Central Bank Credibility and Institutional Resilience*

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How central banks define their mission and how they are perceived by the public appears to have undergone a substantial shift since the Global Financial Crisis (GFC). Over the past 16 years, the persistence of unconventional monetary policy and subsequent return of inflation have diminished the credibility of central banks as measured, for example, by the gap between expectations and inflation performance. This paper explores whether a loss in confidence in central banks may lead to real institutional effects, hypothesizing that short-term declines in central bank credibility generate a fall in the institutional resilience of an economy. Using data from up to 107 developed and emerging market countries over 27 years, fashioning an explanation of the drivers of institutional resilience, and utilizing system-GMM, we find uniformly that decreased trust in central banks is associated with a significant lowering of resilience.

JEL Codes: E58, E42, O17.

1. Introduction

Academics and policymakers have recently rekindled their interest in economic and institutional resilience in the face of exogenous shocks (e.g., Brunnermeier 2021). Our study is squarely concerned with

*The authors wish to thank the Editors, an anonymous referee, and Michael Bordo, Richard Burdekin, Kristin Forbes, and Davide Romelli for comments on earlier drafts, as well as participants at the 2022 Asian Meeting of the Econometric Society in Shenzhen, China, for their suggestions, participants at a research seminar at Bournemouth University in 2022 for their insights, and Davide Romelli for sharing his data on central bank independence. Raw data are available from the authors on request. Corresponding author: psiklos@wlu.ca.

the role and impact of central banks in delivering both forms of resilience. Coming off a high point of more secure property rights and more liberal trade worldwide during the most recent wave of globalization, the series of global crises since the 2000s has slowed, or even reversed, many of these gains while at the same time emboldening populist voices (Devinney and Hartwell 2020; Wolf 2023).

As documented by Bordo and Siklos (2021), central banks were heavily affected in their institutional workings by the Global Financial Crisis (GFC). This was seen in calls throughout advanced economies to pull back some of the independence of central banks (Goodhart and Lastra 2018), changing how central banks defined their missions (Blinder 2010), how they communicated with the public (Horvath and Vasko 2016; Blinder et al. 2022), or how credible they were perceived as being vis-à-vis their inflationary targets (Bordo and Siklos 2021).

With emerging markets tending to overshoot their inflationary targets during the GFC and developed economies undershooting them until 2021, the credibility of central banks in terms of their ability to adhere to their central mandates, especially in weaker institutional environments, was threatened. Combined with the response to the crisis, the "whatever it takes" mentality of central bankers, and a willingness to take on new responsibilities (e.g., see Orphanides 2019), the stage was set for a combination of significant monetary interventions lacking an ex ante consensus on how they would play out or should be unwound.

A decline in central bank credibility is bound to have far-reaching ramifications. Indeed, links between inflation outcomes and the real economy continue to be debated (e.g., Coibion and Gorodnichenko 2015; Blinder 2018; Bernanke and Blanchard 2023). Elsewhere, inflation targeting is seen as crucial to maintaining this credibility but may become less effective if inflationary expectations become unmoored from monetary policy (e.g., CEPR 2013; Ehrmann 2021).

Based on the foregoing developments, this paper hypothesizes that short-term declines in central bank credibility (a flow variable) imply a parallel decline in the overall *trust* placed in central banks (with trust a slower-moving, institutional, or stock variable). If trust begins to ebb away from the central bank, this would likely be accompanied by a broader degradation of institutional quality and,

as a consequence, institutional resilience in an economy. We define "institutional resilience" as the capacity of a system to absorb a disturbance (Folke 2006; Brunnermeier 2021). Hence, resilience is not just about the strength of institutions, but also about adaptability to external shocks.

This paper extends the notion of institutional resilience one step further by extending a line of research found in Hartwell (2018a, 2018b, 2019) on the effects of monetary policy on institutions and marrying it with the research stream of Bordo and Siklos (2021) on central bank credibility and institutional resilience. More broadly, our paper stands at the intersection of three related literatures, namely the steering of inflation expectations; the trust in, credibility of, and confidence in central banks; and institutional strengths, weaknesses, and governance. We do not offer a new all-encompassing theory, instead fashioning an explanation of the drivers of institutional resilience. The novel contribution of this paper is to quantify—using a new and novel data set—the credibility and resilience links which have been left largely unexplored in the relevant literature. We provide new empirical evidence that strongly supports the notion that institutional resilience and economic performance are related. Methodologically, our work relies on dynamic panel (system generalized method of moments) and time-series models to estimate how changes in central bank credibility influence shifting institutional attributes.

Briefly, our results show that poorer central bank performance in terms of stated or implicit monetary goals significantly impacts institutional resilience. More precisely, we find that since the 1990s, each percent decline in a central bank's credibility corresponds with an average 3.6 percent drop in a country's institutional resilience. This result is robust to a variety of methodologies and to a split between pre- and post-GFC samples.

The rest of the paper is organized as follows. The next section provides a literature review encompassing credibility, trust, and institutional resilience. There is an important thread linking these topics to each other that adds to our understanding of central bank resilience. A description of the data and the various methodologies employed precedes a discussion of the empirical results. The paper concludes with a summary, lessons learned, and potential for future research.

2. Literature Review

2.1 Central Bank Credibility

There is no universally accepted definition of credibility (see Cukierman 1986; Bordo and Siklos 2021; references therein). Ultimately, credibility is about the central bank delivering on its promise to keep inflation under control and delivering to the public on promises made (e.g., Cukierman 1986; Blinder 2004). Typically, such promises have centered on inflation performance. As a policy target, inflation has many advantages. First, its effects can be observed fairly quickly (e.g., monthly). More generally, as Borio (2019, p. 269) points out, "[P]rice and financial stability are inexorably linked. As concepts, they are joined at the hip."[1]

Almost all empirical attempts begin with the notion that deviations in observed inflation from some expectation can potentially lead to a loss of credibility.[2] Examples of studies in this vein include Cukierman (1986, 1992), Bodea and Hicks (2015), and Bordo and Siklos (2021). There is a fair amount of consensus in favor of a negative relationship between significant and persistent deviations in inflation from expectations and central bank credibility.[3]

The connection between central bank credibility and the adoption of inflation targeting (IT) is less clear-cut (e.g., see Filardo and Genberg 2010). On balance, the view is that, for at least two reasons, an IT policy regime provides the kind of discipline that enhances credibility (e.g., see Rose 2020) via demands for greater accountability. First, many central banks that are not explicitly mandated to meet a numerical inflation goal (e.g., U.S., euro area) mimic the behavior of the more formal version of a policy regime. Second, there are subtle differences in how IT regimes are defined, rendering

[1]There are lingering doubts about the strength of this connection (e.g., see Issing 2003). Nevertheless, many central banks have some or exclusive responsibilities for financial stability (e.g., Blot et al. 2015; Lombardi and Siklos 2016).

[2]An early example of this kind of definition used to operationalize the definition of credibility is Cukierman (1986).

[3]Data limitations often limit the body of empirical work in this area to professional forecasts or ones derived from developments in asset prices (e.g., fed funds futures or the equivalent), although this is changing, with household and firm expectations becoming used more frequently.

comparisons between IT and non-IT central banks difficult (e.g., Ehrmann 2021).

Keeping inflation within a defined range also serves to enhance the reputation of the monetary authority and "buys" the institution time, for example, in the event large shocks lead to departures from agreed-upon inflation objectives or financial market volatility rises sharply (e.g., see Hartwell 2018b).[4]

Existing credibility indicators ignore that institutions change slowly, as surveys of changes in central banking legislation (e.g., see Romelli 2021) or even monetary regimes (Unsal, Papageorgiou, and Garbers 2022) attest. Yet, there is a long-standing literature that associates governance with overall economic performance and even risk-taking (inter alia, see Clague et al. 1999, Butkiewicz and Yanikkaya 2006, and Kanagaretnam et al. 2019).[5]

2.2 Confidence and Trust in Monetary Institutions

Alesina and La Ferrara (2000) argue that the determinants of trust in society, a vital aim of institutions, are unclear. In a similar vein, but generalized to the entire economy, economic performance can also drive trust in political and economic institutions, with major crises such as the GFC diminishing trust substantially (Stevenson and Wolfers 2011). These suppositions are supported by political scientists (Citrin and Stoker 2018).

Less has been written about trust in central banks. Berggren et al. (2014) argue that central bank autonomy and societal trust

[4]There is, of course, another critical factor at play, namely how well the central bank communicates with markets and the public. Central bank communication is a separate branch of research that has emerged, especially after the GFC of 2008–09 significantly reduced central banks' room to manoeuvre their policy stance via changes in policy rates, combined with a growing need to explain why it was necessary to introduce unconventional monetary policies (UMP). A deeper analysis of the connection between communication, credibility, and institutional resilience is beyond the scope of this paper. However, see Blinder et al. (2008, 2022) and Orphanides (2019).

[5]At least in theory, deficiencies in central bank governance can be offset by appointing a conservative central banker, much like the conservative central banker is used to prevent politicians from favoring more inflation to exploit a Phillips curve trade-off (Rogoff 1985). Even if this is the case, there is no indication of how a conservative central banker can make the entire institution more resilient.

are positively related, albeit in a nonlinear manner.[6] One additional complication is that trust is an endogenous variable; that is, it is influenced by central bank independence but can also contribute to effectively raising it.[7]

There is some evidence of the effect of trust in a central bank. For example, Ehrmann, Soudan, and Stracca (2013) report an empirical connection between trust in the European Central Bank (ECB), a supranational institution, and economic performance. They link estimates of trust in the ECB, based on the Eurobarometer survey,[8] to trust in other European institutions as well as the public's views about the banking sector. Space limitations prevent a more detailed discussion of institutional trust in other central banks (see, however, Siklos 2002, 2017).

2.3 Institutional Resilience

Institutional resilience in society is impacted by both credibility and confidence. The most commonly agreed core of what makes an institution resilient is its ability to withstand shocks—or enable policymakers to respond to those shocks, as in Briguglio et al. (2009).[9] Goodhart and Lastra (2018) show that resilience (couched in terms of flexibility) and certainty (a key measure of confidence in a particular institution) trade off in a dynamic fashion. Moreover, as Zheng (2011, p. 298) notes, "political institutions that facilitate ex post flexibility in policy implementation will necessarily limit ex ante policy certainty."

[6]Space limitations prevent a discussion of the pros and cons of measuring central bank independence (de jure or de facto; e.g., see Masciandaro and Romelli 2018). We note that Adrian, Khan, and Menand (2024) have created a new index of central bank independence that explicitly incorporates governance indicators. The data, at the time of writing, are not yet available.

