# Working Paper Series

Livio Stracca The Great Moderation at 40:
learning from the cross section

**Abstract**

This study examines the drivers of inflation levels, inflation variability, and growth variability collectively representing long-term central bank performance across 37 advanced economies in the Great Moderation era. A key finding is that central bank performance is consistently linked to the overall quality of institutions, while central bank-specific factors such as independence, exchange rate regimes, or inflation targeting show no significant impact. The analysis is extended to the 2022 inflation resurgence, using pre-2022 country characteristics. The results indicate that reliance on imports from Russia (likely gas) and its interaction with post-COVID GDP growth are the primary determinants, suggesting that the inflation surge was not a reversal of the Great Moderation.

# 0   Non-technical Summary

Over the last three decades, inflation in advanced economies has converged to low and stable levels, a stark contrast to the high and volatile inflation of the 1970s. This period of stability, often referred to as the "Great Moderation," is particularly noteworthy because it marks the first time such stability has been achieved under a fully fiat money system. Many attribute this achievement to factors such as central bank independence, inflation targeting, and rule-based monetary policies. Despite these explanations, it remains puzzling why inflation performance and central bank credibility have become so similar across countries, given the diversity in economic conditions, resources, and institutional setups.

One potential explanation is globalization, which may have synchronized inflation trends across countries. However, many argue that central banks retain significant control over inflation regardless of global trade and financial integration. This suggests that globalization alone cannot fully explain the convergence of inflation outcomes. If maintaining low and stable inflation is inherently difficult, one might expect more variation in inflation outcomes across countries, much like the variation observed in other areas of economic policy. Surprisingly, this variation is relatively minor, and it is not immediately clear how factors such as central bank resources or expertise influence inflation performance.

This paper investigates the cross-sectional differences in how countries experienced the Great Moderation. Specifically, it examines the variation in inflation levels, inflation volatility, and economic growth volatility, all of which reflect central bank performance. While much of the existing research has focused on the Great Moderation within individual countries, particularly the United States , there is limited exploration of why different countries experienced this period differently. Some studies suggest that improved monetary policy played a key role, likening it to a new "technology" that became available in the mid-1980s and was adopted by countries to varying degrees of success. This paper seeks to identify the country-specific factors that influenced the timing and effectiveness of this adoption.

By focusing on cross-sectional differences, this study provides a long-term perspective, where temporary shocks and non-fundamental factors are less likely to distort the results. The analysis uses data from 37 advanced countries since 1986, examining the average levels and volatility of inflation and economic growth. These outcomes are then related to various potential drivers,

including central bank characteristics, institutional quality, and monetary regimes.

The key finding is that institutional quality, as measured by the Rule of Law indicator, plays a central role in explaining cross-country differences in economic performance during the Great Moderation. Countries with stronger institutional foundations tended to achieve better outcomes in terms of inflation stability and economic growth. Importantly, this relationship holds even for countries operating under fixed exchange rate systems, such as the euro area, where monetary policies are partially constrained. While the influence of institutional quality is less pronounced when inflation levels are already low, it remains significant for inflation volatility.

These results suggest that the broader institutional environment in which central banks operate is more important for economic stability than the technical details of monetary policy or the structural characteristics of an economy. In other words, strong institutions provide the foundation for successful monetary policy and stable economic outcomes. This has important implications for both policymakers and researchers: efforts to improve economic stability should focus on strengthening institutional quality, such as promoting the rule of law and good governance, rather than solely refining the technical aspects of monetary policy.

The study also examines the recent surge in inflation during 2022, which contrasts sharply with the Great Moderation. Interestingly, institutional quality does not appear to play a significant role in explaining inflation during this period. Instead, inflation was largely driven by specific supply-side factors, such as reliance on energy imports from Russia. This suggests that the inflation resurgence was a temporary phenomenon rather than a reversal of the broader trends of the Great Moderation.

# 1 Introduction

One notable feature of the last three decades has been the convergence of inflation to low and stable levels across virtually all advanced economiesa phenomenon often associated with the term *Great Moderation*. The persistence of low and stable inflation is remarkable, especially considering the high and volatile inflation of the 1970s and the fact that, historically, this is the first time the world is operating under a fully fiat money regime. Central bank independence, inflation targeting, and rule-based monetary policymaking have all been linked to this remarkable achievement.

However, the high degree of convergence in inflation performance and central bank credibility across countries remains puzzling. While it is possible that the synchronization of inflation trends across countries has contributed to this outcome, many argue that central banks retain the ability to control inflation even in the face of significant trade and financial globalization. This suggests that globalization alone cannot fully explain the phenomenon.[1] If achieving low and stable inflation (and stable economic growth) is inherently challenging, one would expect significant variation across countries, akin to the variation observed in other economic policy domains (e.g., market regulation). Resource availability and the economic expertise of central banks should, in theory, be correlated with inflation outcomes. Yet, at least *prima facie*, this correlation appears weak.

With this question in mind, this paper aims to analyze the *cross-sectional* dimension of the Great Moderation, focusing on the drivers of cross-country variation in inflation levels, inflation volatility, and economic growth volatility measures that collectively represent central bank performance. While there is a substantial body of literature documenting the Great Moderation in the United States and investigating its drivers (e.g., Blanchard and Simon [2001], Gambetti and Gal [2009], Ahmed et al. [2004], and Stock and Watson [2002]), most studies attribute at least some role to sound monetary policy as a key determinant.[2]

Surprisingly, the literature on the cross-country dimension of the Great Moderation remains limited.[3] Both Summers [2005] and Cecchetti et al. [2006] documented that the Great Moderation

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[1]See Woodford [2007]. Yilmazkuday [2022] demonstrate that gravity variables help explain inflation convergence across country pairs, highlighting the role of international factors.

[2]See, however, Lima et al. [2017] for a more critical perspective.

[3]Keating and Valcarcel [2012] and Keating and Valcarcel [2017] argue that the Great Moderation is not a unique episode and identify other historical periods of volatility compression, notably post-World War II and in the 1920s.

of the mid-1980s was broadly experienced across countries. However, they did not delve into the drivers of cross-country heterogeneity. If the Great Moderation largely reflects improved monetary policy, it can be thought of as a new "technology" that became internationally accessible in the mid-1980s and could be adopted with varying degrees of effectiveness. This paper seeks to test the country-specific characteristics that influenced the timing and quality of this "technology" adoption.

Examining the cross-sectional variation among countries is particularly useful because, over a period of nearly 40 years, it can be reasonably assumed that non-fundamental factors and temporary shocks have largely dissipated. As such, average outcomes for inflation levels and volatility provide a reliable measure of central bank performance. This paper focuses on understanding the fundamental drivers of cross-country heterogeneity in how the Great Moderation was experienced and how effectively central banks performed. Moreover, a cross-sectional approach allows for the control of common factors such as technological advancesthat may have contributed to reduced business cycle volatility and are likely to be shared among advanced economies.[4] Although some have seen the Global Financial Crisis as an interruption of the Great Moderation, Gadea et al. [2018] argue convincingly that this was not the case and low growth volatility resumed after the large shock of 2008-09.

Of course, one limitation of the cross-sectional approach is the loss of temporal information. Each country's experience is treated as a single observation, even though there may have been significant intra-period variation (e.g., countries adopting different monetary regimes during the period, such as euro area countries or those implementing inflation-targeting strategies). This limitation is partially addressed by examining different sample periods. While there is independent value in analyzing phenomena at both higher and lower frequencies, this paper adopts the latter approach.

Specifically, I analyze a cross-section of outcomes traditionally associated with the Great Moderationnamely, inflation levels and volatility, as well as growth volatilityacross 37 advanced countries since 1986. I regress sample averages of these indicators on a range of potential drivers, including country characteristics, central bank attributes, institutional quality, and monetary regimes.

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[4]Kamber and Wong [2020] also find that trend inflation is predominantly determined by domestic factors rather than foreign shocks, underscoring the role of domestic authorities.

The findings highlight the central role of institutional quality, measured by the Rule of Law indicator, in explaining cross-sectional performance during the Great Moderation. This relationship holds even within fixed exchange rate systems, such as the euro area, and other pegged regimes. The importance of institutional quality diminishes somewhat, but remains significant, when countries are already within the Great Moderation regime in terms of inflation levels, although the link remains strong with inflation volatility. Taken together, these results suggest that the institutional environment in which central banks operate is more crucial for economic outcomes than the specific details of monetary policy implementation or the structural characteristics of an economy.

