]	Mongolia	United Kingdom
Ethiopia[*]	Montenegro[‡]	United States
Fiji	Morocco	Uruguay
Finland	Myanmar	Venezuela, RB
France	Namibia	Yemen, Rep.[*]
Gabon	Nepal	Zambia
Gambia, The	Netherlands	Zimbabwe
Georgia[‡]	New Zealand	

[†] Countries that were excluded (due to data limitations) from the preferred specification (I2) and (I4) are denoted with an asterisk.
[‡] Countries classified as transition economies.

A.4 Strong independence need not result in low inflation: some historical examples

In this appendix, we document a number of historical cases where central bank independence, *per se*, did not—for various reasons—induce the pursuit of lower inflation.

The best-known example of has to do with the Federal Reserve during the period of the Great Inflation. Starting in January 1965, consumer price inflation rose from 1.1 percent to peak at 13.7 percent in March 1980, before declining in 1983. The episode is well-studied, and a number of explanations have been advanced as to the causes. We will not revisit this debate, but a number of key choices were undeniably influential. These included the decision by McChesney Martin, the then-Chair of the Board of Governors, to define Fed independence as one of limited actions "*within* the government, not independent *of* it" (Meltzer 2005, p. 153, *emphases* added). Consequently, Martin acquiesced to financing any budget approved by Congress in the interest of "policy coordination," including deficit financing under President Lyndon Johnson.

By the time Arthur Burns assumed the role of Chairman, the Fed had sacrificed so much on the altar of policy coordination that he was either unwilling or unable to carry through any anti-inflation program that also entailed heavy costs in terms of unemployment (Meltzer 2009). Indeed, even while Burns remained keenly aware that any failure to undertake decisive action on monetary policy would lead to an outbreak of inflation, his unwillingness to "irritate his chief executive [Nixon]" and his desire to be "in his president's good graces" (Shlaes 2019, p. 3) led him to pursue far-too-timid increases in interest rates.

Throughout this period, the laws governing the Fed remained unchanged, and the institution retained the same formal degree of independence throughout. Yet it is clear that personal and political beliefs, together with political objectives, preempted any more decisive action to stem the rise of inflation. With inflation-suppression policies decidedly second-order relative to those that supported employment, high prices were exacerbated and became entrenched as a result of the oil price shocks of 1973–74. Thus, even a central bank possessing a high degree of formal independence may choose not to exercise its and instead pursue non-price stabilization objectives, with potential inflationary consequences.

Japan offers another cautionary tale. Throughout much of Japan's postwar economic history, the Bank of Japan (BoJ) was only nominally independent. This remained the case during the runup to its massive stock market bubble that burst in 1992; yet during that period, inflation remained very much under control, averaging 1.9 percent annually in the decade prior. The BoJ only gained full independence in 1997, when a revision to the Bank of Japan Act limited the government's authority to checking whether the BoJ's actions satisfied its stipulated rules and regulations.[42] But independence was followed by two decades of disinflation and outright deflation, rather than price stability.

One possible reason why the BoJ may have been less than successful in managing such negative price pressures may be because of the institution is constrained in its

[42]The revision, approved in June 1997, came into force in April 1998. Central bank reform took the cue from the international movement toward greater monetary authority autonomy, but also had domestic roots as lawmakers sought to re-establish BoJ credibility in the wake of the 1992 crisis (Dwyer 2004).

ability to independently execute monetary policy. The Bank of Japan Act officially requires the institution to "buy and sell foreign exchange as an agent handling national government affairs... at the request, or upon approval, of the Minister of Finance" (Art. 40, Sec. 2–3). In practice, the necessity of executing exchange rate policy—with an explicit purpose of "stabiliz[ing] the exchange rate of the national currency" (Art. 7, Sec. 3)—has meant that the BoJ has had to engage in near-universal sterilization of BoJ currency interventions (Ito 2003), to contain its impact on domestic credit. In addition to complicating the day-to-day management of the money supply, this mixed mandate almost certainly interfered with the conduct of monetary policy proper. At the onset of Japanese deflation, economists repeatedly advocated for more aggressive monetary growth to counter the liquidity trap faced by the economy (Bernanke 2000; Krugman 1999); some even advanced a "foolproof way" to escape deflation via the exchange rate (Svensson 2003). Yet this was never pursued in earnest, because doing so would have excessively weakened the *yen*,[43] which would have contravened (or at the least, been detrimental to) the BoJ's currency stability goals.