[7]Bjørnskov's (2011) result would suggest otherwise, as societal trust seems rather stable over time. An interfering variable may be the quality of the legal system, that is, the strength of the rule of law.

[8]https://europa.eu/eurobarometer/screen/home.

[9]Brunnermeier (2021) also links the concept of resilience to the statistical concept of impulse responses. Resilience also means adaptation in the ecological literature (Harkes and Novaczek 2002) but has also found a home in institutional economics, with ideas like Ostrom's (2010) need for institutional orders which collectively are able to facilitate adaptation (Aligica and Tarko 2014).

Resilience can run counter to the inherent attributes of institutions, namely their "relatively durable patterns of social interaction" (Steinberg 2009, p. 64). Hannaford (2018, p. 95) argues that "resilience is an entirely internal property of a system and relates to shifts between states rather than structural changes within the system." Bordo and Siklos (2021) construct a resilience index comprised of mostly system-wide economic attributes plausibly related to the ability of a system to withstand shocks, including governance and institutional attributes.

Generally, there is a consensus that an institutional system with a few institutions dominating is one which has more vulnerability than resilience. Moreover, a system which promotes poor policies also increases vulnerabilities (Kassab 2017). This is a crucial point to keep in mind for the examination below.

3. Methodology

3.1 Determining Confidence

We posit that confidence in a central bank consists of three components: a penalty for missing an inflation objective (explicit or implicit; TMISS); an indicator of monetary policy uncertainty (MPU); and a global component (GDEV). There is ample theory and evidence that some combinations of these three factors play decisive roles in determining confidence in the central bank (see, inter alia, Blinder 2000; Bordo and Siklos 2017; Levieuge, Lucotte, and Ringuedé 2018; or Cole and Martínez-García 2023). There is less agreement on how to define these concepts empirically. Our strategy consists in providing plausible definitions while investigating the sensitivity of the results to changes in some specifications. Confidence, expressed in equation form, is assumed to be an aggregation of the three components defined above:

$$CONF_{it} = \alpha TMISS_{it} + \beta MPU_{it} + \gamma GDEV_{it} + \varepsilon_{it}. \qquad (1)$$

Equation (1), defined for country i at time t, is expressed linearly and has an inverse interpretation, mainly that higher values of this

variable signify less confidence due to poor performance on the part of the central bank.[10]

Not all deviations from some numerical target (TMISS) need signal a loss of credibility, since it is reasonable to assume that policymakers and the public will tolerate some errors as inevitable, temporary, or even uncontrollable by the central bank. Therefore, it seems reasonable to penalize an institution for misses over the medium term rather than to penalize any period-by-period deviations. The larger and more persistent the misses over business cycle frequencies, the greater the loss of confidence in a central bank's ability to deliver an inflation objective. This leads us to write the following specifications where the subscript identifying a country in question (i.e., i) is dropped to economize on notation:

$$TMISS_t = \begin{cases} 0 & (2a) \\ (\tilde{\pi}^e_{t+1} - \tilde{\pi}^*_t)^2 & (2b) \end{cases}$$

$$\text{IF } \tilde{\pi}^*_{t,t-2} - \theta \leq \tilde{\pi}^e_{t+1} \leq \tilde{\pi}^*_{t,t-2} + \theta \quad (2a')$$

$$\text{IF } \tilde{\pi}^*_{t,t-2} - \theta > \tilde{\pi}^e_{t+1} > \tilde{\pi}^*_{t,t-2} + \theta \quad (2b')$$

$$\tilde{\pi}^*_t = \tilde{\pi}^*_t - \lambda_0 F(\dot{y}_t) - \lambda_1 F(\dot{\varepsilon}_t). \quad (3)$$

In Equations (2) and (3), π_t is annual inflation at time t.[11] TMISS implies no loss of credibility (implicitly for country i) as long as expected inflation (π^e_{t+1}) is within the bounds given by Equation (2a). Otherwise, a quadratic element kicks in which penalizes misses in an inflation objective ($\tilde{\pi}^*_t$) relative to one-year-ahead expectations ($\tilde{\pi}^e_{t+1}$).[12] The tolerance ranges (i.e., θ) given in Equations (2a)

[10]Of course, other functional forms are possible and interaction effects can also be added. We leave these, and other extensions, for future research in part because the results below are robust to a wide variety of econometric approaches.

[11]The choice of annual inflation is dictated by data availability for many of the institutional variables being considered. See Section 4.

[12]In the interests of a sensitivity analysis, we can apply the quadratic penalty (i.e., Equation (2b)) even within the target range (not all IT central banks adopt a target range). Alternatively, we can use the absolute value of inflation misses, that is, $(\tilde{\pi}^e_{t+1} - \tilde{\pi}^*_t)$. Still another possibility is to assume that confidence losses

and (2b) are determined according to how inflation expectations behave relative to observed inflation. TMISS is based on past performance and the two-year horizon is chosen since it is traditionally the time it takes for monetary policy decisions at time t to fully impact inflation in future.[13] We also consider, as a sensitivity test of our results, a longer reaction interval of five years. Our conclusions are unchanged. To distinguish the year-over-year inflation rate (π_t) from the two-year performance metric, we define such inflation performance as $\tilde{\pi}_t$.

When a central bank follows an explicit inflation target, $\tilde{\pi}_t^*$ is directly observable. The evidence is that the permissible range of misses around a central numerical inflation objective is generally smaller in advanced economies (AEs) than in emerging market economies (EMEs) (Levieuge, Lucotte, and Ringuedé 2018; Bordo and Siklos 2021). Hence, we set θ equal to ± 1 percent for AEs and ± 2 percent for EMEs. Notice that Equation (2a) treats a miss within the IT range as "bygones are bygones," which results in TMISS $= 0$, with credibility unaffected (Bicchal 2022).[14] Clearly, there is an element of arbitrariness in such definitions that cannot be avoided but the chosen ranges are consistent with how inflation target ranges are defined in practice as between AEs and EMEs (e.g., see Siklos 2017).

Observed inflation need not, of course, fluctuate symmetrically around the target over time. Hence, the central bank is penalized in the same manner whether inflation is too low or too high. Alternative specifications to replace TMISS do not yield different conclusions, and this is confirmed with experimentation (not shown) with alternatives to Equations (2a) and (2b) along the lines just described.

When the target range is not explicitly defined, a simple approach is to rely on, say, a five-year moving average of inflation,

follow an S-shaped function, again absolute value. For each one of these alternatives symmetry around the target is assumed, which, again, is also consistent with how inflation target ranges have been defined in practice.

[13] Indeed, many central banks explicitly refer to the two-year horizon when explaining the transmission process of monetary policy.

[14] Interestingly, the Fed's adoption of average inflation targeting suggests that the past does matter, since inflation below target for years is supposed to provide the central bank with some latitude to exceed a medium-term inflation objective, thereby making up for past misses.

that is, $\tilde{\pi}_{t,t-5}$. This has the advantage of being a metric that is easily comparable with the one specified for central banks where an explicit numerical objective is available.[15] Although the number of potential candidates for Equation (3) is large, experimentation reveals few notable differences between the simplest (i.e., a moving average) adopted in the empirical results below and a more sophisticated version.

Next, we argue that confidence in the central banking institution is adversely impacted by uncertainty generated by the conduct of monetary policy. There is general agreement that uncertainty has detrimental economic effects (Baker, Bloom, and Davis 2016). We consider that there are at least two elements that contribute to determining the level of monetary policy uncertainty. We posit that forecast errors in inflation and real GDP growth combine to generate monetary policy uncertainty. Theory has also focused attention on these variables as the main drivers in the policymakers' loss function.

We hypothesize that the larger the unexpected deviations from observed inflation and real GDP growth, the less confident forecasts are about the evolution of these two variables over time. This will undoubtedly contribute to raising monetary policy uncertainty from the central bank's standpoint.[16]

We next estimate monetary policy uncertainty (MPU) as follows, again dropping the country subscript (i) to simplify notation:

$$MPU_t = \sum[(\pi^e_{t+1} - \pi_{t-1})^2 + (\dot{y}^e_{t+1} - \dot{y}_{t+1})^2], \tag{4}$$

where all the terms were previously defined. Note that forecast errors are evaluated relative to last year's observed inflation and real GDP growth, since contemporaneous values may not be observed at the

[15]One can either set it equal to that adopted in a comparable economy or estimate an implicit inflation objective for a non-IT central bank (e.g., via some filtering algorithm based on past performance). This is the approach adopted, for example, by Parkin (2014).

[16]For an example of this kind of approach to estimating MPU for the U.S., see Husted, Rogers, and Sun (2020). The alternative of using text analysis from news sources for a large number of countries, let alone data collected for over 170 countries as we have done, is impractical.

time uncertainty is evaluated. Equal weighting is given to inflation volatility and output growth volatility.[17]

The third component of confidence in central bank performance summarizes how the role of global shocks, considered an external threat to a domestic inflation target, are accounted for. Reintroducing the subscript identifying country i:

$$GDEV_{it} = \pi_{it-1} - \delta_i \pi^G_{t-1}. \tag{5}$$

The global factor dictates that confidence in the central bank requires an adjustment to domestic inflation rates due to incomplete pass-through effects from exchange rate changes (e.g., à la Forbes, Hjortsoe, and Nenova 2018). It is shown here as the gap between domestic inflation last period, used because of the lag in obtaining external inflation rates (e.g., main trading partners or some combination of external inflation rates), and last period's "global" inflation rate (i.e., π^G_{t-1}), measured as the average of the inflation rate of the United States and the European Union.[18] The coefficient δ reflects a view about the pass-through effects of external inflation.[19] Equation (5) asserts that a central bank in country i gets a boost

[17]Since both elements of Equation (4) point in the same direction for increasing uncertainty, and central bankers generally care about both metrics, this seemed to us a more plausible strategy than assuming alternative weights. Data limitations also mean that MPU can only be evaluated for a small set of forecasts. We rely on the forecasts from the World Economic Outlook (WEO). The historical data are available from https://www.imf.org/external/pubs/ft/weo/data/WEOhistorical.xlsx. We also used, for shorter samples, OECD Main Economic Outlook projections, Oxford Economics, and Consensus forecasts. However, the number of available countries and sample spans were much shorter for these other data sets. The paper's main conclusions seem unaffected by combining alternative forecasts with ones from the IMF.

[18]The European Union inflation rate is calculated based on all Member States as of that year.

