Distribution Tails, Recession Risks and Macroeconomic Policies

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The Global Financial Crisis of 2007–2009 ignited significant reconsideration of financial and economic policies, spurring extensive research efforts to prevent future crises and cultivate a more stable and inclusive economic framework. Our research proposes a macro-financial empirical modelling framework that can assess various short-term and long-term macroeconomic risks through the examination of the tails of distributions of macroeconomic variables. The analysis reveals many novel facts regarding higher moments of the US output growth distribution. It also implies new findings and policy recommendations related to the impact of financial (risk premia) as well as monetary policy shocks on downside macroeconomic risk.

A New Approach to Deciphering Systemic Risks

The Global Financial Crisis of 2007–2009 revealed profound issues within the financial system, directly impacting macroeconomic stability. Systemic risk and financial stability concerns highlighted how interconnected financial institutions can destabilise entire economies. Regulatory failures, with insufficient oversight of large financial institutions and inadequate regulation of complex instruments like derivatives, exacerbated these issues. The crisis also underscored the possible limitations of traditional monetary policy and macroprudential policy tools, necessitating unconventional (and potentially problematic) measures such as quantitative easing by central banks. Additionally, large-scale fiscal stimulus packages implemented by governments to mitigate the economic downturn raised macroeconomic concerns about public debt sustainability and the long-term effectiveness of fiscal interventions. The subsequent surge in inflation over the 2022–2023 period, and the concerns over a recession, have starkly highlighted the adverse impacts that macroeconomic volatility can have on individuals and the broader economy.

These revelations have emphasized the critical interplay between financial system health and broader macroeconomic stability, prompting extensive reforms and research in both fields. Historically, economic policy has focused on the 'first moment' analysis of macroeconomic variables (or, more simply, looking at the mean of data distribution). New research is investigating the role of higher moments of the distribution in macroeconomic modelling.

We introduce a novel empirical framework for analysing the tails of distributions of macroeconomic variables and their implied risks. This aims to provide policymakers with better tools to predict and manage extreme economic events, thereby enhancing the stability and resilience of the economic and financial system. By empowering policymakers to decipher the complex narratives hidden in the tails of economic data, we hope to facilitate more informed and proactive decision-making. Through better-tailored policy recommendations, we seek to help mitigate economic fluctuations and the dangers of recessions, improving society's overall well-being.

'Tails Tell Tales': Unveiling Economic Risks

Our analysis can be encapsulated in the phrase 'Tails tell tales', because our non-linear macro-financial empirical modelling framework scrutinises the distribution tails of macroeconomic variables. One of the innovations is that this is done without quantile regression, also allowing for non-normal distributions. Such detailed data exploration can uncover various imminent threats to the economy, enabling policymakers to devise strategies and frameworks to reduce macroeconomic risks. To do so effectively, our framework encompasses both short- and long-term perspectives.

Macroeconomic risk can be quantified by estimating the potential severity of a decline in Gross Domestic Product (GDP) growth. Intuitively, a higher likelihood of a significant reduction in GDP growth indicates greater macroeconomic risk. Understanding the extent of a possible GDP downturn is therefore crucial, as it can alert policymakers to existing threats to the overall economy.

Our key findings can be summarized as follows. Our short-run analysis implies that the conditional output growth distribution is asymmetric vis-à-vis financial and monetary policy shocks. These shocks seem to have a broader and deeper effect on downside risk than what a conventional policy analysis focused on the conditional mean would suggest. In terms of our long-

term investigation, we show that while US output growth left-tail risk was on a downward trend in the two decades preceding the Global Financial Crisis, this trajectory was reversed post-2008. The implication (and a policy warning) is that the unconventional monetary measures embraced by the Federal Reserve and other leading central banks may lead to greater long-run downside tail risk.

Putting the New Framework to Work

Let us provide more details regarding the framework and our findings. To gauge the likelihood of a substantial downturn in GDP growth, we harness quarterly data spanning the years 1964 to 2019 for the US. Our endeavour involves determining the threshold for GDP growth, beneath which it would manifest in the most adverse scenarios, representing the 10th percentile of the GDP growth distribution. To comprehensively evaluate the macroeconomic risk over the long term, it becomes imperative to scrutinise potential declines in GDP growth vis-à-vis all pertinent factors governing the dynamics of economic expansion.

Within this analytical framework, we discern three distinct qualitative factors shaping long-term macroeconomic dynamics: Firstly, the equilibrium states, denoting the enduring values of macroeconomic variables; secondly, the unforeseen shocks that may disrupt these equilibrium states; and finally,

the transient relationships between macroeconomic variables and the unexpected perturbations that arise, encapsulating the short-term dynamic interplays within the macroeconomic landscape.

By understanding these elements, we can better anticipate and mitigate the risks associated with severe GDP downturns. Consequently, the long-run macroeconomic risk measure provided by our analysis offers several valuable insights.