Even in cases when central banks do not face multiple or conflicted targets, independence alone has seldom been sufficient for keeping the lid on inflation, especially in settings where democratic norms are yet to fully coalesce. This has been most evident across Latin America, especially during the region's hyperinflationary period. For instance, even after the functions of the Banco Central do Brasil (BCB) were formally separated from those of the National Treasury—as a result of the reorganization of government finances in 1987, which substantially increasing the independence of the central bank[44]—inflation remained in the triple digits, and remained so for seven years (peaking at 2,076 percent in 1994).[45] In the end, it was the *Plano Real*, introduced in 1994, that broke the back of inflation.

If anything, Brazil's nascent democracy probably exacerbated efforts aimed at taming inflation. The return to democracy in 1985 had led to a proliferation of budgetary demands, giving rise to a large fiscal deficit. It was the installation of Itamar Franco as president—who, owing to a lack of interest in economic affairs, simply signed off on ministerial requests—that finally depoliticized the fiscal process. This allowed the BCB to exploit a constitutional amendment passed in 1994 that allowed it to decline implementation of the budget; this, in effect, empowered the central bank and the Treasury to subvert democracy (Franco 1995).

Even in the Latin American economies where hyperinflation was not as chronic, inflation did not appear to have been reined in by increases in central bank independence.

[43] Although the Ministry of Finance had often favored a weak currency, the required real depreciation would have been to the order of 20–25 percent (Krugman 1999), a figure that would almost certainly have been unacceptably large. In any case, the Bank of Japan Act subordinates foreign exchange policy to the Ministry of Finance, thereby constraining any currency action available to the BoJ.

[44] It is worth noting that this *de jure* independence likely followed from externally-imposed conditionalities associated with IMF loans in the late 1980s and early 1990s. Consequently, it is entirely possible that the BCB's *de facto* independence may have been much weaker; indeed, we draw this distinction and study this possibilty more carefully in Section 6.2.

[45] One proximate cause for persistent inflation was the widespread practice of wage indexation, which may have contributed to the phenomenon of inertial inflation; however, this conclusion has been challenged empirically in models that allow for price stickiness (Durevall 1999).

Bolivia underwent its hyperinflation phase between 1978 and 1986—with the worse of its inflation spike occurring in 1984 and 1985, when rates jumped to 1,281 and 11,750 percent, respectively—but the Banco Central de Bolivia saw no change in its autonomy until 1995, when inflation had already returned to single and low-double digits. Moreover, while Bolivia experienced a democratic opening between 1982–85, the Hernan Siles Suazo administration chose to honor its large external debt obligations in an effort to shore up internal legitimacy (Kehoe, Machicado & Peres-Cajías 2019). This set the stage for an economic crisis that included hyperinflation.

One final case is worth highlighting, mainly because of its transmission channel. Like many transition economies, Latvia underwent a period of extremely high inflation after independence in 1990. By 1992, inflation was 952 percent, and the Supreme Council of the Republic moved quickly to establish a new monetary authority. Taking the cue from the experience of the *Bundesbank*, the *Latvijas Banka* was immediately vested with substantial autonomy (Bitāns & Purviņš 2012); indeed, between 1992 and 2001, the legal independence of the central bank was comparable to that of the Federal Reserve. This decision proved very sound, and with the introduction of a domestic currency (the *lats*), imported inflation from abroad fell rapidly, falling to the 2s by the end of the decade.

Following a positive Financial System Stability Assessment (FSSA) by the IMF and World Bank in 2001, a number of moves further strengthened the independence of the central bank, including more binding restrictions on lending to the Ministry of Finance. In spite of this almost-doubling of (*de jure*) independence—a state of affairs that would persist through till today—the central bank never quite secured price stability. Indeed, whereas average inflation over the five-year period just prior to the FSSA was 4.2 percent, this grew to 9.0 percent for the five years just prior to the global crisis (*after* the central bank had increased its independence). This could easily have been attributed to a host of external factors, but in 2018, Ilmars Rimsevics—the Governor of the Bank of Latvia—was dismissed on corruption charges, for accepting bribes over the course of a money laundering scandal (Eglitis & Speciale 2018).[46] Having been in the position since 2001, the high degree of independence of the central bank may, ironically, have enabled political side payments of this nature.