[19]Once again, other specifications are possible. For example, the openness of an economy, the kind of exchange rate regime, and barriers to trade are also plausible alternatives. Another option is to regress domestic on global inflation and possibly allow for some time variation in the estimates of δ, or even assume that some form of cointegration between domestic and foreign inflation rates is possible, and use the error-correction term to capture pass-through effects. Each alternative is potentially problematic since the researcher takes a view concerning specific factors that drive inflation and this may cloud our estimates of the role of external shocks.

in confidence if it outperforms (i.e., has lower inflation than) global inflation.[20]

3.2 Determining Institutional Resilience

As previously noted, overall institutional resilience in an economy can be thought of as a combination of political and economic institutional resilience. We combine the following salutary aspects of an institutional order which can help to absorb shocks:

- *Property Rights*: In theory, a country with higher levels of property rights should instill confidence in citizens during times of crisis; similarly, the ability to trade, manage, and dispose of one's own property should allow for adjustment mechanisms to work more efficiently in times of crisis, lessening the pain felt due to an exogenous shock. Property rights are expressed here as "contract-intensive money" (Clague et al. 1999); that is, the proportion of money held inside the formal banking sector.
- *Exchange Rate Type:* The more flexible a country's exchange rate regime is, the greater should be the ability to adjust to external shocks.[21] We use the Ilzetzki, Reinhart, and Rogoff (2019) definition of exchange rate regimes here, with higher values of their numerical classification indicating more flexible exchange rates.
- *External Openness*: This element is made up of two parts. Both a country's openness to trade and its openness to capital movements should allow for more rapid adjustments in the economy. We utilize the standard measure of trade openness (exports and imports as a percentage of GDP) and the Chinn-Ito (2008) indicator of financial openness to capture these metrics.

[20]The development of each of these subcomponents of the confidence indicator is shown in Appendix A, broken out by geographic groupings.

[21]Whether, or how much, a floating exchange rate actually insulates an economy from shocks does, however, remain debated. For example, Devereux, Engel, and Tille (2003) find that exchange rate pass-through is low. Indeed, a variety of other exchange-rate-related puzzles have generated a growing literature. Since this is outside the scope of our study, we refer readers to, for example, Rey (2013), Gopinath et al. (2020), and Itskhoki and Mukhin (2021) for additional details.

The foregoing metrics have all been given equal weighting in the composite indicator (i.e., summed and divided by four) and then normalized between 0 and 1. The assumption behind this aggregation is that each of these subcomponents has a beneficial effect on resilience—meaning the most flexible of systems (taken here to be the most resilient) would have a score, after normalization, of 1 and the least flexible would have a score of 0.

Three specific attributes of a country's political system are also viewed as contributing to resilience. Our variable choices are inspired by a large literature in political science and economics that has relied on our chosen metrics.[22] They are: the *extent of democracy* (as captured in the Polity "democracy" indicator), based on the theory that democracy can enable the transfers necessary to cushion the pain of economic shocks (Margalit 2019); *executive constraints*, essentially capturing the veto points in a polity, as a guard against bad economic policies (Arezki and Brückner 2010; Besley and Mueller 2018); and *government expenditures to GDP* (Bordo and Siklos 2021), as a measure of rigidity of the economy (i.e., responses determined based on budgetary cycles rather than price signals). Both democracy and executive constraints, taken from the Polity 5 database, are expected to have a positive relationship with institutional resilience, while the size of government should correlate negatively. We aggregate the (normalized) values of these three measures by adding democracy and executive constraints and subtracting out the size of government.

The overall institutional resilience measure (RES) is defined as a linear combination of the economic and political components of resilience. Both components are equally weighted due the absence of theoretical exposition on which component *should* be given more weighting. We are aware of the so-called "hierarchy of institutions" argument of Acemoglu, Johnson, and Robinson (2005) but prefer to remain agnostic on this question and leave it to future research.

The model that is confronted with the data is written

$$RES_{it} = f\big(\widehat{CONFIDENCE}_{it}, MACRO_{it}, INSTITUTIONS_{it}, ATTRIBUTES_{it}, CRISES_{it}\big). \tag{6}$$

[22]See https://www.systemicpeace.org/index.html, where both the raw data and publications associated with these data are available.

As in Equation (1), CONFIDENCE is the confidence which a country, i, holds in a central bank at time t. A country with less confidence or trust in its central bank is less likely to be resilient. The hat over the CONFIDENCE variable highlights that it is estimated separately.

The list of covariates, their theorized relationship with overall resilience, and data sources are shown in Table 1 and explained further below. The MACRO vector in Equation (6) refers to a vector of macroeconomic and country-specific variables which are separate from those which lead directly to resilience but which are likely to make an institutional system more resilient.[23] The INSTITUTIONS vector encompasses institutional volatility, including changes in underlying institutions such as property rights and democracy, added to capture how unstable institutions may affect resilience. ATTRIBUTES represent inherent traits of an economy unrelated to macroeconomics or related only peripherally, including land area, stocks of human capital, or resource abundance. Finally, CRISES is a constructed measure of "excess crises," using the cumulative total of financial/monetary/currency crises that a country has faced (taken from the Laeven and Valencia (2018) database) less the crises faced by the United States (proxying for global common shocks).[24]

We implement three model selection techniques to provide a more robust representation of the effects of central bank credibility. The methodologies applied are as follows:

[23]Inflation, as measured by annual change in consumer prices, is included in the list of plausible covariates. Readers will note that it is also a component of the confidence indicator. There is, however, not necessarily any collinearity either theoretically or econometrically. From a theoretical standpoint, the confidence indicator is constructed using actual performance of inflation measured against preset metrics (or theorized metrics) and thus is a distance variable. The distance performance of a central bank is not related to the underlying change in inflation, as the targets vary across countries and inflation is but one component of the distance variable. Econometrically, there is almost no correlation between the inflation metric and the confidence metric, with a simple correlation of 0.015 between the two. Finally, the model selection process, as will be shown below, consistently drops inflation as an explanator so that it does not even appear in the baseline specification.

[24]Within the database this means, for example, that during 2001, when the world was in a recession, the number of "excess" crises for any country would be 0, as it was a common shock.

Table 1. Covariates of Resilience

Variable [Mnemonic]	Source	Reasoning/Effect on Resilience
Arable Land (Hectares per Person) [ARABLELAND]	WorldBank WDI	More land area available for productive purposes (especially agriculture) can correlate with institutional resilience, in providing a basis for growth. Conversely, it may also trap countries in an agrarian mentality, harming resilience
Central Bank Independence [CBI]	Romelli (2021)	A more independent central bank should be more flexible and resilient than one which is beholden to the ruling government
Central Government Debt as a Percentage of GDP [DEBT]	IMF	Governments which are highly indebted have less fiscal space in the face of a crisis and thus are likely to display low institutional resilience
Conflict [CONFLICT]	UCDP/PRIO Armed Conflict Dataset Version 21.1	Conflict can presage the breakdown of institutions or at least their reordering, and thus we expect the presence of armed conflict to be negatively correlated with institutional resilience
Employment Growth in Percent [EMPG]	The Conference Board Total Economy Database	A business cycle measure; countries with abundant jobs and the ability to create them are likely to see more institutional resilience
Excess Crises [EXCESS CRISIS]	Authors' calculations based on Laeven and Valencia (2020)	Coded as the number of crises above and beyond crises which have occurred in the United States. Each additional, nonglobal crisis can weaken institutions and make them less resilient
Financial Risk [FINRR]	ICRG	Coded from 0 to 100, with higher numbers indicating lower risk. Countries which have more fragile macroeconomic conditions overall are likely to have less resilient institutions, especially in the face of exogenous shocks
Foreign Direct Investment, Net Inflows (Percentage of GDP) [FDI]	World Bank WDI	The presence of funding coming from outside one's own borders acts as a supplement to internal funding and can provide a safety net in times of crisis
GDP Growth [GDPGUSD]	World Bank WDI	Countries which are growing may be able to absorb more shocks than economically fragile ones
Real GDP Growth Forecasts	IMF	Used in combination with real GDP growth data to estimate forecast errors. See Equation (4)

Table 1. (Continued)

Variable [Mnemonic]	Source	Reasoning/Effect on Resilience
Human Capital [HC]	Penn World Tables	Measured as a human capital index based on the average years of schooling; we would expect countries with higher levels of educated workers to be more resilient, in terms of both institutions and economy
Inflation, Consumer Prices (Annual Percent) – [INF]	World Bank WDI	The presence of escalating prices can seriously undermine both political and economic institutions (Hartwell 2018a)
Inflation Forecasts (One Year Ahead)	IMF	Used together with inflation to estimate inflation forecast errors. See Equation (4)
Informal Output (Percentage of Official GDP) [INFORMALITY]	Elgin et al. (2021)	A dynamic general equilibrium (DGE) model-based estimate of the informal output of each country. Countries with large informal sectors may have weak formal institutional resilience; however, the presence of a large informal sector may also contribute to resilience via diversity and redundancies
Political Institutions Volatility, Three-Month [POLVOL]	Authors' calculations from Polity IV data	The three-month rolling standard deviation of the Polity indicator. Countries with erratic commitment to democracy are likely to see erosion of both political and economic institutional resilience over time
Population Growth, Percent [POPG]	World Bank WDI	Like land, population growth can signal a deeper pool of resources to draw upon in case of a crisis; it may also signal more inclusive rather than extractive institutions
Property Rights Volatility, Three-Month [PTYRIGHTS]	Authors' calculations from IMF data	The three-month rolling standard deviation of contract-intensive money. Countries with erratic enforcement of property rights are likely to see erosion of both political and economic institutional resilience
Resource Rents as a Percentage of GDP [TOTALNATURALRE-SOURCE]	World Bank WDI	Countries which are more reliant on natural resources are tied to commodity cycles and likely to be less resilient than countries which are well-diversified

(i) Bayesian Model Averaging (BMA)

(ii) Stepwise (Backward) Regressions; and

(iii) Lasso Regressions

The BMA approach utilized here is the "exact BMA" originally devised by Leamer (1978) and programmed by De Luca and Magnus (2011), combining "prior beliefs on the unknown elements of the model with the additional information coming from the data," weighting each individual model by its posterior probability (ibid., p. 521). Our priors are small indeed, leaving the model space open (and computationally intensive) for various combinations. In order to choose variables for the model, De Luca and Magnus (2011), following Barbieri and Berger (2004), suggest a median probability rule of retaining model variables which display an absolute t-ratio of greater than 1 (corresponding to a posterior inclusion probability of 0.5). We prefer to set a more stringent limit of a posterior inclusion probability of 0.75, in the vein of Jeffreys (1961), Kass and Raftery (1995), and Mutshinda, Finkel, and Irwin (2013), corresponding to a "strong" probability.

Next, we also utilize stepwise regression; the backward approach we use here starts with all explanatory variables in the model and then eliminates them one by one based on statistical significance. Given the well-known issues with stepwise regression (Thompson 1995; Smith 2018), we treat these results with caution, and only as a robustness test for the BMA regressions, and set a strict criterion of a t-stat of 2.54 (i.e., at the 1 percent significance level) to keep a variable through for the next model.