This has significant implications: policymakers and researchers should prioritize strengthening institutional foundations over focusing on the technical nuances of monetary policy or the specifics of monetary regimes. Enhancing institutional quality could lead to more robust economic performance and stability. By emphasizing the broader institutional context, this study underscores the foundational role of strong institutions in achieving and sustaining economic stability. It calls for a comprehensive approach that prioritizes fostering the rule of law and other institutional strengths to support effective monetary policy and resilience.

In contrast, the analysis of cross-sectional drivers during the 2022 inflation resurgence reveals a different picture. Institutional quality plays no significant role in this context. Instead, energy imports from Russia emerge as consistently positive and significant predictors of inflation, indicating that the inflation surge was driven by specific, contingent supply-side factors rather than a reversal of the Great Moderation.

Overall, while monetary policy may require substantial resources and technical expertise, the findings suggest that achieving good stabilization outcomes depends more fundamentally on a country's institutional framework than on the technical execution of monetary policy itself.

The paper is structured as follows: Section 2 describes the data, Section 3 presents the model, and Section 4 discusses the results. Section 5 explores the cross-section of the 2022 inflation resurgence. Section 6 concludes.

# 2 Measuring Central Bank Performance

## 2.1 Data

This study uses annual data for 37 advanced countries, averaged over the period 1986–2021 or specific sub-samples. The country list includes: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, United Kingdom, and United States.

Two variations of the sample period are considered:

(i) 1997–2021, and

(ii) 1986–2021, excluding 2008–09 (i.e., the global financial crisis).[5]

Table 1 describes all the variables in more detail. Notably, inflation values above 100% are excluded, as is data from the COVID-19 pandemic period for growth levels and volatility.

**[Insert Table 1 here]**

## 2.2 Indicators of Performance

Central bank performance over the medium term can be assessed using inflation, considering both its level and volatility. Additionally, central banks often prioritize economic growth stability, either explicitly (e.g., the dual mandate of the US Federal Reserve) or implicitly. Accordingly, the following measures of central bank performance are analyzed:

(i) The level and standard deviation of annual CPI inflation,

(ii) The level and standard deviation of annual GDP deflator inflation (to capture the domestic component of inflation), and

(iii) The standard deviation of real GDP growth.[6]

An *overall performance measure* is also considered, calculated as the simple average of all the above performance indicators. Additionally, the absolute deviation of CPI annual inflation from

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[5] Charles et al. [2018], however, find that the global financial crisis did not represent a structural break in the Great Moderation.

[6] Levieuge and Lucotte [2014] use a combination of output and inflation volatilities to measure central bank conservatism.

2% is examined, as this is widely regarded as a benchmark for price stability. This measure accounts for the fact that both very low or negative inflation can be detrimental to society. Note, however, that all inflation-related performance indicators are strongly positively correlated.[7]

## 2.3   Testing for a Structural Break in Inflation

Figure 1 shows the median and standard deviation of inflation across countries. The chart indicates two potential dates for the widespread adoption of a low-inflation regime: the mid-1980s (based on the global median of inflation) or the mid to late 1990s (based on the cross-sectional standard deviation). This distinction suggests two phases of the Great Moderation:

- The international availability of a technology for maintaining low and stable inflation, beginning in the mid-1980s.
- The widespread adoption of this technology, occurring in the late 1990s.

Figure 2 illustrates that countries adopted this technology at different times, with transition economies such as Poland doing so significantly later. To distinguish between availability and adoption, another central bank performance indicator is introduced following this approach:

(i)   Testing for a structural break in the mean of inflation for each country (starting from 1970), and

(ii)   Considering only inflation observations after the estimated structural break.

Table 2 reports the estimated structural breaks by country, using a supremum Wald test for a structural break at a single unknown date. As expected, many advanced economies experienced a structural break in the mid-1980s, for Poland for example, the estimated break occurred in 1997.

Interestingly, there appears to be no trade-off between inflation and growth volatility, at least from a cross-sectional perspective (see Figure 3). If anything, the correlation seems to be mildly *positive*.

**[Insert Figures 1–3 and Table 2 here]**

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[7]A few inflation-targeting countries have had inflation targets different from 2% (e.g., Australia: 2.5%; Hungary: 3%; Iceland: 2.5%; Poland: 2.5%; and Mexico: 3%). Adjusting the indicator for these variations does not significantly alter the results.

# 3 Cross-Sectional Regressions

## 3.1 Specification

Let $CB_i$ be the chosen indicator of central bank performance over the sample period. I estimate a simple cross-sectional regression as follows:

$$CB_i = \alpha + \beta X_i + \epsilon_i \tag{1}$$

where $X$ is a vector of variables that includes the potential drivers of central bank performance, discussed below. Variables with subscript $_i$ are cross-sectional averages over the sample period (1986–2021 in the baseline). For ease of interpretation, all non-dummy elements of the $X$ vector are standardized.

I assume that causality runs from $X$ to $CB$, which may be justified by the principle of monetary neutrality in the long term (i.e., inflation and monetary policy should not affect real variables in the long run). For most of the variables used, concerns about reverse causality are minimal. In Section 4, I briefly elaborate on the reverse causality problem using instrumental variables.

## 3.2 Potentially Relevant Explanatory Variables

The indicators in the $X$ vector reflect different possible theories of central bank performance:

**Resources.** A first hypothesis is that countries with more resources may have better economic expertise in their central banks (e.g., comparing the US with Malta). This idea is captured by including real GDP per capita (in PPP terms) and population. Larger countries may also have better risk-sharing mechanisms, which could influence inflation and growth volatility (see Head [1995]).

**Quality of Institutions.** The quality of institutions may also drive central bank performance. Since central banks are public institutions, their functioning and performance may reflect the broader quality of governance in a country. The World Bank Rule of Law indicator is used to measure institutional quality.[8]

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[8]Results are very robust when using alternative governance indicators from the World Bank dataset.

**Country Structure.** Country characteristics may influence inflation and growth volatility. Relevant factors include trade openness and the oil trade balance (a proxy for the importance of oil imports, which is particularly relevant for CPI inflation volatility). Additionally, the industrial structure of a country is captured by the share of manufacturing employment relative to total employment.

**Public Debt to GDP.** The average public debt-to-GDP ratio is included as a measure of fiscal sustainability and the potential risk of fiscal dominance.

**Financial Development and Openness.** It has been long argued that financial development and openness to capital flows could smooth the business cycle, provide risk sharing, and be helpful for the Great Moderation, in particular in terms of output volatility. To capture this set of variables empirically, three indicators are considered: (i) financial development; (ii) the Chinn-Ito measure of financial openness; and (iii) capital controls as in the data from Fernandez et al. (2016).

**Demographics.** A higher share of the working-age population may act as a positive supply shock, increasing labor supply and reducing old-age dependency, which can lower inflation (see Goodhart and Pradhan [2020]). To capture this, I include the working-age dependency ratio.

**Central Bank Characteristics.** Central bank performance may be influenced by the institution's own characteristics and policies. This category includes central bank independence (using the database of Garriga [2016]) and central bank transparency (based on the indicators in Dincer and Eichengreen [2014]). However, due to limited observations for central bank transparency, this variable is analyzed through simple correlations, which are generally low.

**Monetary Regime.** The monetary regime in place can affect the level and volatility of inflation. Two dummy variables are considered:

 (i) Whether the country had an explicit inflation-targeting regime for more than half of the sample period.
 (ii) Whether the country was in a fixed exchange rate arrangement for more than half of the sample period (e.g., euro area countries are labeled as having a fixed exchange rate).

The literature on the role of inflation targeting (IT) in advanced economies is mixed. While the theoretical benefits of IT in anchoring inflation expectations are widely accepted, empirical evidence of its benefits is less clear. For example, Ball and Sheridan [2004] and Lin and Ye [2007] find limited evidence of substantial benefits in advanced countries, while Tawadros [2009] concludes that *"The empirical evidence suggests that almost all of the central banks that have pursued this strategy have been unsuccessful at controlling inflation, with the results indicating that the adoption of an inflation-targeting regime has had the perverse effect on inflation for almost every country."*

Other studies, such as Levin et al. [2004], report that inflation targeting is often associated with rising inflation in emerging markets, while it has stabilizing effects on inflation expectations in advanced economies. Balima et al. [2017] highlight potential publication bias in the literature on the positive effects of inflation targeting. More recent studies, such as Fratzscher et al. [2020] and Huang et al. [2019], find conditional benefits of IT, particularly in response to specific shocks or when accounting for endogeneity. However, Zhang and Wang [2022] remain skeptical of the stabilizing benefits of IT, particularly in emerging economies. Overall, the evidence on IT's effectiveness remains mixed.