First, it reveals how policy frameworks – monetary, fiscal, and macroprudential policies – as well as other short-run economic relationships, have contributed to the risk. Second, it demonstrates how long-run structural changes impact the risk, including the decline of the natural rate of output and interest observed in high-income countries over the past several decades. Third, our risk measure indicates how

the average size of economic shocks influences the risk, exemplified by periods such as the Great Moderation from the mid-1980s to the 2008 Global Financial Crisis.

Assessing the contribution of each risk factor can illuminate the nature of long-run macroeconomic risk and its evolution over time.

Key Insights Regarding Short- and Long-Term Macroeconomic Risks

The key empirical findings and policy implications can be summarised as follows. In the short term, economic and policy shocks significantly impact downside macroeconomic risk. Notably, these effects differ from those on the conditional means, which policymakers typically focus on. These findings align with existing literature, but we enhance them by providing deeper insights into the impact of distribution moments. For instance, we demonstrate that an

unexpected monetary policy shock (lower interest rate) creates asymmetry in the output growth distribution in the short term, making very low growth more likely in the future. A similar phenomenon occurs when financial conditions unexpectedly loosen (e.g., due to more relaxed macroprudential measures). This results in a GDP growth distribution with a longer left tail and greater variance, signalling heightened macroeconomic risks ahead.

Our primary long-run finding concerns the unconventional monetary policy framework adopted in the US following the 2008 Global Financial Crisis, specifically the large-scale asset purchases known as Quantitative Easing. Our research indicates that this policy led to a substantial increase in output growth risk. Notably, our measure of long-run downside risk ceased its decline around 2008 and began rising in 2014.

Long-run Risk Decomposition via Counterfactuals
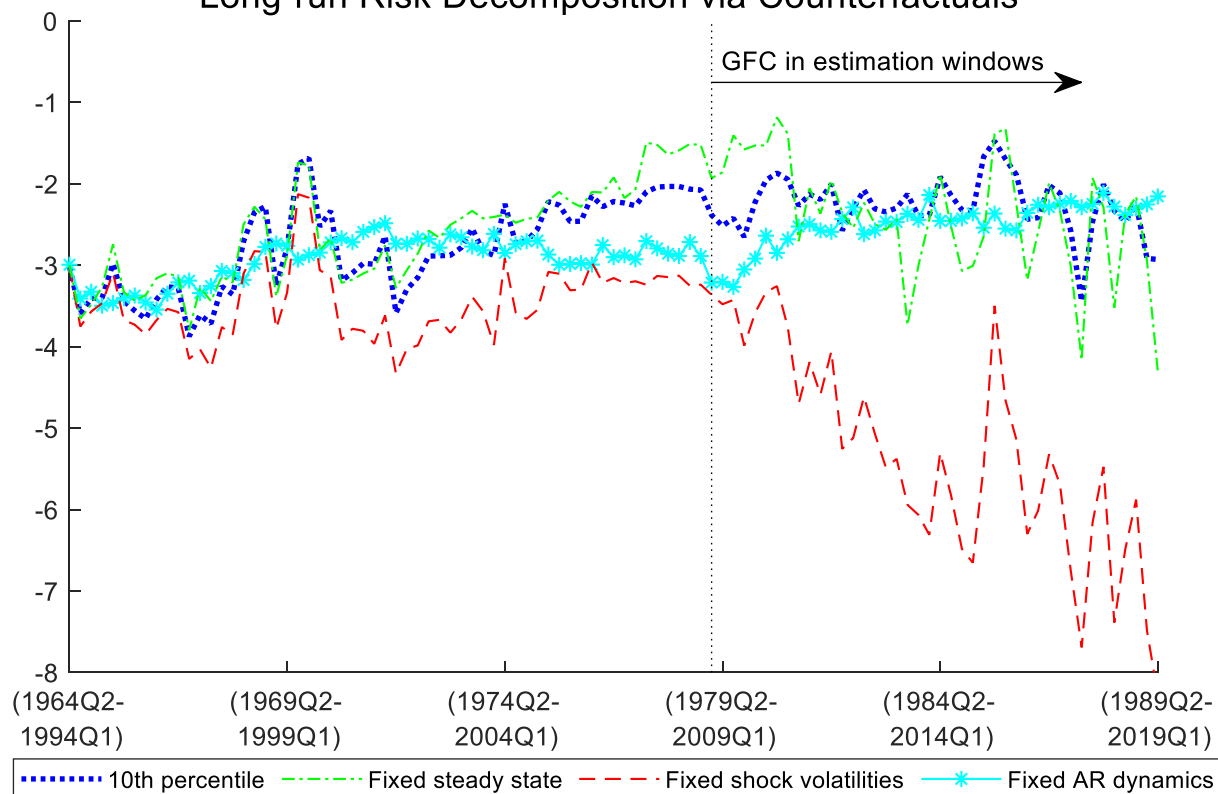
The 10th percentile of the long-run output growth distribution, along with counterfactual scenarios featuring a fixed steady state, fixed shock volatilities, and fixed average revenue parameters, respectively.