Lasso regression (Tibshirani 1996) is a penalized least-squares regression which shrinks the coefficients of variables based on their significance (theoretically zeroing-out insignificant coefficients and allowing for estimation using nonzero coefficients). Lasso is effective and widely used when there are a large number of covariates, and the fact that it retains variables within the model estimation means it avoids many of the issues with stepwise regressions.

Once we have settled on a list of covariates from the theoretically plausible set of determinants, identification of the impact of credibility and institutional resilience is achieved by fashioning a system-GMM approach, operationalizing Equation (6) as

$$Y_{it} = \alpha \widehat{CONFIDENCE}_{it} + \beta X_{it-1} + \varepsilon_{it}, \tag{7}$$

where Y is, as noted above, institutional resilience, *CONFIDENCE* is our constructed measure of confidence in a central bank, X is the lagged vector of controls noted in Equation (6), encompassing macroeconomic variables, country attributes, institutional volatility, and a measure of crises, and the error term (ε) is specific for each country. System-GMM was chosen as it is a preferred estimation technique in a panel setting such as this, with large N and moderate T, and it also has the ability to allow for fixed effects and correct for serial correlation, as well as correcting for heteroskedasticity of unknown form via clustering on the country variable.[25] The lags were chosen to correct for the well-known persistence of inflation (e.g., see Fuhrer 2010; system-GMM also fits our identification strategy as it works well in the persistence of key variables; see Heid, Langer, and Larch 2012) and to satisfy the identification conditions as checked by commonly utilized diagnostics (the Hansen J-statistic and the AR(n) tests).

Finally, as discussed earlier, resilience in statistical terms can be evaluated in the form of responses to shocks; that is, relying on impulse response functions. Accordingly, we report results from the estimation of local projections (LPs), introduced by Jordà (2005); also see Barnichon and Brownlees (2019) and Plagborg-Møller and Wolf (2021). This is a widely used methodology to estimate impulse responses from vector autoregressions (VARs). The intuition behind the technique is that the impact of a shock in the current period (the impulse) can be traced out from forecasts of the dependent variable of interest in future (the response). We only report the responses to

[25]As a robustness test, not shown here, we also utilized a static panel fixed-effects model, absorbing country fixed effects. However, the short time span for most countries (an average t of 25 years) meant that Nickell bias was likely prevalent. Additionally, the manifest endogeneity of many of the variables became clear, as the human capital variable tended to absorb all of the significance in the equation. Results available from authors on request. In order to identify the model as shown in Equation (7), we use an instrumentation strategy which instruments the variables found significant in the model selection via their closest feasible lags, while variables found insignificant in the model selection process are included as instruments at their levels (all instruments are collapsed to avoid overfitting).

key determinants of central bank resilience, while others are available on request.

4. Data and Results

Because our empirical exercise relies on several institutional variables obtained from a variety of sources, it is natural to ask about the quality of the data employed. Space limitations prevent a detailed discussion. Fortunately, others have investigated the properties of the series employed here. IMF data are among the most widely used in empirical economics and there are regular reviews and assessments of the quality and reliability of the large number of time series collected (e.g., see the IMF's Dissemination Standards Bulletin Board).[26] The same comment applies to the World Development Indicators database.[27] Romelli (2021) is the source for the most recently updated central bank independence (CBI) data and comparisons are made with the other most widely used and available indices. Comparisons with other CBI metrics are also provided by the authors. Romelli's data also have the advantage of including a wider array of central bank characteristics and legal features than other indices that have been previously published. As a result, the data are relatively more robust to measurement errors. It is worth pointing out, however, that all such CBI indicators are de jure and not necessarily de facto measures (although it is not clear that this should induce a difference in the perception of central bank confidence unless there is a large gap between the two).

While several authors have constructed financial crises indicators and chronologies (e.g., Reinhart and Rogoff 2009; Schularick and Taylor 2012), the Laeven and Valencia (2020) data are among the most widely used (e.g., see Huynh and Uebelmesser 2024) and their chronology has the added advantage of being based on a broader

[26] https://dsbb.imf.org/dqrs/DQAF.

[27] "...a compilation of relevant, high-quality, and internationally comparable statistics..." (from https://datatopics.worldbank.org/world-development-indicators/stories/world-development-indicators-the-story.html). Also, see World Bank (2018).

definition of what constitutes a banking crisis than alternative indicators. The human capital series, from the Penn World Tables, is based on Barro and Lee's (2013), which is arguably the best known, but not the only indicator or measure of educational attainment.[28] The Polity data are considered "the most closely scrutinized data on political issues," while the same description applies to the ICRG database, which combines qualitative and quantitative risk metrics and covers well over 100 countries (e.g., see Levieuge, Lucotte, and Pradines-Jobet 2019, and references therein). In a similar vein, the data on armed conflict come from the gold standard in this area, the UCDP/PRIO Armed Conflict Dataset from Uppsala University, covering all armed conflicts from 1946 to 2022 where at least one party is a state actor. The extent of a country's informal economy is taken from Elgin et al. (2021), who have created a database which has strong cross-country and time-series coverage and which far outpaces other data on informality. Other data sources consulted include the OECD (Main Economic Indicators, Economic Outlook), the BIS, and the Conference Board. All are routinely used in empirical research.

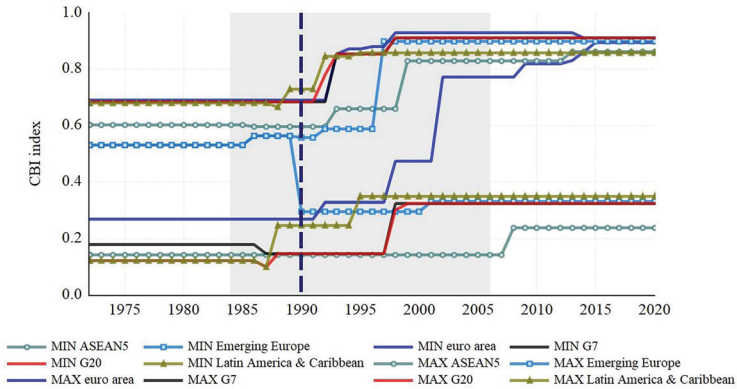
All estimation was conducted at an annual frequency (summary statistics can be found in Appendix B). When we maximize the number of covariates included in estimation, the econometric results discussed in reality encompass the period starting from 1990, and this does not reflect the lags utilized in Equation (6).[29] Nevertheless, several series have been available since the early 1960s. We provide some discussion of these data in the next section. The countries in the data set represent around 80 percent of global GDP,[30] while differences in inflation performance between all potential countries and the ones that remain when Equation (6) is estimated are very small. Our econometric estimates are based on a data set which varies between 92 countries at a minimum and 107 countries as the maximum, with a mode of 100 countries; the differing number of

[28]Fraumeni (2015) provides a comparison of alternative human capital indicators relative to the Barro and Lee measure. The study does not reach a firm conclusion about whether one indicator is superior to the others.

[29]As a result, plots shown in Figure 2 show data for the sample from 1992 to 2019, capturing the use of lags in the model.

[30]See https://g20.org/.

Figure 1. Central Bank Independence



Note: Based on annual data from Romelli (2021). The shaded area is the period of the Great Moderation (1984–2006). The minimum value for the CBI index is 0, the maximum is 1. Data are available from dromelli.github.io/cbidata/index.html. There is some overlap between certain country groupings (i.e., G7 and G20; G20 and Latin America and Caribbean; G7, G20, and euro area). Appendix D provides more details about the countries included in each country group and where overlap exists. The total number of non-overlapping countries included in the figure is 79. The vertical line is drawn at 1990, which dates the start of the sample used in most of the econometric results presented in Tables 2 and 3.

countries across specifications is due to data availability on covariates (see Appendix C for the list of countries by model selection method). Regardless, the large coverage here gives us hope that we are capturing the true effects of the relationship.

4.1 A Few Stylized Facts

Figures 1 and 2 provide a few stylized facts. Figure 1 illustrates the indicator of overall central bank independence (CBI) used since the early 1970s for several country groupings. CBI has often been used to assess the performance of monetary authorities across a wide range of macrofinancial and institutional variables, including inflation, real GDP growth, and transparency and accountability.[31] We

[31]There is no let-up in investigations of links between CBI and macroeconomic and institutional performance. Readers are asked to consult, for example, Dincer

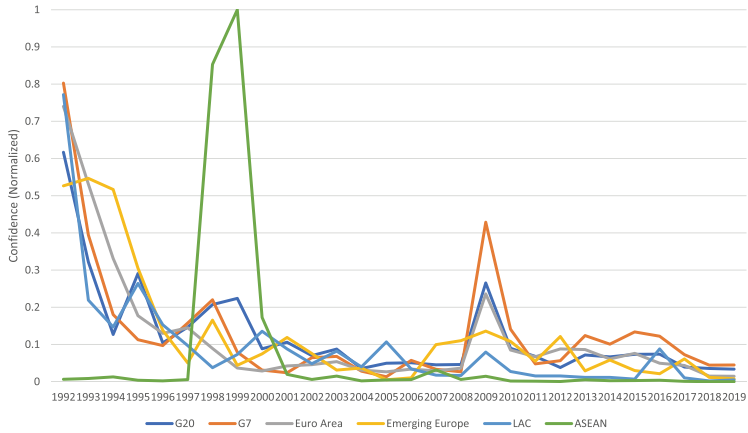
use the country groupings defined by the IMF in its WEO publication to estimate average levels of independence (see Appendix D for details). The shaded area highlights the era of the Great Moderation as a benchmark.

While there is a general tendency for CBI to rise over time there remains considerable heterogeneity across various regions of the world. Indeed, the gap between highest (MAX) and lowest (MIN) levels of CBI has widened over time in most regions of the globe shown in Figure 1. Using a vertical line, Figure 1 also identifies when the sample begins for the econometric tests reported below. Prior to the 1990s there is little variation in CBI over time between country groups. This also partly explains why the results shown in the tables to follow (Tables 3 and 4) pertain to the last three decades of data (i.e., 1990–2020). Moreover, while the tests below were conducted for longer samples, there is also a loss of data as several of the series listed in Table 1 are not available for many countries before the 1990s and even more are missing before the 1980s. Finally, it is also worth pointing out that CBI was rising when the global economy was well into the period of the Great Moderation. On average, governments granted greater autonomy to monetary policymakers after inflation began to moderate and economic growth became less volatile. That said, the subsequent era of financial crises (i.e., the period since 2006) does not yet appear to suggest a reversal of fortune in CBI.