**Transition Economy.**   Inflation has historically been high and volatile in transition economies. To account for this, a dummy variable is included for countries that transitioned from centrally planned economies in Eastern Europe.

## 3.3   Dealing with the Dimensionality Problem: Bayesian Model Averaging

With only 37 cross-sectional observations and a relatively long list of potential regressors, it is necessary to address the issue of model dimensionality while preserving sufficient degrees of freedom. This is a common problem in macroeconomics and a manifestation of model uncertainty, as discussed in Steel [2017].

To identify a small set of variables consistently associated with central bank performance, I apply Bayesian model averaging (BMA). This approach considers all possible models and minimizes the Bayesian Information Criterion (BIC).[9]

One important caveat of BMA is that the evaluation of causality takes as given the outcome of

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[9]Results are very consistent when using the "best subset regression" method described in Hastie and Friedman [2009], which was applied in a previous version of this study. Results also remain robust when targeting the Schwarz Information Criterion.

the model selection procedure, which is based on OLS regressions. Consequently, a variable that could be important when causality is properly considered (e.g., using instrumental variables) might not be selected by the procedure, and thus might escape deeper causal analysis.

# 4  Results

## 4.1  Cross-Sectional Regressions

**Baseline.**  The baseline results of the cross-sectional regressions are presented in Table 4 for the overall measure of central bank performance. A key finding is that a model including *only* the Rule of Law indicator as an explanatory variable is the best possible model from a Bayesian model averaging perspective (column 1). The coefficient is negative, statistically significant, and approximately -1, indicating that a one standard deviation increase in Rule of Law improves central bank performance by one standard deviation.

In subsequent columns, small groups of additional variables are introduced. Larger and more open countries exhibit better central bank performance (i.e., lower and more stable inflation), but these effects are significant only at the 10% level, and their coefficients are smaller than that of Rule of Law. Interestingly, monetary regime-related variables (e.g., exchange rate regime, central bank independence, inflation targeting) are consistently insignificant once Rule of Law is included. In order to get a visual feeling of the results, Figures 4 and 5 respectively report scatter plots of the overall measure of central bank performance and, respectively, Rule of Law and central bank independence. While there is a clear downward relationship in the former case, there is no notable connection in the latter (if anything, the regression line is slightly *positively* sloped), consistent with the regression results.

**[Include Table 4 here]**

**Does a Peg Make a Difference?**  An interesting question is whether being in a pegged exchange rate regime weakens the link between fundamental drivers and inflation performance. The rationale is that monetary policy in a peg arrangement (e.g., in a monetary union) is largely disconnected from country fundamentals. This would imply that the relationship between fundamentals and inflation performance should be weaker, though it might also imply less responsiveness to fundamentals.

This hypothesis is tested in the last two columns of Table 4, where interaction terms between Rule of Law and the peg dummy, as well as a dummy for euro area countries, are included. If being in a peg mattered, the interaction dummy would be expected to have a positive and significant coefficient, suggesting that a peg removes the link between a country's institutions (Rule of Law) and its inflation performance. Surprisingly, the interaction dummy is insignificant, indicating that the exchange rate regime does not influence the relationship between institutions and inflation performance. This is also visible in Figure 6, where the downward relationship between central bank performance and Rule of Law remains intact also for countries that are designed as pegs.

**Sample Sensitivity.** The impact of Rule of Law is consistent across different samples, as shown in Table 5. The size of the coefficient remains very similar in all cases. For instance, excluding the global financial crisis period (column 3) does not substantially alter the results.

**Dependent Variable Sensitivity.** Table 6 reports a sensitivity analysis for the different individual indicators included in the overall performance measure (see Section 3). The effect of Rule of Law is strongly significant and negative for all indicators, with a somewhat smaller slope for inflation levels after the estimated structural break in the level (column 5). However, the Rule of Law remains significant and with a similar coefficient when the standard deviation of inflation post break is considered (column 6). Surprisingly, Rule of Law is also significant for real GDP growth volatility (last column), also reflecting the absence of a trade-off between inflation and output volatility.

**Potential Endogeneity and Other Robustness.** Finally, Table 7 conducts robustness checks on the relationship between Rule of Law and inflation performance. Rule of Law, being a slow-moving variable influenced by political, historical, and institutional factors, is unlikely to be driven by inflation levels or volatility and is rather persistent over time, see Figure 7.[10] Nevertheless, in column 2, Rule of Law is instrumented for the 1997-2021 sample using its values at the beginning of the sample period in 1996, which is a strong instrument according to the first stage F statistic. The relationship remains economically and statistically significant.

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[10]Another argument supporting the causality direction from X to CB variables, and not vice versa, is long-run monetary neutrality; nominal variables such as inflation should not affect real variables over long periods (e.g., several decades).

Furthermore, in columns 5-6, the best model (according to Bayesian model averaging) is selected for mean and standard deviation of inflation post structural break. For mean inflation only, a model only including income per capita is preferred, although when this variable is included jointly with Rule of Law, both are marginally statistically significant (not reported for brevity). The R square of the post break mean inflation regression is lower than the other cases, suggesting that close to *nothing* explains cross-sectional variation in this indicator.

**[Include Tables 5-7 here]**

**Summary of Results.** The Rule of Law indicator consistently plays a significant role in explaining cross-sectional variation in central bank performance during the Great Moderation. This relationship holds even for euro area countries (which operate under a fixed exchange rate regime) and other pegged exchange rate systems. However, the importance of Rule of Law diminishes when countries are already within the Great Moderation regime in terms of inflation levels (though not volatility).

The key implication is that the institutional environment in which central banks operate is more critical for economic outcomes than the specifics of monetary policy implementation or the structural characteristics of an economy. This finding underscores the importance of strengthening institutional quality to achieve better economic performance.

## 4.2 Some Interesting Examples

To illustrate the concrete implications of these results, specific country examples are helpful. In particular, it is worth examining four commonly assumed features of central banking:

(i) country size (related to resources available to central banks),

(ii) the exchange rate regime,

(iii) central bank independence, and

(iv) an explicit inflation-targeting regime.

Figure 9 compares pairs of *above-median* Rule of Law countries that differ in each of these characteristics: Sweden and the United States (small vs. large country), Austria and Switzerland (peg vs. floating exchange rate), Germany and Japan (high vs. low central bank independence), and the United Kingdom and the United States (with vs. without an explicit inflation-targeting

regime).

The general observation is that these countries do not differ significantly in their inflation experiences. Inflation levels and volatility are similar across pairs, and in some cases (e.g., Switzerland and Japan), inflation is even lower than in the comparison countries.

Of course, this analysis is not exhaustive, as other examples could be considered. However, it provides a visual illustration of the main theme: the quality of institutions appears to be the primary driver of cross-country differences in central bank performance.

**[Include Figure 9 here]**

## 5 The cross section of the great inflation surge of 2022

After looking at the historical experience of the past 40 years, I now focus on the resurgence of inflation in 2022. In real time, some observers have surmised that this could be the interruption of the Great Moderation that many of them saw coming, and a harbinger of a different and more unfavourable monetary policy regime. While it is still too early to say, it appears now that the inflation surge will prove to be temporary, albeit quite persistent. One element that could shed some further light on the nature of the inflation surge is whether countries that were already doing less well due to fundamental factors, namely the quality of their institutions, are also those where the surge was more pronounced, or if the cross sectional variation is rather driven by other factors. Hence, similar to the previous analysis, I run a cross sectional regression of this type,

$$\pi_{i,2022} = \alpha_i + \beta X_{i,2021} + \epsilon_i \tag{2}$$

where $X_{i,2021}$ is a vector of pre-2022 variables (not necessarily only in the year 2022) and $\pi_{i,2022}$ is a measure of the inflation surge, measured as explained below. This analysis is similar in spirit to Milesi-Ferretti [2021] for the cross sectional effects of the Covid-19 crisis on GDP, or the earlier study by Lane and Milesi-Ferretti [2011]. Clearly, as Figure 8 shows, even though the 2022 inflation surge was a global one there still was significant cross sectional variation in its impact. I run this regression on a larger sample of 55 countries, also including emerging economies.