[46]Rimsevics has since seen his dismissal challenged by the European Court of Justice, on the basis of insufficient evidence; however, he remains relieved of his position, and no trial has yet been set.

A.5 Replicating the fixed-effect benchmark

In this appendix, as a counterpoint to our causal analysis, we replicate a number of standard approaches in the literature, using our expanded dataset. In addition to obtaining a benchmark, we also contribute to the extant literature by including two-dimensional fixed effects (for country and year), along with multi-way clustering of errors (along region and time). We also allow for the possibility of dynamics by introducing a lagged dependent term. In effect, this set of estimates consider models of the form:

$$\begin{aligned}\pi_{it} = \phi_F \pi_{i,t-1} + \beta_F CBI_{it} + \delta_F DEMOC_{it} + \kappa_F CBI_{it} \times DEMOC_{it} \\ + \mathbf{X}'_{i,t-1}\mathbf{\Gamma_F} + \alpha_i + \alpha_t + \epsilon_{it},\end{aligned} \tag{A.1}$$

where, following the main text, π, CBI, and $DEMOC$ are inflation, central bank independence, and democratic representation, respectively, and $\mathbf{X}$ is a vector of lagged controls (to contain simultaneity bias). α_i and α_t are, respectively, spatial and temporal fixed effects. Following much of the rest of the literature that works with inflation at the annual frequency, we generally set $\phi_f = 0$, although we consider a number of lagged dependent specifications that require us to estimate least squares dummy variables with a correction for Nickell (1981) bias (Bruno 2005). We also set $\kappa_F = 0$ for the majority of the specifications, introducing the interaction term only to situate our results relative to the existing literature. In most standard cases, $\epsilon \sim N(0, \sigma_\epsilon^2)$ is the idiosyncratic innovation, with the possibility of $E(\epsilon_i \epsilon_j) \neq 0 \; \forall i \neq j$ if i and j belong to the same cluster.

The results for various specifications of (A.1) are reported in Table A.7. The first two columns are the most basic specifications: one with only our variables of interest (independence and democracy) as regressors, and the next with a parsimonious set of controls (these were chosen to both align with the covariates commonly applied in the literature, while simultaneously minimizing sample attrition). The specifications also include two-way (country and year) fixed effects, to address unobserved heterogeneity along the two main dimensions. The next two columns repeat the same two specifications, but now we further include two-way clustering of errors (by year and region[47]). The next two columns introduce interactions between the two, while the final column allows for the possibility of inflation persistence by including a lagged dependent variable.

By and large, the results comport with those in the literature. First, we verify the negative relationship between central bank independence and inflation performance, even after controlling for the effects of democracy (which, as expected, is positively related to independence). These effects are statistically significant—typically at the 1 percent level—and economically so, with an average elasticity bound by the range $[-1.02, -0.05]$. The results are also fairly robust, surviving the inclusion of a standard set of controls, as well as two-way clustering of errors.

Second, in the cases where interaction terms are included (columns F5–F6), the conditional effect of independence on inflation is likewise negative. That is, given a certain

[47]Our choice of clustering by region follows the conventional approach of accounting for within-cluster correlations at the level higher than the panel unit (Cameron & Miller 2015). It is also consistent with the observed pattern of regional "waves" of democratization (Huntington 1991). In the absence of an intuitively-evident higher ordering for time, we continue to cluster by year for the additional dimension.

Table A.7: Panel fixed effects models for inflation and central bank independence[†]

	(**F1**)	(**F2**)	(**F3**)	(**F4**)	(**F5**)	(**F6**)	(**F7**)	(**F8**)
Independence	-1.017	-0.818	-1.012	-0.793	-0.170	-0.054	-0.457	-0.432
	(0.280)***	(0.276)***	(0.215)***	(0.317)**	(0.456)	(0.436)	(0.136)***	(0.158)***
Democracy	0.040	0.042	0.043	0.043	0.086	0.080	0.023	0.020
	(0.016)**	(0.016)***	(0.015)**	(0.012)**	(0.026)***	(0.022)***	(0.012)**	(0.010)**
Independence × Democracy					-0.115	-0.100		
					(0.050)**	(0.050)**		
Lagged dep?	No	No	No	No	No	No	Yes	Yes
Controls?	No	Yes	No	Yes	No	No	No	Yes
Fixed effects:								
Time?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2 (adj.)	0.239	0.274	0.462	0.503	0.241	0.371	0.528	0.519
R^2 (w/in)	0.247	0.283			0.249	0.380	0.425	0.436
Estimation	FE	FE	FE	FE	FE	FE	LSDV-C	LSDV-C
Errors	HAC	HAC	Clustered	Clustered	Clustered	Clustered	Bootstr.	Bootstr.
Ctry (yr)	149 (43)	144 (42)	149 43	144 (42)	149 (43)	143 (42)	149 42	144 (42)
Obs.	4,323	3,716	4,262	3,679	4,323	3,540	4,179	3,716