Figure 2 plots, for the sample used in the econometric testing below and for the same country groupings as in Figure 1, our measure of confidence in a central bank (CONF; see Equation (1)), which aggregates target misses (TMISS), monetary policy uncertainty (MPU), and the global factor (GDEV). As noted, a lower value of CONF translates into greater confidence in the central bank. Plots of the individual components can be found in Appendix A. Three notable features are seen in the plot. First, there is considerable heterogeneity in central bank confidence over time. Indeed, as

and Eichengreen (2014), Garriga and Rodriguez (2019), Romelli (2021), Adrian, Kahn, and Menand (2024), and references therein. While CBI plays an important role in the empirical work below, it is only one of several other components we argue can and should be employed to evaluate the performance and resilience of central banks.

Figure 2. Confidence in Central Banks



Note: See Figure 1 and Equation (1) for details. A lower level of CONF translates into greater confidence in the central bank.

might be expected, CONF is far more volatile than CBI. CONF in the G7 is generally much lower than elsewhere in the world although the ASEAN5, Latin America and the Caribbean, and indeed the G20, have overtaken the G7 for some years after the GFC. We also observe the spike in CONF among the richest economies (i.e., G7, euro area) during the GFC, which translates into a temporary, but large, drop in confidence in central banks. While CONF recovers post-GFC, it only comes close to pre-GFC levels by the end of the sample.

This same dispersion of our CONF variable can be seen on a country-by-country basis in Table 2, which displays the minimum and maximum of the raw (nonnormalized) confidence scores by each country used in the most expansive econometric estimation (see also below). While some countries have minima below zero (corresponding to lower-than-expected inflation performance), the more interesting metric is the maximum scores, which show by how much a country's central bank has missed its targets or how uncertain its policies have been. For the maxima shown in Table 2, the dispersion for advanced countries is tightly clustered, while countries such as Brazil have a maximum score of multiple millions and the Republic of Yemen has the worst-performing central bank globally, with

Table 2. Variation across Confidence and Resilience, by Country

Country	Raw Confidence Score			Resilience			Sample Period
	Std. Dev.	Min.	Max.	Std. Dev.	Min.	Max.	
Albania	4,537.56	–0.30	23,418.03	0.498	0.595	2.000	1993–2019
Algeria	135.01	–2.55	556.77	0.578	0.003	1.998	1992–2019
Angola	1,710.01	–56.55	5,594.50	0.200	0.701	1.475	2004–2019
Australia	2.96	–0.61	12.14	0.345	0.421	1.388	1992–2019
Austria	2.62	–0.62	11.53	0.220	0.472	1.201	1992–2019
Bahrain	25.97	–2.25	128.78	0.638	0.020	1.987	1992–2018
Bangladesh	3.75	1.52	16.93	0.534	0.051	1.758	1992–2019
Belgium	3.89	–0.77	16.87	0.622	0.000	1.964	1992–2019
Bolivia	447.60	1.50	2,388.94	0.625	0.096	1.953	1992–2019
Botswana	24.80	1.40	94.45	0.598	0.327	1.987	1992–2019
Brazil	780,699.50	2.36	4,115,369.00	0.474	0.474	1.997	1992–2019
Bulgaria	204,150.50	–1.31	1,072,750.00	0.337	0.950	2.000	1992–2019
Burkina Faso	246.26	–4.68	1,128.71	0.445	0.191	1.502	1992–2019
Cambodia	105.12	0.97	505.83	0.405	0.263	1.961	1996–2018
Cameroon	82.87	–1.69	351.11	0.341	0.232	1.353	1992–2019
Canada	2.45	–1.54	11.12	0.707	0.065	1.972	1992–2019
Chile	71.59	0.78	375.24	0.674	0.070	1.957	1992–2019
China	54.90	0.55	263.68	0.262	0.998	1.995	1992–2019
Colombia	54.84	1.25	220.26	0.276	0.130	1.117	1992–2019
Congo, Rep.	156,000,000.00	5.79	568,000,000.00	0.488	0.003	1.326	1992–2019
Costa Rica	111.73	0.06	414.90	0.387	0.198	1.635	1992–2019
Croatia	385,084.30	–0.79	1,963,973.00	0.544	0.000	1.998	1994–2019
Cyprus	78.00	0.26	341.95	0.370	0.631	2.000	1994–2019
Czech Republic	79.59	0.07	286.92	0.263	0.886	1.933	1993–2019
Denmark	3.98	–1.47	19.23	0.219	0.524	1.324	1992–2019

(*continued*)

Table 2. (Continued)

Country	Raw Confidence Score			Resilience			Sample Period
	Std. Dev.	Min.	Max.	Std. Dev.	Min.	Max.	
Dominican Republic	492.12	4.39	2,074.61	0.531	0.367	1.999	1992–2019
Egypt, Arab Rep.	51.47	0.19	202.19	0.570	0.001	1.999	1992–2019
Estonia	920.53	0.07	4,522.94	0.389	0.328	1.998	1994–2019
Ethiopia	568.61	9.13	2,130.15	0.340	0.363	1.540	2003–2019
Finland	7.00	–1.38	30.72	0.355	0.145	1.385	1992–2019
France	2.25	–1.23	8.90	0.325	0.877	1.999	1992–2019
Gabon	180.53	–2.00	822.36	0.257	0.823	2.000	1992–2019
Germany	3.95	–1.30	16.66	0.351	0.262	1.556	1992–2019
Ghana	401.53	6.16	1,468.94	0.381	0.538	2.000	1992–2019
Greece	13.00	–0.17	51.53	0.276	0.997	1.998	1992–2019
Guatemala	171.24	2.00	916.95	0.652	0.030	1.952	1992–2019
Hungary	77.01	1.02	394.84	0.450	0.115	1.999	1992–2019
India	16.71	1.29	66.30	0.460	0.178	1.996	1992–2019
Indonesia	399.63	1.20	1,648.86	0.748	0.000	1.905	1992–2019
Iran, Islamic Rep.	169.66	20.98	756.37	0.497	0.256	1.999	1992–2019
Ireland	10.88	–0.58	35.17	0.289	0.430	1.358	1992–2019
Italy	3.50	–0.84	15.02	0.397	0.088	1.394	1992–2019
Jamaica	1,632.54	1.82	8,545.20	0.391	0.208	1.706	1992–2019
Japan	40.74	–3.18	212.72	0.115	0.560	1.103	1992–2019
Jordan	60.52	–1.31	246.62	0.739	0.020	1.903	1992–2019
Kazakhstan	29.67	5.11	96.97	0.241	0.209	1.005	2007–2019
Kuwait	722.36	–0.12	3,750.19	0.560	0.144	1.989	1992–2019
Kyrgyz Republic	118.04	0.53	481.18	0.315	0.334	1.446	1997–2019
Latvia	158,398.50	0.89	792,339.30	0.546	0.187	1.828	1993–2019
Lithuania	146,222.10	–0.75	724,295.10	0.529	0.094	1.737	1993–2019
Malaysia	12.40	0.00	64.96	0.435	0.004	2.000	1992–2019
Mali	162.00	–1.78	750.44	0.376	0.504	1.714	1992–2019
Mauritius	11.07	0.08	48.87	0.621	0.049	1.954	1992–2019

(*continued*)

Table 2. (Continued)

Country	Raw Confidence Score			Resilience			Sample Period
	Std. Dev.	Min.	Max.	Std. Dev.	Min.	Max.	
Mexico	107.26	1.00	450.11	0.722	0.082	1.999	1992–2019
Moldova	620,067.00	4.75	2,435,056.00	0.387	0.670	1.996	1993–2019
Morocco	22.22	–1.71	105.25	0.506	0.007	1.997	1992–2019
Myanmar	661.33	0.41	2,608.47	0.232	0.760	1.563	2002–2019
Namibia	9.04	2.89	37.99	0.467	0.378	1.974	2004–2019
Netherlands	2.00	–1.28	6.79	0.370	0.072	1.331	1992–2019
New Zealand	2.62	–1.67	10.30	0.353	0.027	1.394	1992–2019
Niger	177.25	–1.36	696.28	0.555	0.002	1.895	1992–2019
Nigeria	600.87	8.94	2,439.02	0.464	0.435	1.802	1992–2019
Norway	2.52	–1.33	8.45	0.233	0.423	1.574	1992–2019
Pakistan	11.69	1.74	47.24	0.563	0.020	1.904	1992–2019
Paraguay	57.70	1.49	222.80	0.680	0.043	2.000	1992–2019
Peru	25,228.02	0.48	133,613.70	0.569	0.199	1.999	1992–2019
Philippines	28.85	1.11	156.96	0.701	0.077	1.958	1992–2019
Poland	5.97	–0.84	23.90	0.637	0.068	1.993	2000–2019
Portugal	2.64	–1.09	8.17	0.292	0.998	1.997	1992–2019
Qatar	137.15	0.82	616.54	0.699	0.025	1.928	1992–2019
Romania	7,978.41	–0.02	25,476.40	0.544	0.118	1.998	1992–2019
Russian Federation	76,310.87	1.57	388,413.50	0.289	0.872	1.798	1994–2019
Rwanda	69.95	6.04	314.98	0.725	0.002	1.996	1992–2019
Saudi Arabia	34.71	–2.05	163.90	0.445	0.255	1.633	1992–2019
Senegal	190.34	–1.96	751.22	0.648	0.064	1.888	1992–2019
Singapore	12.96	–2.48	48.18	0.693	0.013	1.998	1992–2019
Slovak Republic	33.09	0.70	161.12	0.353	0.753	1.895	1994–2019
Slovenia	106.02	–0.02	477.01	0.374	0.045	1.618	1994–2019
South Africa	10.36	2.31	50.09	0.723	0.015	1.999	1992–2019
South Korea	2.50	–0.58	9.32	0.654	0.048	1.967	1992–2019
Spain	4.28	–0.63	19.35	0.280	0.999	1.999	1992–2019
Sri Lanka	104.75	3.73	507.02	0.354	0.375	1.611	1992–2019
Sweden	3.90	–2.31	16.57	0.220	0.675	1.489	1992–2019