**[Include Figure 8 here]**

Here an inflation surge, $\pi_{i,2022}$, is defined as the latest annual CPI inflation based on quarterly

data, minus the average of the same variable in the 2015-2021 period. I also consider two variants of it, namely subtracting the pre-Covid inflation (average 2015-2019) and taking CPI core inflation, rather than headline. Several theories have been put forward to explain the surge in inflation in 2022, which shows considerable heterogeneity across countries, hence making a cross sectional analysis particularly interesting. Among the possible drivers mentioned in the policy debate, I consider: (i) economic growth during (2020) and out of Covid (2021); (ii) inflation in the pre-Covid period 2015-2019; (iii) the stance of monetary and fiscal policy in 2021;[11][12] (iv) trade openness (proxy for dependence on supply chains); (v) dependence on Russian imports; (vi) the quality of institutions; (vii) the weight of energy imports; (viii) the share of fossil fuels in energy production (those countries with a higher share of renewables should have been partly shielded from the spike in oil and gas prices); and (iv) the shift in the sectoral composition of output during Covid, in particular the boom in goods as opposed to services, which are more contact-intensive. All variables are standardised to facilitate the interpretation of the coefficients and evaluate their economic significance. Table 3 details all the variables used in the empirical analysis.

Looking at the regressions reported in Table 8 (the first three columns refer to headline inflation, the following three to core inflation), three key results stand out. First, pre-2022 (energy) imports from Russia is key for headline inflation, but not for core; more so, in fact, than overall oil imports, possibly pointing to a large role for gas imports. Second, pre-Covid inflation enters positively for core, suggesting some persistence in inflation levels and expectations (for example, the rise in core inflation was more subdued in Japan, where pre-Covid inflation was significantly lower). Third, the interaction between 2021 (i.e., post Covid) growth and pre-2022 imports from Russia is also significant for both headline and core inflation. Overall, therefore, the energy shock from Russia has been important for headline inflation in particular; however, the previous inflation trend and growth in the post Covid period have been relevant as well. Fiscal policy, trade openness (a proxy for vulnerability to supply bottlenecks), the quality of institutions are all statistically insignificant.

This evidence is also interesting as it speaks to a recent literature on whether the inflation surge was more supply or demand driven. On the one hand, a recent comprehensive analysis

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[11]See, for example, Bianchi and Melosi [2022] on the role of US fiscal policy for the inflation surge in the United States.

[12]I do not show the stance of monetary policy in the regression since it is available only for a subset of countries and is insignificant in all regressions.

by Dao et al. [2024] concludes that the international rise and fall in inflation since 2020 largely reflected the direct and pass-through effects of headline shocks, and macroeconomic conditions (including their policy-related drivers such as monetary and fiscal policy) played a secondary role. On the other hand, Giannone and Primiceri [2024] emphasise more the demand side of the explanation, not only for the US but also, more surprisingly, for the euro area. Harding et al. [2023] point to a non-linear Phillips curve as the key driver of inflation in the post Covid period, which amplifies the role of demand factors.

The cross sectional evidence shown here suggests that both supply and demand factors played a role, but the supply factor (imports from Russia) appear to be quantitatively more important. As a further spin to the main story, also the interaction between demand and supply factors, notably *the interplay* between pre-surge growth and exposure to Russia, is a significant driver of the intensity of the surge cross section. Finally, it is evidence that the cross sectional drivers of the 2022 inflation surge are very different from those found to explain inflation performance in the preceding decades, suggesting that the surge itself is not a reversal of the Great Moderation in any shape or form.

**[Include Table 8 here]**

# 6  Conclusions

This paper provides a novel perspective on the Great Moderation by focusing on cross-sectional heterogeneity among advanced countries. The Great Moderation can be interpreted as a collective learning processa "technology" enabling control of inflation in a fiat money regime without an external anchoremerging around the mid-1980s.[13] While advanced economies were collectively exposed to this positive global shock, their readiness and ability to benefit from it varied. The main aim of this paper has been to investigate this heterogeneity.

Using a sample of 37 advanced countries over the period 1986–2021, this study conducts a cross-sectional analysis of key indicators of the Great Moderation, also examining relevant sub-samples. To address model dimensionality, Bayesian model averaging is applied, and reverse causality concerns are mitigated through instrumental variable regressions and sample adjustments. Across all specifications, the quality of institutions consistently emerges as the

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[13]This interpretation of the Great Moderation is expanded upon in Stracca [2018].

most important factor in explaining economic performance during the Great Moderation. This relationship holds even within fixed exchange rate regimes, such as the euro area, but becomes less significant in countries already experiencing stable inflation levels (though not necessarily in terms of volatility).

The central conclusion is that the institutional framework in which central banks operate is more critical for economic outcomes than the details of monetary policy or structural attributes of an economy. Policymakers should therefore prioritize improving institutional quality over focusing narrowly on monetary policy implementation. Strengthening institutional foundations can lead to more durable economic stability and performance.

Regarding the 2022 inflation surge, this study finds that institutional quality does not play a significant role. Instead, energy imports from Russia consistently explain inflation increases, suggesting that the surge was driven by specific supply-side factors rather than a reversal of the Great Moderation.

The key implication of this analysis is that, while monetary policy is complex and resource-intensive, its effectiveness ultimately depends on the broader institutional environment. Persistent factors, such as institutional quality, were fundamental in shaping the Great Moderation and remain critical for maintaining low and stable inflation in the future. Narrowly defined monetary policy tools or central banking characteristics, while important, are unlikely to have a lasting impact on their own. Improving the quality of institutions and the broader social fabric is likely to be more effective and enduring. Put simply, there are no shortcuts to achieving the Great Moderation.

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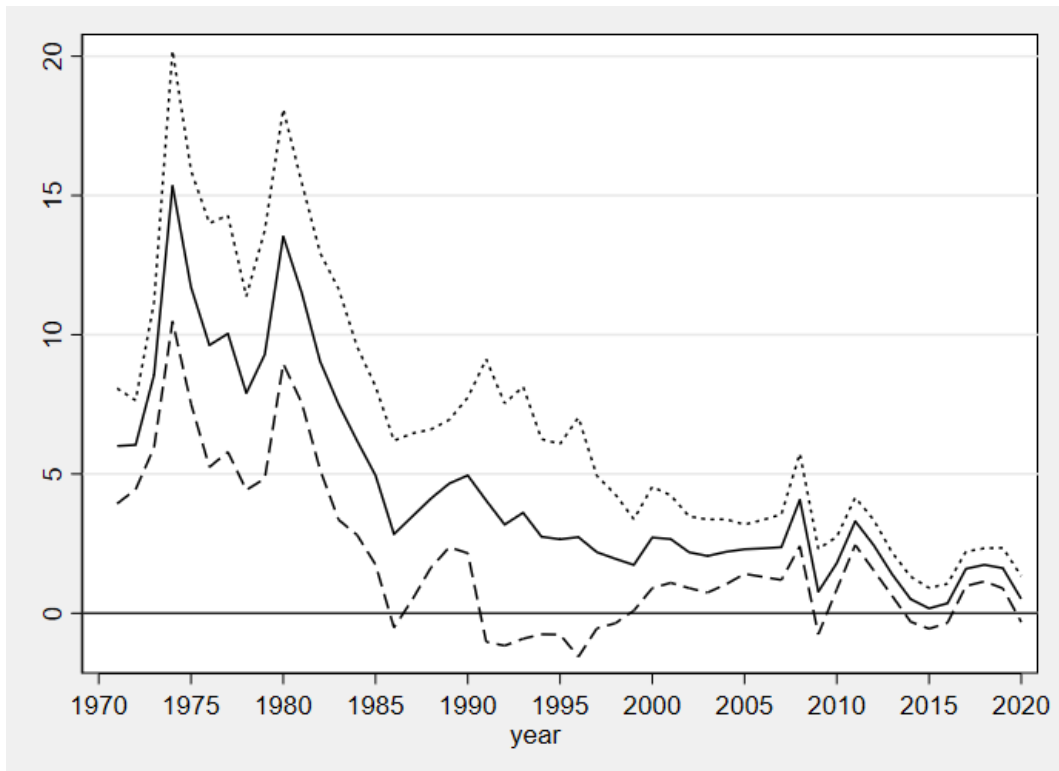
Figure 1: Cross sectional moments of the CPI inflation distribution over time, based on annual data for 33 countries. The solid line reports the median inflation across countries, the dotted and dashed lines respectively one cross sectional standard deviation below and above the mean.