[†] The dependent variable is the inverse hyperbolic sine transformation of CPI inflation. Control variables are GDP per capita, real GDP growth, and government consumption expenditure, all lagged one period and expressed in either inverse hyperbolic sine or natural logarithm transforms (as indicated in the data appendix). A constant term was included in all regressions, but not reported. Heteroskedasticity and autocorrection-robust standard errors are given in parentheses, or otherwise clustered/bootstrapped as indicated. Lagged-dependent bias correction initialized by the Arellano-Bond estimator, approximated up to $O(1/NT^2)$. Goodness-of-fit measures report the adjusted R^2 and within R^2. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

degree of democratic development, an independent central bank is associated with a lower level of inflation.[48] Given that both the level and interaction terms are negative, the total effect is also negative, and hence consistent with no-interaction model.

Finally, accounting for lagged effects does little to alter the conclusions above. While the magnitude of the independence effect is muted (to about half the size), it remains negative, and the bias-corrected standard errors shrink correspondingly in size. Part of the effects of democracy are also now captured in the lagged dependent variable, but nevertheless remain statistically significant.

Our conclusion from this replication exercise is that the expanded sample that we work with, along with a fairly broad range of fixed effects specifications designed to capture unobserved heterogeneity, yields the standard negative independence-inflation tradeoff common in the literature. What this class of models do not do, however, is adequately address potential endogeneity concerns, which is a key objective of the paper.

[48] Or, *vice versa*, the effect of democracy on inflation, conditional on a certain level of central bank independence, is negative, although this is a less plausible mechanism.

A.6 Breaking down central bank independence

In this appendix, we decompose the independence measure into its four subcomponents, and repeat our regressions. The results of this exercise, shown in Table A.8, are intriguing: the positive and significant coefficient remains, and appears to operate on the CEO, objective, and lending channels. Put another way, neither independence of the governor, nor modifications to the institution's objectives, nor even limiting its monetization of the government fisc make much difference to the objective of *lowering* inflation. Rather, it appears to be directives over central bank that enter with the theoretically-preferred negative sign (albeit with much noise, owing to weak instruments).

Recognizing this contribution is important, because policy formulation currently receives among the *lowest* weight in academic (and presumably policymakers') assessment of central bank independence.[49] Indeed, the *a priori* expectation might be that constraints on lending would be the key. Instead, it is policy aspects such as the central bank being conferred the legal authority to formulate monetary policy, together with its possession of the final authority to define its goals, that may potentially make the most difference.

[49] Objectives and policy both receive a weight of 0.15, while CEO-related aspects are weighted with 0.2, and lending criteria receive the highest weight of 0.5.

Table A.8: Decomposition of independence measures for inflation and central bank independence[†]

	(**D1**) *CEO*	(**D2**) *Obj.*	(**D3**) *Policy*	(**D4**) *Lend.*
Independence	10.305	10.676	-26.116	9.257
	(3.782)***	(5.366)*	(28.695)	(4.340)**
Lagged dep?	No	No	No	No
Controls?	Yes	Yes	Yes	Yes
Fixed effects:				
Time?	Yes	Yes	Yes	Yes
Country?	Yes	Yes	Yes	Yes
Goodness-of-fit	8.420***	5.240***	2.743**	4.607***
Underid. p	0.000	0.007	0.365	0.004
Weak id. (crit.)	27.4 (9.0)	8.8 (9.0)	0.9 (9.0)	9.2 (9.0)
Weak in. p	0.001	0.001	0.001	0.001
Estimation	GMM-IV	GMM-IV	GMM-IV	GMM-IV
Clustered errors	Yr	Yr	Yr	Yr
Ctry (yr)	141 (42)	141 (42)	141 42	139 (42)
Obs.	3,660	3,660	3,660	3,651