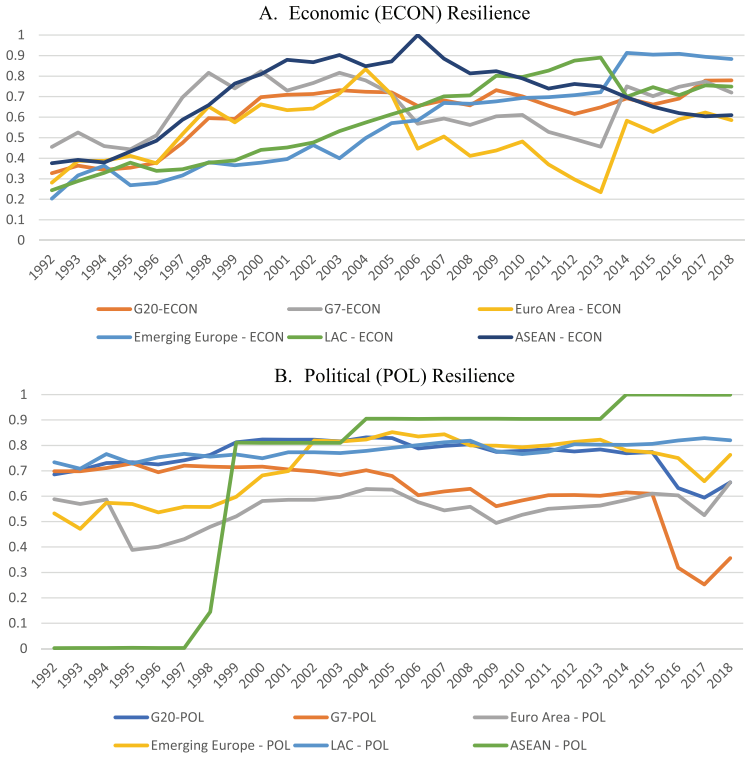
(*continued*)

Table 2. (Continued)

Country	Raw Confidence Score			Resilience			Sample Period
	Std. Dev.	Min.	Max.	Std. Dev.	Min.	Max.	
Tanzania	283.22	2.45	1,308.90	0.378	0.156	1.229	1992–2019
Thailand	15.41	–0.89	61.95	0.573	0.022	1.831	1992–2019
Togo	192.08	32.40	897.79	0.585	0.131	2.000	1992–2019
Trinidad and Tobago	33.17	2.62	151.07	0.512	0.252	2.000	1992–2018
Tunisia	5.98	0.84	27.22	0.551	0.001	2.000	1992–2019
Turkey	771.46	8.50	3,981.43	0.424	0.249	1.898	1992–2019
Uganda	60.66	–0.40	229.17	0.213	0.207	1.078	1995–2019
Ukraine	3,160,807.00	9.27	15,800,000.00	0.282	0.505	1.492	1994–2019
United Arab Emirates	53.49	1.59	181.81	0.318	0.700	1.955	2009–2019
United Kingdom	2.19	–1.26	9.75	0.291	0.884	1.986	1992–2019
United States	3.71	–0.64	16.98	0.340	0.782	1.847	1992–2019
Uruguay	2,141.47	3.89	11,278.23	0.528	0.087	1.999	1992–2019
Venezuela	270,000.50	35.43	715,338.80	0.224	0.574	1.532	2010–2016
Vietnam	782.92	–1.19	3,615.22	0.410	0.417	1.984	1997–2019
Yemen, Rep.	273,000,000,000,000,000.00	11.25	1,020,000,000,000,000,000.00	0.347	0.334	1.595	1994–2014
Zambia	7,697.03	18.12	30,181.63	0.649	0.197	1.880	1992–2019

Note: Equation (1) defines CONFIDENCE. In the estimation phase, CONFIDENCE is normalized for reasons explained in Section 4.1.

Figure 3. Economic and Political Resilience



Note: Resilience (RES) is defined in Equation (6). The discussion in Section 3.2 provides the details about the economic and political components of RES.

a maximum score of 1.02 quintillion.[32] These confidence indicators are also matched against the dispersion (maximum, minimum, standard deviation) in the normalized resilience indicators, which are far less disciplined by country type—put another way, it appears that countries can change their resilience substantially, and development level is not correlated with resilient policies.

Figure 3 puts the various inputs into resilience together into two parts: economic and political components of resilience. We plot

[32]The massive dispersion of these raw scores is another reason why the overall confidence indicator has been normalized.

levels of resilience for the same country groups as in Figures 1 and 2 for consistency. Resilience (RES in Equation (6)) is defined such that more confidence in central banks and greater institutional trust, as well as an improved ability to react to macroeconomic and financial shocks, define more resilience. On this score, levels of both economic and political resilience have risen over time, although the changes can be region- or country group-specific. Overall, there is a slow but noticeable downward trend since a major improvement took place in the mid-1990s, when positive institutional developments (e.g., more central bank independence) gathered pace and the Great Moderation was in full swing. There is a clear decline in economic resilience in the euro area associated with the sovereign debt crisis while many parts of the world, notably in emerging Europe and the G7, experience a rise. Nevertheless, there are signs of modest declines in this form of resilience following the GFC.

A similar pattern is seen in the political resilience indicator. However, we note a sharp rise in political resilience especially after the Asian financial crisis of 1997 and the drop in political resilience in the G7 after 2016,[33] while resilience in the euro area rises in the aftermath of the sovereign debt crisis. Finally, economic resilience is seen to improve toward the end of the sample. This development precisely captures the concept of resilience, namely the ability to withstand and recover from developments that have a negative impact on the public's confidence in central banks.

4.2 Results: Model Selection and Econometric Results

The results from the three model selection approaches are shown in Appendix E; the BMA analysis, comprising 65,536 unique models, indicated a parsimonious set of six control variables in addition to the lagged central bank credibility indicator, while the stepwise approach indicated only a slightly larger set of eight control variables and the Lasso approach took in nine covariates.

The results from the regressions relating institutional resilience to central bank confidence take these results into consideration and are shown in Table 3 for the system-GMM model. Given the

[33] We cannot determine, of course, whether this is triggered by the U.S. elections that year.

Table 3. System-GMM Results, Factors Affecting Institutional Resilience

	1	2	3	4	5
	BMA	**Stepwise**	**Lasso**	**Lasso**	**Lasso**
	SYS-GMM	**SYS-GMM**	**SYS-GMM**	**Pre-GFC (1990–2009)**	**Post-GFC (2010–19)**
CB Credibility	–0.35	–0.38	–0.39	–0.52	–0.73
	*3.15***	*2.81***	*2.84***	*2.73***	*2.07***
Property Rights Volatility	–8.64	–6.88	–6.57	–9.76	–9.42
	*2.41***	*2.16***	*2.05***	*1.43*	*1.30*
Central Government Debt	–0.001			NA	NA
	0.93				
Human Capital	–0.07	0.24	0.24	–0.06	
	0.62	*1.19*	*1.22*	*0.26*	
FDI	0.003		0.003	0.010	
	1.08		*1.02*	*0.83*	
Informality		0.02	0.02	0.02	0.010
		1.21	*1.26*	*1.70**	*0.69*
GDP Growth		0.03	0.03	0.01	
		*2.09***	*2.17***	*1.04*	
Population Growth		0.76	0.67	20.62	
		0.55	*0.56*	*2.64****	
Central Bank Independence (CBI)	0.71	0.74	0.66	0.25	–1.67
	*2.74****	*2.46***	*2.19***	*0.48*	*1.45*
Excess Crises	–0.08	–0.09	–0.09	–0.37	
	0.75	*0.65*	*0.73*	*2.16***	
Resource Rents		0.003	0.0001	–0.020	
		0.07	*0.02*	*2.04***	
Debt	NA	NA	NA	–0.003	0.002
				1.16	*0.86*
N	2,023	2,219	2,219	1,319	732
Number of Instruments	97	97	97	65	33
AR(n)	0.583	0.687	0.572	0.35	0.11
Hansen Statistic	0.45	0.325	0.334	0.554	0.214
Lag Structure	4 8 collapsed	4 8 collapsed	4 8 collapsed	8 10 collapsed	3 3 collapsed

Note: Absolute value of t-stats underneath the coefficients. *,**,*** denotes 10 percent, 5 percent, and 1 percent level of significance respectively. The AR(n) test gives the test of serial correlation for the first lag of the lag structure used.

similarities in the model selection process, for many of the GMM models the only changes are thus to be found in the instrumentation strategy, shifting according to the covariates found to be significant. Starting from the BMA analysis, our key variable of interest has a consistent result across all model selection criteria, with lower central bank credibility (manifested in a higher score) correlating strongly and significantly with lower institutional resilience. Across models, each percent increase in the central bank (non)confidence measure corresponds with an average 3.6 percent drop in institutional resilience.

For the remaining covariates, the results are uniform, with property rights volatility and government debt having a strong negative relationship; in terms of scale for property rights volatility, the highest amount of property rights volatility in the set (0.264, found in Ghana in 1964) corresponds to a drop of 57 percent in institutional resilience. Even when observed at its mean, the presence of property rights volatility results in an average 2 percent drop in resilience. In terms of positive influences on resilience, only GDP growth and central bank independence enter in as positive in two of the three regressions. The remaining determinants are all statistically insignificant.

4.3 Robustness Testing

These results point to a clear relationship between how key economic institutions perform and (lack of) institutional resilience, as, uniformly, a lack of central bank credibility correlates strongly and negatively with resilience. To see if these results are robust to changes in variables or methods, we undertake an extensive battery of robustness tests.

First, to rule out that a resilience effect is specific just to various years, we break out our sample into two time periods, a pre-GFC period (to 2009) and a post-GFC period (2010 onward) (last two columns of Table 3). As can be seen, the effect of central bank credibility is more statistically significant in the pre-GFC period, although it remains significant in both periods; perhaps of more interest is that so many plausible covariates drop out via the BMA model selection procedure in the post-GFC world, leaving central bank credibility, property rights volatility, debt, and central bank

independence as the only determinants of resilience. It must be noted that none of these has a positive effect on resilience, apart from a central bank which adheres to its stated policy goals. This second model also requires some caution in interpretation, as the only significant variable is the confidence variable; more importantly, the vast reduction in observations makes the system-GMM model more fragile, with serial correlation being rejected but only at the 11 percent level.

We replace covariates which are similar (and have high collinearity), but which could be capturing additional effects related to resilience, to see if the relationship between resilience and central bank credibility remains (Table 4). Given the stronger performance of central bank credibility in the Lasso model from Table 3, we have chosen to retain this variable set as the model to check robustness. In the first instance, column 1 shows the effects of replacing the human capital indicator from the Penn World Tables with another metric to proxy for human capital, namely mortality rates; high mortality is both a significant negative correlate with human capital and should have a deleterious effect on resilience. This model is even stronger than our baselines, with mortality having little effect but lack of central bank credibility continuing to have a significantly negative effect on resilience. A similar effect holds when we replace government debt with an overall indicator of "financial risk" (related to debt, current account, and other indicators of government finances; see Table 1), entering into the system-GMM (column 2) as also significant: as can be seen, the results of central bank credibility remain unchanged, albeit at a slightly smaller level of economic significance.