Tables and Figures

| Variable | Source and definition |
|---|---|
| Indicators of central bank performance | Standard deviation of CPI and GDP deflator inflation; absolute deviation of CPI inflation from 2%; standard deviation of real GDP growth; overall measure=simple average of these indicators |
| Real GDP, CPI, GDP deflator, total population | OECD Economic Outlook |
| Trade openness | Share of exports and imports to GDP, based on IMF World Economic Outlook data |
| Peg | From Klein and Shambaugh [2012]; note that euro area countries are classified as pegs if they have been euro area members or in a fixed exchange rate regime for at least 16 years since 1986 |
| GDP per capita (at purchasing power parity), public debt to GDP ratio | European Commission AMECO database |
| Oil trade balance as a share of GDP | IMF World Economic Outlook |
| Rule of Law | World Bank Worldwide Governance Indicators, available from 1996 |
| Central bank independence | Weighted average of de iure CBI using the Cukierman, Webb, and Neyaptis criteria, from Garriga [2016] |
| Inflation targeting regime | Dummy equal to one for the following countries (year of adoption in parenthesis): Australia (1994), Canada (1992), Czech Republic (1998), Hungary (2001), Iceland (2001), Israel (1997), Latvia (1994), Mexico (2001), New Zealand (1990), Norway (2001), Poland (1998), Sweden (1995), Switzerland (2000), United Kingdom (1992) |
| Financial development | World Bank Global Financial Development Database |
| Chinn-Ito measure of financial openness (KAOPEN) | Available at https://web.pdx.edu/ ito/Chinn-Ito$_w$ebsite.htm |
| Capital controls | Overall measure from Fernandez et al. (2016) |

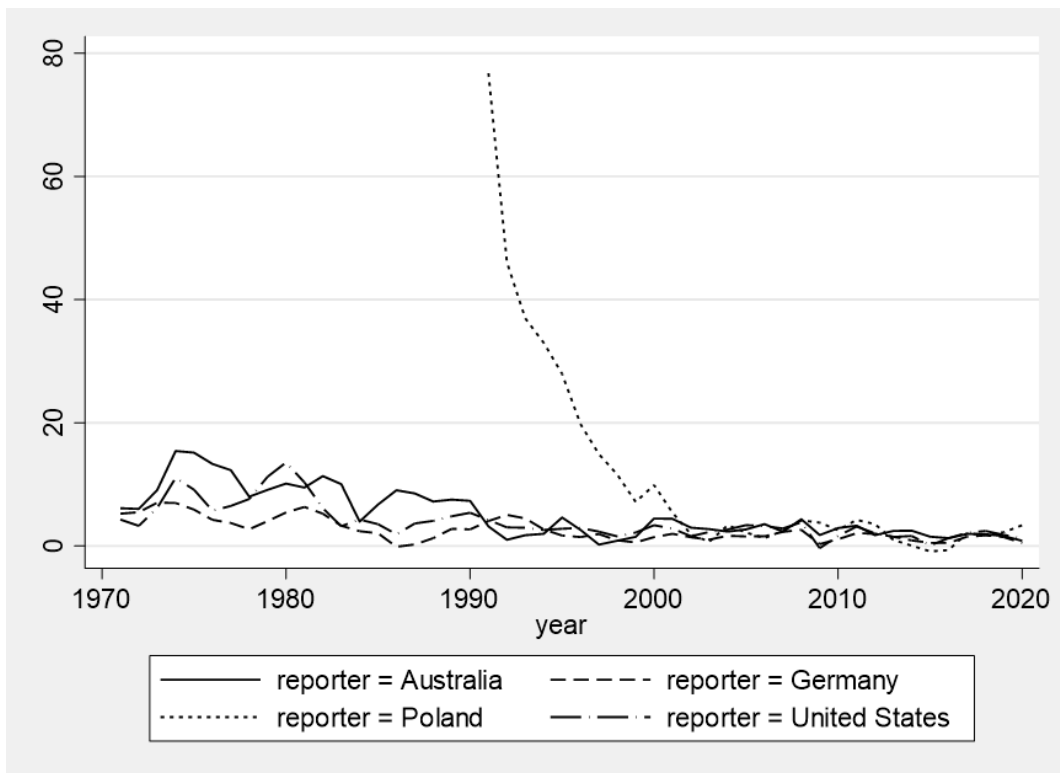Table 1: Sources and definition of the variables.

Figure 2: Annual CPI inflation in selected economies.

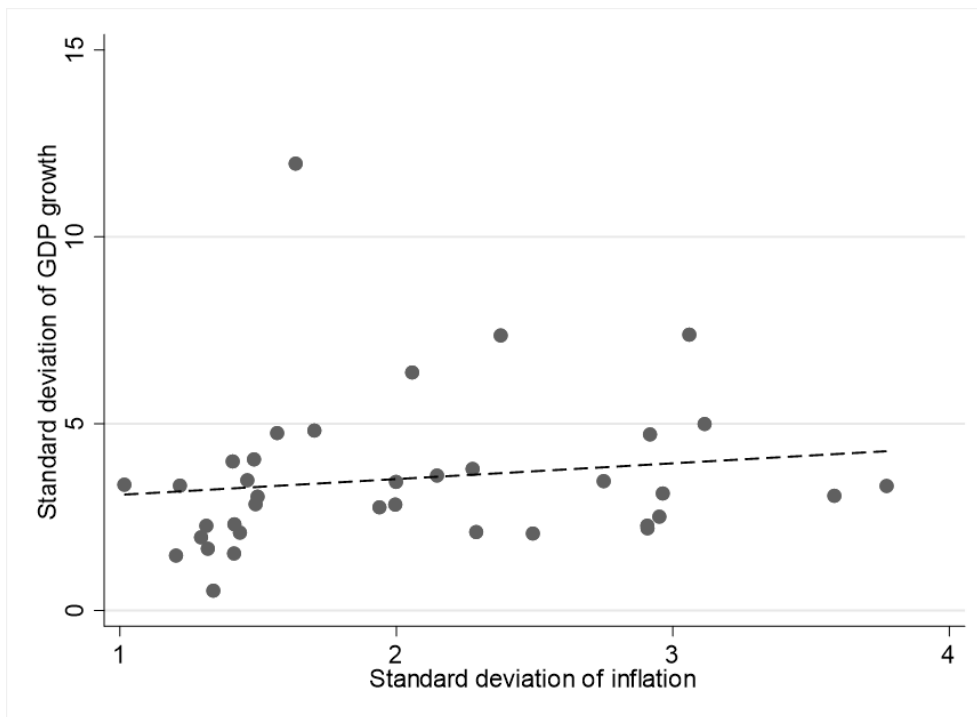No trade-off between inflation and growth volatility



Figure 3: Averages 1986-2021 for 37 advanced countries; see Table 1 for the definition of the variables.

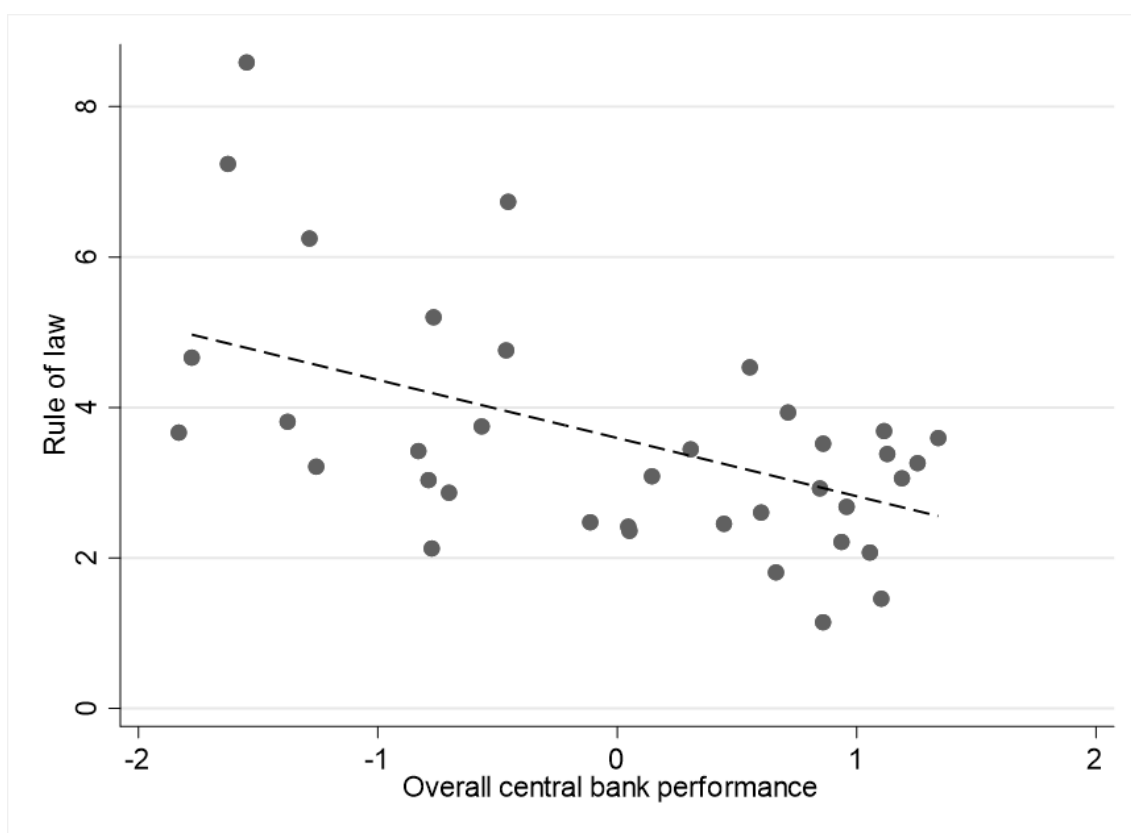Rule of Law and overall central bank performance measure