The graph evaluates the significance of the three aforementioned long-run factors and their evolution over time. It illustrates how the severity of output declines (i.e., the threshold for the worst 10% of outcomes) would change if one of the macroeconomic dynamic factors remained constant over time.

For instance, the red dashed line in the graph represents a scenario where the average size of economic shocks in the sample is held steady. Notice that the red line tends to decrease in the latter half of the sample period. This indicates that the actual set of economic shocks in our dataset has pushed the threshold for severe GDP growth to decline upward. Keeping the shocks constant implies the observed downward trajectory of the limit in the graph. Consequently, the implication is that these shocks have contributed to reducing long-run macroeconomic risks.

Focusing on recent shifts in macroeconomic risk, as indicated by the blue dotted line, we observe that the 10th percentile tends to decrease after the inclusion of data from the Global Financial Crisis in the estimation windows (marked by the vertical black dotted line). Our decomposition analysis suggests that this decline is primarily driven by the evolving relationships between macroeconomic variables. Specifically, if these relationships are held constant (i.e., fixed average revenue dynamics as shown by the cyan line with stars), the 10th percentile increases once the Global Financial Crisis data is factored in. Thus, the actual changes in short-run economic relationships contribute to the decrease in the 10th percentile, thereby leading to a rise in long-term macroeconomic risk.

Our analysis reveals that in the aftermath of the crisis, short-run economic relationships between interest rates, risk premiums, inflation, and output underwent significant changes, coinciding with shifts in the US monetary policy framework. This suggests that monetary and macroprudential policies can profoundly impact both short- and long-term economic outcomes. Understanding these effects is crucial for the ongoing debate about the likelihood of a hard versus soft landing (i.e., whether the US will experience a recession in 2024 due to the disinflationary period) and for minimising future macroeconomic fluctuations.

Summary and Conclusions

Mark Twain's adage, 'If you hold a cat by the tail, you learn things you cannot learn any other way,' suggests that direct, potentially painful experiences impart unique lessons. This insight resonates with the aftermath of the Global Financial Crisis, which prompted economists and policymakers to understand extreme scenarios, often found at the tails of

macroeconomic variables, unlike the stable conditions during the preceding Great Moderation. The crisis highlighted the need to examine these extremes for future economic stability. The inflationary period of 2022-2023, and the dire impacts it has had on the lives of individuals, have reinforced this need.

We propose a new econometric framework to estimate and analyse output growth tail risk, focusing on the asymmetric and fat tails of macroeconomic variables. Unlike traditional methods that consider only the mean, our model examines the entire distribution, recognising that policies and shocks affect the mean and tails differently. This approach provides a deeper understanding of macroeconomic risks and informs strategies to mitigate adverse outcomes.

Our findings described above offer a number of new insights for monetary and macroprudential policymakers that may help them enhance macroeconomic resilience and stability. Broadly speaking, our investigation highlights the fact that the entire distribution of key macroeconomic variables must be examined by policymakers, given that various policy and economic/financial shocks impact the conditional mean differently from the tails.

More specifically, the analysis emphasises that changes in short-term macroeconomic dynamics (reduced-form monetary or macroprudential policy rules) may alter trends in long-run risk. This implies that the choice of the policy framework is paramount for controlling long-run downside macroeconomic tail risk. Further research is, however, needed to explore the complex impacts of monetary and macroprudential policies on downside risks and people's well-being.

Meet the researchers

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Michal Franta is a researcher and Research Coordinator (Monetary Policy area) at the Czech National Bank. He studied mathematics, logic, and philosophy at Charles University in Prague, where he subsequently received his PhD in economics from the CERGE-EI. He worked at several policy institutions (European Central Bank, Bank of Japan, Bank for International Settlements) as well as academic institutions (La Trobe University in Melbourne, Czech Academy of Sciences). He has authored a number of papers that appear in policy and academic outlets such as the *Journal of Economic Dynamics and Control.*

Jan Libich is Associate Professor at La Trobe University, and also affiliated with VSB-TU Ostrava. He holds a Bachelor of Commerce and Master of Commerce in Finance from the University of Economics in Prague, as well as a PhD in Economics from the University of New South Wales in Sydney. Dr Libich is the author of a book on economic policy, co-author of leading economics textbooks and has published over 40 academic papers in economics journals such as the *Journal of Public Economics*. He has presented his research at well over 100 seminars and conferences, including influential policy institutions such as the International Monetary Fund and ten central banks. He has also been the recipient of many research grants, honours, and awards, such as a Citation for 'Outstanding contribution to student learning' from the Australian government.

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FURTHER READING

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