Building on the fact that perhaps the central bank itself is better the longer it is around, column 3 also includes a dummy if a country had a central bank pre-Second World War (i.e., 1939 or earlier). This variable will hopefully capture two possible effects: first, central banks which have been around for a much longer period have institutional memory in dealing with inflation; second, and perhaps more importantly, central banks which have existed for a hundred years might have already built up a store of credibility, meaning we would expect that countries which had a central bank pre-World War II would have more institutional resilience. However, rerunning the Lasso selection shows that this variable is insignificant, and so it is instead included as an additional instrument. In any event, this

Table 4. Robustness Tests

	1	2	3	4	5	6	7
	System-GMM	**System-GMM**	**System-GMM**	**System-GMM**	**System-GMM**	**Tobit (Lasso)**	**Tobit (BMA)**
CB Credibility	–0.38	–0.28	–0.37	–0.32	–0.30	–0.22	–0.21
	*3.43***	*2.89***	*2.83***	*2.53***	*2.38***	*3.45***	*3.25***
Property Rights Volatility	–2.91	–5.12	–3.02	–6.56	–9.90	–4.29	–3.46
	1.26	*1.94**	*1.25*	*1.95**	*3.09***	*3.70***	*3.18***
Human Capital		0.23	0.16	0.20	0.04	0.05	0.005
		1.42	*0.74*	*1.26*	*0.25*	*1.01*	*0.09*
Mortality	0.001						
	0.81						
FDI	0.0009	0.001	0.0003	0.003	0.0004	0.001	0.003
	0.35	*0.19*	*0.13*	*0.94*	*0.15*	*0.88*	*2.32***
GDP Growth	0.01	0.01	0.005	0.02	0.01	0.01	
	1.08	*1.08*	*0.60*	*2.31***	*1.35*	*2.10***	
Population Growth	1.76		0.87	0.46		0.19	
	0.87		*0.66*	*0.44*		*1.14*	
Central Bank Independence (CBI)	1.02	0.77	1.08	0.83	–0.22	0.03	0.08
	*3.71***	*2.71***	*3.30***	*3.10***	*0.44*	*0.19*	*0.46*
Informality	–0.006	0.01	0.005	0.01	0.01	0.003	
	0.75	*0.99*	*0.31*	*1.09*	*1.54*	*1.04*	
Excess Crises	–0.06		–0.05	0.04	–0.20	–0.12	–0.15
	0.37		*0.42*	*0.33*	*1.23*	*3.12***	*3.76***
Resource Rents	0.004		0.01	0.001		–0.001	
	0.76		*1.96***	*0.32*		*0.40*	

(*continued*)

Table 4. (Continued)

	1	2	3	4	5	6	7
	System-GMM	**System-GMM**	**System-GMM**	**System-GMM**	**System-GMM**	**Tobit (Lasso)**	**Tobit (BMA)**
Land Area			–1.21				
			*1.69**				
Financial Risk		0.03					
		*3.95****					
Years of a Central Bank				–0.001			
				0.51			
Debt					–0.009		–0.001
					*1.91**		*1.78**
CBI*Debt					0.01		
					*1.85**		
N	2,349	2,141	2,216	2,219	2,023	2,219	2,023
Number of Instruments	97	97	92	98	86		
AR(n)	0.237	0.4670	0.134	0.829	0.8710		
Hansen Statistic	0.18	0.351	0.202	0.285	0.295		
Lag Structure	4 8 collapse	4 8 collapse	4 8 collapse	4 8 collapse	5 8 collapse		

Note: Absolute value of t-stats underneath the coefficients. Column 3 uses pre-war central bank existence as an additional instrument, as it was insignificant in a rerun Lasso model selection test.

does not change the effects of lower confidence in central banks on institutional resilience. Similarly, perhaps it is not just if a bank has been in existence for a long time but how long, and we thus include a variable measuring the number of years a central bank has been in existence to capture more recent memory effects (column 4). The same result is obtained, with Years of a Central Bank entering in directly in the equation but not significant, drawing some minor significance from the credibility of the bank and its effect on institutional resilience (p=0.011). Keeping with this same theoretical line, we posit that perhaps it is how central banks handle their debt which is the key measure for resilience, and we find (column 5) that interacting CBI and levels of debt does show an improvement in resilience, as more independent central banks do contribute to higher levels of resilience via their management of debt. However, this result is significant only at the 10 percent level, and credibility remains a key determinant of resilience at the 5 percent level.

Given that the resilience indicator we utilize here is censored from left and right between the values of 0 and 2, we utilize a tobit regression in columns 6 and 7 for both the Lasso and BMA results respectively. As the tobit model does not account for endogeneity or fixed effects, these results should be interpreted more cautiously, and indeed, excess crises have much more of an effect here: we surmise this is the case because the underlying causes of crises are not used as instruments. In any event, while the magnitude of the resilience effect is smaller, the statistical significance of the central bank credibility variable remains strong.

Finally, a selection of impulse responses from estimated local projections are shown in Figure 4. We focus on the impact of shocks from four of the covariates shown in Tables 2 and 3 which have a consistently statistically significant impact on resilience, including central bank credibility, government debt, financial risk, and property rights volatility.[34] When the full data set is considered, central bank credibility is found to raise resilience at all lags.[35] However,

[34] Of course, we also examined the impact of other covariates (not shown). For example, CBI is found to raise resilience but only since 2010. This explains, perhaps, the mixed evidence reported above in relation to this variable.

[35] Given the span of the sample when all covariates are included and the annual frequency, five-year-ahead impulse responses are deemed to be sufficient.

Figure 4. Selected Impulse Responses from Local Projections

Note: Impulse responses for a one-unit shock in the variables shown on RESILIENCE. The black lines are the estimated impulse responses; the red lines are the 68 percent confidence bands. Credibility, debt, FINRR (Financial Risk), and PTYRIGHTS (property rights volatility) are explained in the text and in Table 1. EME, G7, and G20 are, respectively, the emerging market, Group of Seven and Group of Twenty economies in the data set. Estimates are for the full sample (i.e., starting in 1990). Depending on the variables included in the VAR (see Tables 3 and 4), between 83 and 85 countries are included.

the evidence is a little more mixed when only the EMEs are considered, although after one and four years, credibility does improve resilience. It appears that this link is more fragile than for the "rest of the world" (dominated by AEs) and this result parallels the one in

Bordo and Siklos (2021). Similarly, rising government debt reduces resilience, and this result holds even more strongly for the G20 economies, a mix of AEs and EMEs. Financial risk (see Table 1), when it translates into more financial fragility, also reduces resilience for all countries, including EMEs. Finally, the clearest effect comes from the property rights volatility variable, as a rise in this form of volatility unambiguously reduces resilience. Overall, the local projections shown generate results that mirror the regression results discussed above.

The bottom line is that central bank performance, as measured by credibility, and institutional factors, including central bank autonomy and the protection of property rights (to give two examples from a wide variety of indicators examined), robustly explain the resilience of monetary policy as defined in this study. This conclusion is a global one, although there is a small amount of evidence that the nexus between central bank resilience and its determinants may be relatively weaker in EMEs.

5. Conclusions

This paper examines the links from central bank credibility to trust to overall institutional resilience. In positing these links, extant research offers few clues on the factors affecting institutional resilience, preferring to offer instead what resilience encompasses. Building on this gap in the literature, we offer robust empirical evidence about what drives institutional resilience and let our data do the talking via several model selection methods. Applying dynamic panel models, we show that confidence in a central bank—expressed as a function of how good it is at its job, i.e., controlling inflation—is directly related to overall institutional resilience. In particular, the more a central bank loses confidence via missing inflation targets or veering from global trends, the more harm it does to overall institutional resilience in a particular country. Simply put, given the centrality of a central bank to a country's institutional system, both political and economic, the faltering of a central bank in its mission is bound to lead to a loss of resilience for the system.

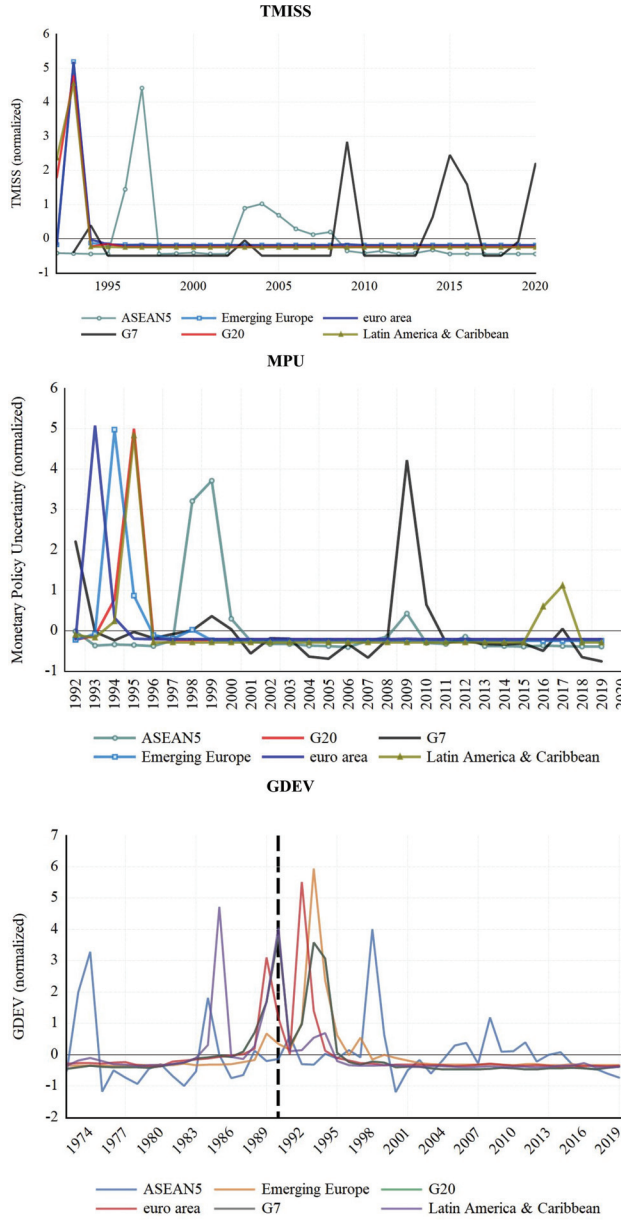
As noted earlier, there is very little to guide our path in theorizing what exactly drives resilience at either the economic or institutional level, making our identification strategy one of the first of (we hope)

a long line of attempts to isolate the relationship between central banks and their institutional environment. Indeed, we have shown a novel attempt to fashion empirical evidence for both confidence in the central bank and institutional resilience and one which builds on existing theories to guide the empirical approach. Accordingly, we invite other researchers to follow in "the wake of Magellan" and explore these issues much more deeply.[36]

Conviction is growing among academics and policymakers that institutional resilience is a critical ingredient not just for central banks but for society more generally. In part to enhance the robustness of our findings, we encourage the search for different ways to quantify institutional resilience at both the political and economic system level, drawing on other disciplines where resilience is an important characteristic, as well as more rigorously modeling the relationship between macroeconomic variables and overall institutional resilience. The attributes of confidence in a central bank could also be refined beyond the ex post measures we have utilized here, to include ex ante measures or to account for the endogeneity of political institutions and the central bank. In any event, given the importance of institutional resilience in a world buffeted by financial, macroeconomic, and now epidemiological shocks and military conflict, the search for the drivers of resilience should keep researchers busy for years to come.