Figure 4: Averages 1986-2021.See Table 1 for the definition of the variables.
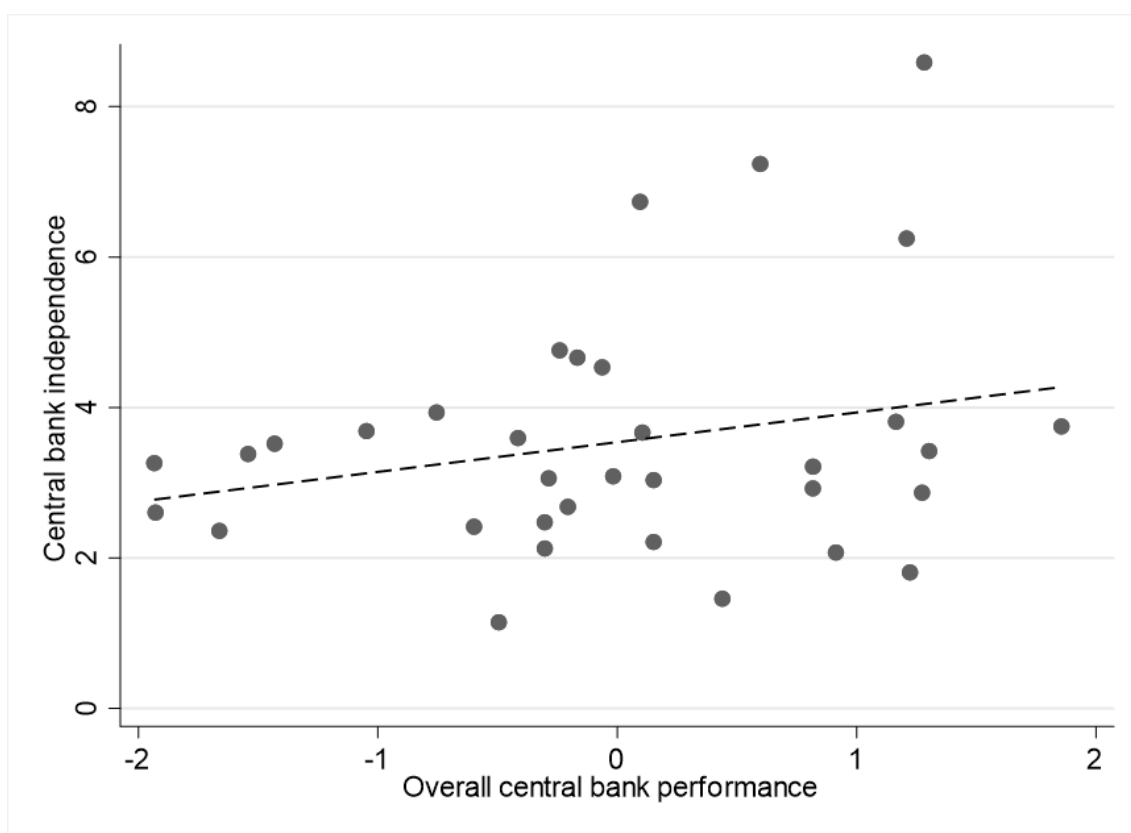
Rule of Law and central bank independence



Figure 5: Averages 1986-2021.See Table 1 for the definition of the variables.

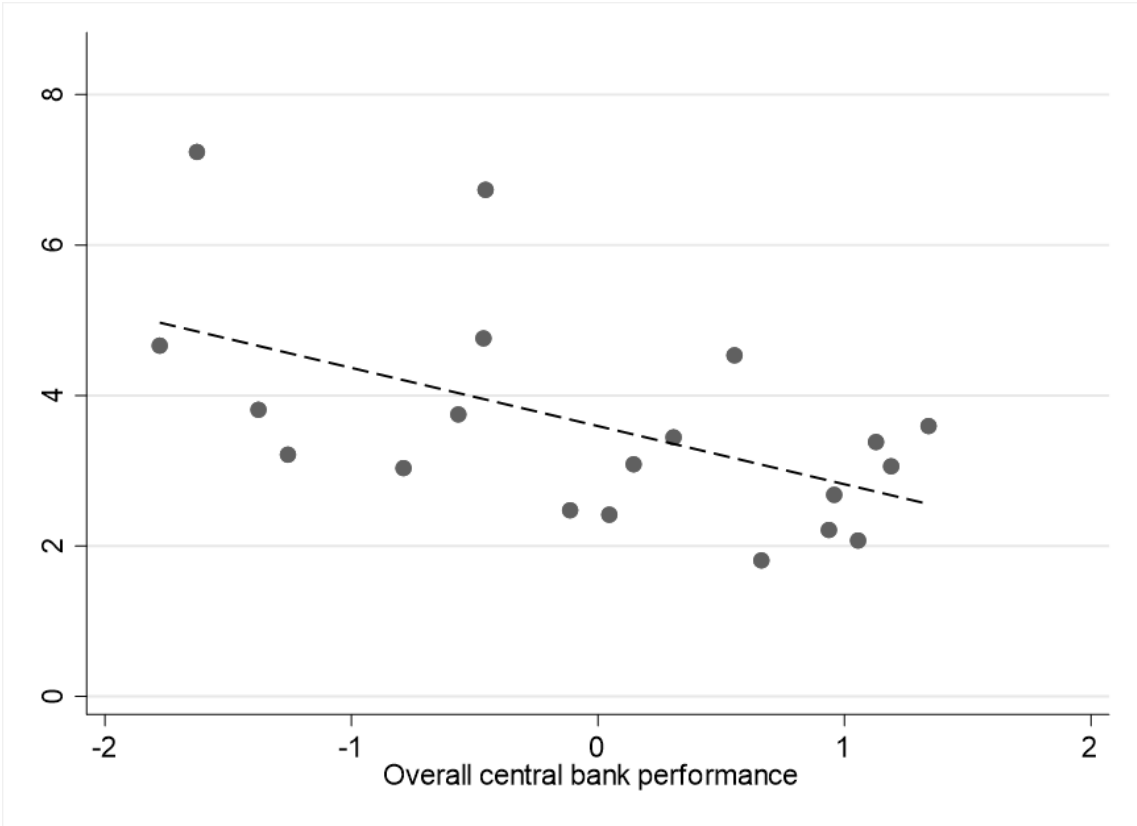Rule of Law and overall central bank performance measure, pegs only