[†] The dependent variable in the second-stage equation is the inverse hyperbolic sine transformation of CPI inflation, and the instrument is the democracy index. Control variables are GDP per capita, real GDP growth, and government consumption expenditure, all lagged one period and expressed in either inverse hyperbolic sine or natural logarithm transforms (as indicated in the data appendix). A constant term was included in all regressions, but not reported. Standard errors, clustered as indicated, are given in parentheses. Goodness-of-fit measures report the F statistic. The underidentification test reports the p-value associated with the Kleinbergen-Paap LM statistic, and the weak identification test reports the Cragg-Donald Wald F statistic, with the corresponding Stock-Yogo critical value for a 15% maximal size distortion in parentheses (no overidentification test is shown because all specifications are just identified). Robust inference under weak instruments is evaluated with the p-value associated with the Stock-Wright LM S. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

A.7 Independence and the variability of inflation

In this appendix, we consider a way to rescue the (undoubtedly intellectually appealing) idea that an independent central bank is the best practice for all economies, even if its democratic tradition has not quite coalesced. In particular, we look beyond how independence may constrain not so much the *level* of inflation, but its *variability*.

While we have not stressed this particular aspect—we consider it of interest, but clearly second-order (literally and figuratively) relative to actual inflation rates—we can take advantage of the comparatively long temporal coverage of our data to compute inflation variance without resorting to overlapping panels or rolling measures. Instead, we construct a cross-section, along with simple means for our regressors. Table A.9 reports the results of this exercise.

Table A.9: Decomposition of independence measures for inflation and central bank independence†

	(**V1**)	(**V2**)	(**V3**)	(**V4**)	(**V5**)	(**V6**)
Independence	1.555	1.305	-15.468	-9.010	-0.632	-8.720
	(0.705)**	(0.749)*	(11.512)	(5.004)*	(4.209)	(5.317)
Democracy	-0.091	-0.098				
	(0.031)***	(0.037)***				
Lagged dep?	No	No	No	No	No	No
Controls?	No	Yes	No	Yes	No	Yes
Goodness-of-fit	0.065	0.094	1.805	1.842	0.023	2.207*
Underid. p			0.110	0.008	0.084	0.015
Overid. p					0.009	0.517
Weak id. (crit.)			2.3 (9.0)	5.6 (9.0)	1.9 (11.6)	3.4 (11.6)
Weak in. p			0.005	0.011	0.007	0.041
Estimation	OLS	OLS	GMM-IV	GMM-IV	GMM-IV	GMM-IV
Errors	White	White	HEW	HEW	HEW	HEW
Obs.	147	141	147	141	131	128

† The dependent variable in the second-stage equation is variance of the inverse hyperbolic sine transformation of CPI inflation, and the instrument is the mean of the democracy index (IV) plus initial per capita income (2SLS). Control variables are mean GDP per capita, real GDP growth, and government consumption expenditure, all lagged one period and expressed in either inverse hyperbolic sine or natural logarithm transforms (as indicated in the data appendix). A constant term was included in all regressions, but not reported. Heteroskedasticity-robust White (OLS) or Huber-Eicker-White (IV) standard errors are given in parentheses. Goodness-of-fit measures report the adjusted R^2 (OLS) or F (IV) statistic. The underidentification test reports the p-value associated with the Kleinbergen-Paap LM statistic, and the weak identification test reports the Cragg-Donald Wald F statistic, with the corresponding Stock-Yogo critical value for a 15% maximal size distortion in parentheses, and the overidentification test reports the p-value associated with the Sargan-Hansen J statistic (where relevant). Robust inference under weak instruments is evaluated with the p-value associated with the Stock-Wright LM S. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level.

It is here that we find a negative, causal effect of independence on inflation volatility (ironically, the *un*instrumented regressions now show a positive effect of independence). The effects are reasonably large, and even in the presence of weak instruments, permit robust inference. Statistical significance is marginal, however, although that is not entirely surprising given the enormous amount of information compressed into each country-observation.

In a way, this set of results brings us full circle to the original arguments advanced in a number of seminal empirical papers, where the case for independence is made also on the basis of second moment effects (Alesina & Summers 1993; Grilli, Masciandaro & Tabellini 1991). Those arguments, however, were premised on empirical work based on only a small number of industrialized economies. Here, we demonstrate that the lower-volatility result goes through even with a large cross-section of advanced and developing countries.