[36]Thanks to Jon Oliva for this phrasing.

Appendix A. The Components of CONF: TMISS, MPU, and GDEV



Note: TMISS, MPU, and GDEV as defined in the text. The line at 1990 on the GDEV graph marks the year when econometric estimates begin.

Appendix B. Summary Statistics

Variable [Mnemonic]	n	Mean	Std. Dev.	Min.	Max.
Resilience [RESILIENCE]	5,117	1.032922	0.5454773	0	2
Confidence [CONF]	3,207	0.1333199	0.2396472	0	1
Controls					
Arable Land (Hectares per Person) [ARABLELAND]	8,877	0.2880	0.2868	0.00	3.30
Central Bank Independence [CBI]	5,519	0.5557	0.1747	0.10	0.93
Central Government Debt as a Percentage of GDP [DEBT]	6,904	48.2685	44.4778	0.00	547.78
Conflict [CONFLICT]	12,283	0.1395	0.3464	0.00	1.00
Employment Growth in Percent [EMPG]	9,209	2.5579	4.8899	–61.96	122.77
Excess Crises [EXCESS CRISIS]	12,283	0.0535	0.2530	0.00	3.00
Financial Risk [FINRR]	4,650	35.0981	8.3106	4.00	50.00
Foreign Direct Investment, Net Inflows (Percentage of GDP) [FDI]	7,035	3.4795	12.3347	–58.32	451.64
GDP Growth [GDPGUSD]	8,719	4.4090	7.6069	–66.66	147.73
Human Capital [HC]	8,337	2.0929	0.7329	1.01	4.35
Inflation, Consumer Prices (Annual, Percent) [INF]	7,071	25.1330	353.3735	–60.50	23,773.13
Informal Output (Percentage of Official GDP) [INFORMALITY]	4,313	31.4979	12.2854	7.97	67.66
Political Institutions Volatility, Three-Month [POLVOL]	8,628	0.4211	1.2674	0.00	9.24
Population Growth, Percent [POPG]	8,939	0.0192	0.1334	–3.20	6.83
Property Rights Volatility, Three-Month [PTYRIGHTS]	7,109	0.0152	0.0201	0.00	0.26
Resource Rents as a Percentage of GDP [TOTALNATURALRESOURCE]	7,299	7.4792	11.2917	0.00	87.51

Appendix C. Countries Included in the Econometric Estimation, by Method

BMA	Stepwise	Lasso
Albania	Albania	Albania
Algeria	Algeria	Algeria
Angola	Angola	Angola
Australia	Australia	Australia
Austria	Austria	Austria
Bahrain	Bahrain	Bahrain
Bangladesh	Bangladesh	Bangladesh
Belgium	Belgium	Belgium
Bolivia	Bolivia	Bolivia
Botswana	Botswana	Botswana
Brazil	Brazil	Brazil
Bulgaria	Bulgaria	Bulgaria
Burkina Faso	Burkina Faso	Burkina Faso
Cameroon	Cambodia	Cambodia
Canada	Cameroon	Cameroon
Chile	Canada	Canada
Colombia	Chile	Chile
Congo, Rep.	China	China
Costa Rica	Colombia	Colombia
Croatia	Congo, Rep.	Congo, Rep.
Cyprus	Costa Rica	Costa Rica
Czech Republic	Croatia	Croatia
Denmark	Cyprus	Cyprus
Dominican Republic	Czech Republic	Czech Republic
Estonia	Denmark	Denmark
Finland	Dominican Republic	Dominican Republic
France	Egypt, Arab Rep.	Egypt, Arab Rep.
Gabon	Estonia	Estonia
Germany	Ethiopia	Ethiopia
Ghana	Finland	Finland
Greece	France	France
Guatemala	Gabon	Gabon
Hungary	Germany	Germany
India	Ghana	Ghana
Indonesia	Greece	Greece
Iran, Islamic Rep.	Guatemala	Guatemala
Ireland	Hungary	Hungary
Italy	India	India
Jamaica	Indonesia	Indonesia
Japan	Iran, Islamic Rep.	Iran, Islamic Rep.
Jordan	Ireland	Ireland
Kazakhstan	Italy	Italy
Kuwait	Jamaica	Jamaica
Kyrgyz Republic	Japan	Japan
Latvia	Jordan	Jordan
Lithuania	Kazakhstan	Kazakhstan
Malaysia	Kuwait	Kuwait
Mali	Kyrgyz Republic	Kyrgyz Republic

BMA	Stepwise	Lasso
Mexico	Latvia	Latvia
Moldova	Lithuania	Lithuania
Morocco	Malaysia	Malaysia
Myanmar	Mali	Mali
Namibia	Mauritius	Mauritius
New Zealand	Mexico	Mexico
Niger	Moldova	Moldova
Nigeria	Morocco	Morocco
Norway	Myanmar	Myanmar
Pakistan	Namibia	Namibia
Paraguay	Netherlands	Netherlands
Peru	New Zealand	New Zealand
Poland	Niger	Niger
Portugal	Nigeria	Nigeria
Qatar	Norway	Norway
Romania	Pakistan	Pakistan
Russian Federation	Paraguay	Paraguay
Rwanda	Peru	Peru
Saudi Arabia	Philippines	Philippines
Senegal	Poland	Poland
Sierra Leone	Portugal	Portugal
Singapore	Qatar	Qatar
Slovak Republic	Romania	Romania
Slovenia	Russian Federation	Russian Federation
South Africa	Rwanda	Rwanda
South Korea	Saudi Arabia	Saudi Arabia
Spain	Senegal	Senegal
Sri Lanka	Singapore	Singapore
Sweden	Slovak Republic	Slovak Republic
Switzerland	Slovenia	Slovenia
Thailand	South Africa	South Africa
Togo	South Korea	South Korea
Trinidad and Tobago	Spain	Spain
Tunisia	Sri Lanka	Sri Lanka
Turkey	Sweden	Sweden
Uganda	Tanzania	Tanzania
Ukraine	Thailand	Thailand
United Kingdom	Togo	Togo
United States	Trinidad and Tobago	Trinidad and Tobago
Uruguay	Tunisia	Tunisia
Venezuela	Turkey	Turkey
Vietnam	Uganda	Uganda
Yemen, Rep.	Ukraine	Ukraine
Zambia	United Arab Emirates	United Arab Emirates
	United Kingdom	United Kingdom
	United States	United States
	Uruguay	Uruguay
	Venezuela	Venezuela
	Vietnam	Vietnam
	Yemen, Rep.	Yemen, Rep.
	Zambia	Zambia

Appendix D. Countries by Grouping in Figures 1 and 2 and Appendix A

Country Groups					
G7	G20	Latin America & Caribbean	ASEAN5	Emerging Europe	Euro Area
CAN	CAN	ATG	IDN	ALB	AUT
FRA	FRA	ABW	MYS	BLR	BEL
DEU	DEU	BHS	PHL	BIH	CYP
ITA	ITA	BRB	THA	BGR	EST
JPN	JPN	BOL	VNM	HVR	FIN
GBR	GBR	BRA		HUN	FRA
USA	USA	CHL		UVK	DEU
	AUS	COL		MDA	GRC
	MEX	CRI		MNE	IRL
	TUR	DMA		MKD	ITA
	RUS	DOM		POL	LVA
	CHN	ECU		ROM	LTU
	IND	SLV		RUS	LUX
	IDN	GRD		SRB	MLT
	SAU	GTM		TUR	NED
	ZAF	GUY		UKR	PRT
	KOR	HTI			SVK
	ARG	HND			SVN
	BRA	JAM			
		PAR			
		PER			
		SUR			
		TTO			
		URY			
		VEN			
		ARG			
		MEX			

Note: ISO-3 codes are used here to identify the countries. The country groupings are the ones used in Figures 1 and 2 and are obtained from the IMF's World Economic Outlook. Country codes that are underlined indicate countries that appear in more than one country group. See https://www.imf.org/en/Publications/WEO/weo-database/2023/October/select-aggr-data for the complete list of countries in each country group. We did not necessarily have data for all the countries in the country groupings shown, except G7, euro area, G20, and ASEAN5.

Appendix E. Results of the Model Selection Process, by Method

	1	2	3
Variables	**BMA**	**Stepwise**	**Lasso**
Arable Land (Hectares per Person)	–0.01		–0.08
	0.33		*1.96*
Central Bank Independence	0.34	0.26	0.52
	*4.81**	*4.70**	*7.63**
Central Government Debt as a Percentage of GDP	–0.001		–0.0003
	*2.33**		*0.81*
Conflict	–0.001		0.04
	0.13		*1.34*
Excess Crises	–0.12	–0.10	–0.11
	*2.76**	*3.00**	*3.07**
Foreign Direct Investment, Net Inflows (Percentage of GDP)	0.008	0.001	0.007
	*2.31**	*1.55*	*2.69**
GDP Growth	0.001	0.02	0.01
	0.37	*7.37**	*4.81**
Human Capital	0.04	0.27	0.27
	*1.44**	*22.22**	*18.74**
Inflation, Consumer Prices (Annual, Percent)	–0.00006		–0.0002
	0.29		*0.93*
Informal Output (Percentage of Official GDP)	0.0003	0.01	0.01
	0.37	*15.04**	*9.93**
Money Supply (M2) Growth	0.00006		0.0001
	0.11		*1.19*
Political Institutions Volatility, Three-Month	–0.0008		0.003
	0.19		*0.28*
Population Growth, Percent	0.006	0.42	0.34
	0.14	*2.47**	*2.10**
Property Rights Volatility, Three-Month	–4.46	–3.21	–3.39
	*5.12**	*4.12**	*4.00**
Resource Rents as a Percentage of GDP	–0.0001	0.004	0.002
	0.24	*3.60**	*2.02**

Note: Absolute value of the t-ratio shown under the estimated coefficient. * indicates variables which are included in the final model.

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