Figure 6: Averages 1986-2021.See Table 1 for the definition of the variables.
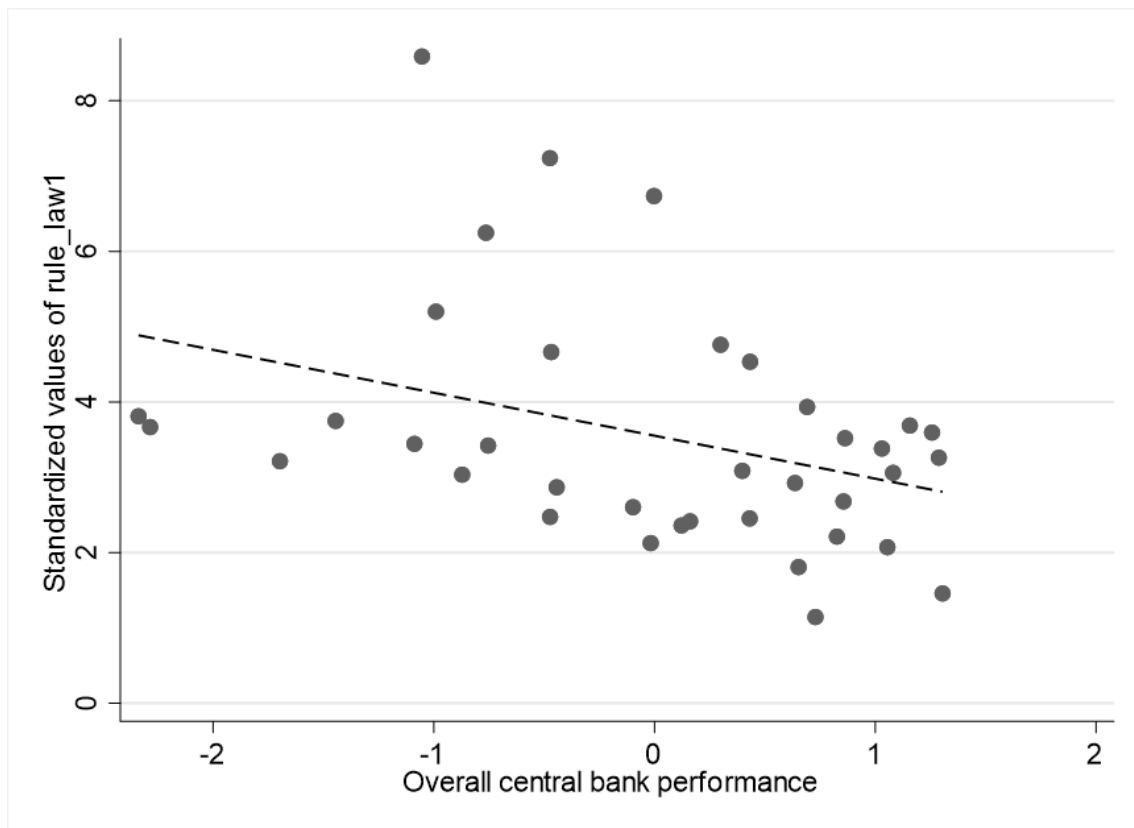
Rule of Law in 1996 vs. averages 1997-2021



Figure 7: Persistence in the Rule of Law indicator: level in 1996 vs. average between 1997 and 2021.
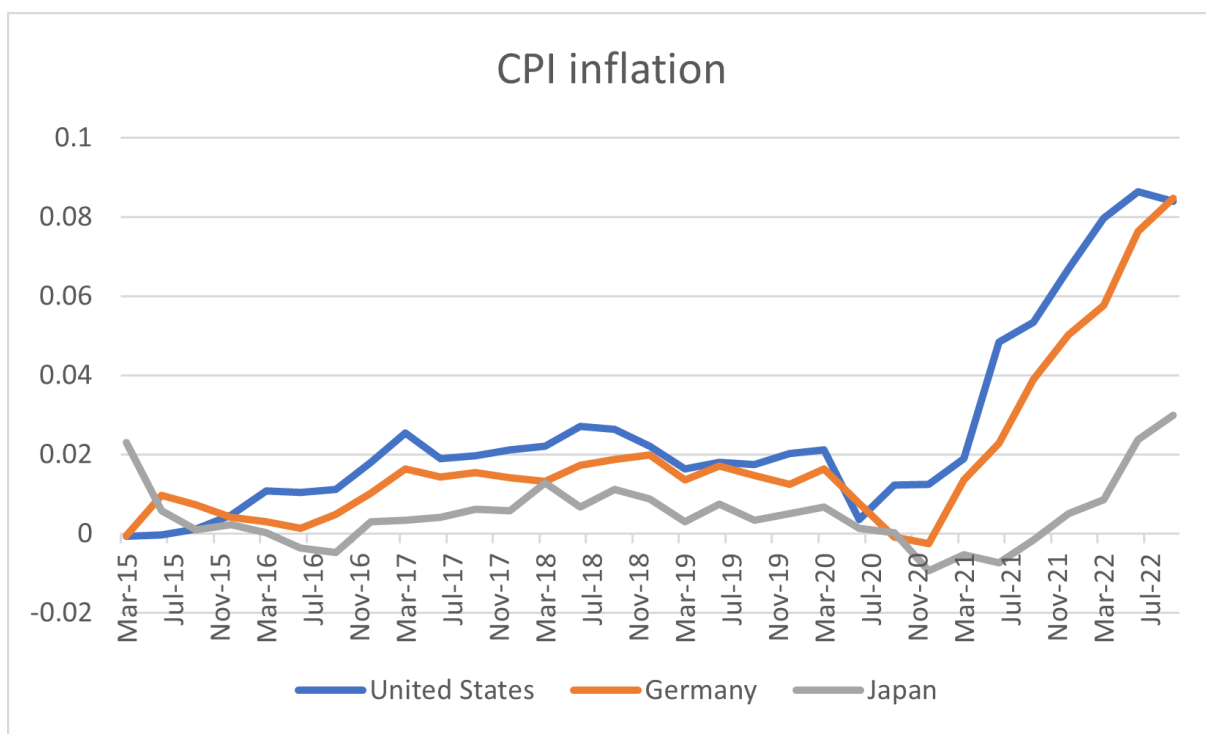
Figure 8: Headline annual CPI inflation in selected countries.
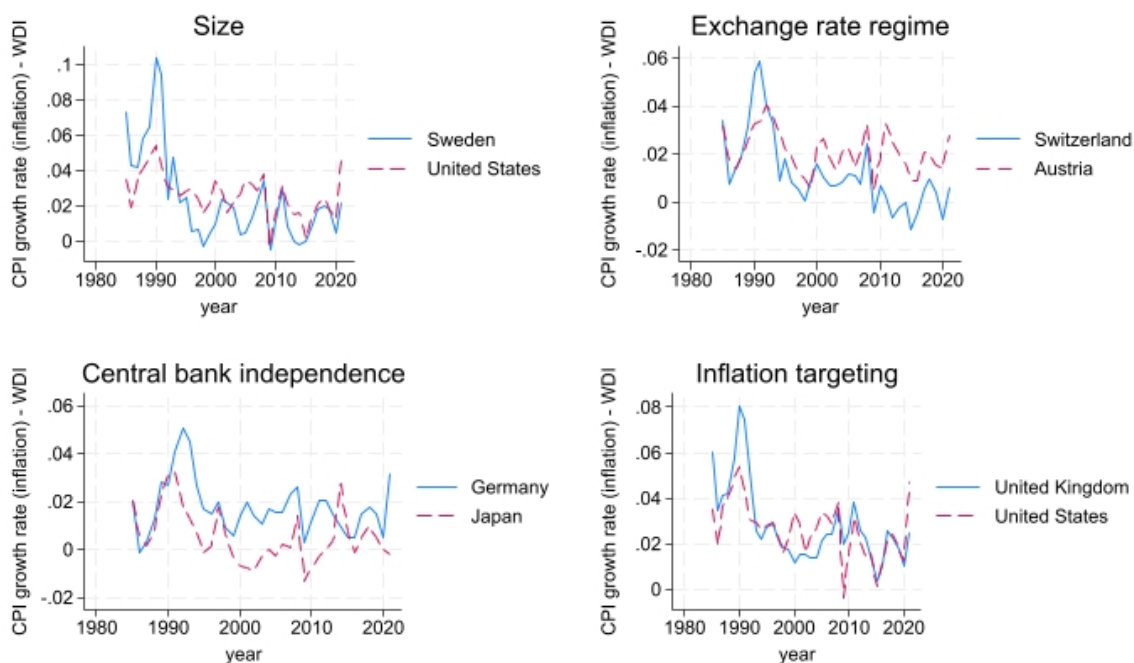


Figure 9: Headline annual CPI inflation in selected high Rule of Law countries; those that are small (upper left panel), with flexible exchange rates (upper right panel), high central bank independence (lower left panel) and an inflation targeting regime (lower left panel) panel are shown in solid lines, the other comparison countries are shown in dashed lines.

| Country | Estimated structural break |
|---|---|
| United States | 1984 |
| United Kingdom | 1984 |
| Austria | 1986 |
| Belgium | 1987 |
| Denmark | 1986 |
| France | 1987 |
| Germany | 1984 |
| Italy | 1987 |
| Luxembourg | 1986 |
| Netherlands | 1984 |
| Norway | 1990 |
| Sweden | 1993 |
| Switzerland | 1995 |
| Canada | 2010 |
| Japan | 1983 |
| Finland | 1986 |
| Greece | 1996 |
| Iceland | 2015 |
| Ireland | 1986 |
| Malta | 1984 |
| Portugal | 1993 |
| Spain | 1988 |
| Australia | 1992 |
| New Zealand | 1989 |
| Cyprus | 1987 |
| Israel | 2001 |
| Hong Kong | 1999 |
| South Korea | 1983 |
| Singapore | 1983 |
| Czech Republic | 2000 |
| Slovakia | 2006 |
| Estonia | 2001 |
| Latvia | 2010 |
| Hungary | 2000 |
| Lithuania | 2001 |
| Slovenia | 2005 |
| Poland | 1997 |

Table 2: The structural breaks are identified by running a regression of inflation on a constant term over the sample 1970-2021, annual data, and applying a supremum Wald test for a structural break at a single unknown break date.

| Variable | Definition |
|---|---|
| Inflation surprise in 2022 | Deviation of 2022 CPI headline and core inflation from 2015-2021 average |
| Past inflation trend | CPI headline inflation average in 2015-2021 and 2015-2019 |
| Economic growth during the Covid pandemic | Real GDP growth in 2020 and in 2021; from IMF World Econonomic Outlook |
| Stance of fiscal policy | Cyclically adjusted primary balance/GDP in 2021; source: IMF World Economic Outlook |
| Stance of monetary policy | 2-year interest rate minus core inflation, average 2021 |
| Oil imports and imports from Russia | IMF data (WEO and Direction of Trade) for 2021 |
| Quality of institutions | Rule of Law and emerging market dummy |
| Sectoral allocation during the pandemic | Share of non-services in total value added, 2021 minus 2019 levels; source; AMECO database, European Commission |
| Share of fossil fuels in energy consumption in 2020 | Our World in Data |

Table 3: Cross sectional data used for the analysis of the 2022 inflation surge, available for 55 countries.

| | (1)<br>1986-2021<br>best model | (2)<br>1986-2021<br>variant 1 | (3)<br>1986-2021<br>variant 2 | (4)<br>1986-2021<br>variant 3 | (5)<br>1986-2021<br>variant 4 | (6)<br>1986-2021<br>variant 5 | (7)<br>1986-2021<br>variant 6 |
|---|---|---|---|---|---|---|---|
| Rule of law | -0.88*** | -0.95*** | -0.59* | -0.89*** | -1.04*** | -1.00** | -0.72** |
| | (0.26) | (0.32) | (0.31) | (0.28) | (0.30) | (0.46) | (0.34) |
| Income per capita (PPP) | | | -0.42 | | | | |
| | | | (0.25) | | | | |
| Population | | | -0.24* | | | | |
| | | | (0.13) | | | | |
| Trade openness | | | -0.38* | | | | |
| | | | (0.20) | | | | |
| Peg | | 0.05 | | | | 0.09 | |
| | | (0.44) | | | | (0.46) | |
| Transition economy | | -0.28 | | | | | |
| | | (0.77) | | | | | |
| Inflation targeting regime | | | | 0.41 | | | |
| | | | | (0.55) | | | |
| Central bank independence | | | | -0.04 | | | |
| | | | | (0.19) | | | |
| Public debt to GDP | | | | | -0.14 | | |
| | | | | | (0.19) | | |
| Oil trade balance/GDP, standardized | | | | | 0.32* | | |
| | | | | | (0.17) | | |
| Rule of law*Peg | | | | | | 0.22 | |
| | | | | | | (0.55) | |
| Rule of Law*Euro area | | | | | | | -0.55 |
| | | | | | | | (0.52) |
| Euro area | | | | | | | 0.58 |
| | | | | | | | (0.46) |
| Observations | 37 | 37 | 37 | 34 | 37 | 37 | 37 |
| R-squared | 0.31 | 0.31 | 0.38 | 0.31 | 0.34 | 0.31 | 0.36 |

Robust standard errors in parentheses

Table 4: The table reports results of a cross sectional regressions of average values in the sample period indicated in each column. The 'best model' is obtained through Bayesian model averaging, notably by minimising the BIC information criterion. Regressions are based on OLS with robust standard errors.

|  | (1) | (2) | (3)<br>1986-2021 | (4) |
|  |  |  | excluding GFC |  |
|  | 1997-2021 | 1997-2021 | | 2001-2021 |
|---|---|---|---|---|
| Rule of law | -0.88*** | -0.73*** | -0.88*** | -0.74*** |
|  | (0.26) | (0.18) | (0.27) | (0.19) |
|  |  |  |  |  |
| Observations | 37 | 37 | 37 | 37 |
| R-squared | 0.31 | 0.36 | 0.29 | 0.35 |

Robust standard errors in parentheses

Table 5: See notes to Table 4. The dependent variable is overall central bank performance indicator.

| | (1) 1986-2021 overall performance indicator | (2) 1986-2021 mean CPI inflation | (3) 1986-2021 mean GDP deflator inflation | (4) 1986-2021 standard deviation CPI inflation | (5) 1986-2021 mean CPI inflation after the structural break | (6) 1986-2021 standard deviation CPI inflation post structural break | (7) 1986-2021 standard deviation GDP deflator inflation | (8) 1986-2021 standard deviation real GDP growth |
|---|---|---|---|---|---|---|---|---|
| Rule of law | -0.88*** | -1.05*** | -0.88*** | -1.08*** | -0.30** | -0.82*** | -0.86*** | -0.33*** |
| | (0.26) | (0.34) | (0.30) | (0.38) | (0.12) | (0.26) | (0.28) | (0.11) |
| | | | | | | | | |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.31 | 0.26 | 0.23 | 0.27 | 0.16 | 0.28 | 0.28 | 0.19 |

Robust standard errors in parentheses

Table 6: Robustness to the performance indicator. See notes to Table 4; the dependent variable is indicated in each column.

|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
|  | overall performance | overall performance IV on rule of law | mean CPI inflation | standard deviation CPI inflation | mean inflation post structural break | standard deviation inflation post structural break | standard deviation real GDP growth |
| Rule of law | -0.88*** | -0.66*** | -1.05*** | -1.08*** |  | -0.82*** | -0.31** |
|  | (0.26) | (0.22) | (0.34) | (0.38) |  | (0.26) | (0.11) |
| Income per capita (PPP) |  |  |  |  | -0.32** |  |  |
|  |  |  |  |  | (0.13) |  |  |
| Trade openness |  |  |  |  |  |  | 0.26*** |
|  |  |  |  |  |  |  | (0.08) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.31 | 0.29 | 0.26 | 0.27 | 0.19 | 0.28 | 0.31 |

Robust standard errors in parentheses

Table 7: Alternative specifications of the cross sectional regression. For additional explanations see notes to Table 4. The IV regression in column 2 is obtained by instrumenting rule of law in 1997-2021 with the level in 1996, which is a strong instrument based on the first stage F statistic.

| | (1) Headline | (2) Headline | (3) Headline | (4) Core | (5) Core | (6) Core |
|---|---|---|---|---|---|---|
| Oil imports/GDP in 2021 | 0.14 | | | 0.12 | | |
| | (0.19) | | | (0.31) | | |
| Imports from Russia 2021 | 0.51** | 0.22** | -0.64** | 0.22 | 0.06 | -0.79** |
| | (0.21) | (0.10) | (0.28) | (0.28) | (0.09) | (0.37) |
| Growth 2020 | 0.24 | | | 0.21 | | |
| | (0.17) | | | (0.20) | | |
| Growth 2021 | 0.34* | 0.16 | 0.22 | 0.13 | -0.00 | 0.40 |
| | (0.17) | (0.12) | (0.20) | (0.21) | (0.10) | (0.28) |
| Inflation 2015-2019 | 0.13 | | | 1.07*** | | |
| | (0.16) | | | (0.31) | | |
| Cyclically adjusted primary balance 2021 | -0.06 | | | 0.01 | | |
| | (0.16) | | | (0.14) | | |
| Trade openness 2021 | -0.18 | 0.07 | 0.28 | -0.00 | 0.14 | 0.57 |
| | (0.20) | (0.13) | (0.36) | (0.34) | (0.12) | (0.48) |
| Rule of Law 2020 | -0.03 | 0.01 | | 0.03 | -0.07 | |
| | (0.18) | (0.13) | | (0.23) | (0.11) | |
| Share of fossil fuels in energy mix, 2020 | | 0.04 | | | -0.04 | |
| | | (0.08) | | | (0.07) | |
| Share of non-services in value added, 2021 vs. 2019 | | -0.26* | | | -0.36*** | |
| | | (0.12) | | | (0.12) | |
| Growth 2021*Imports from Russia 2021 | | | 0.01*** | | | 0.01*** |
| | | | (0.00) | | | (0.00) |
| Growth 2021*Trade openness 2021 | | | -0.06 | | | -0.11 |
| | | | (0.06) | | | (0.08) |
| Countries | 42 | 24 | 50 | 30 | 23 | 38 |
| R-squared | 0.43 | 0.69 | 0.55 | 0.72 | 0.61 | 0.43 |

Table 8: Cross sectional regressions for the 2022 inflation surprise variable; standard errors are robust. See Table 3 for explanations on the included variables.

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