

The End of the Great Moderation: Forecasting in Elevated Uncertainty

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Testifying to Congress in February 2005, then Federal Reserve Chair Alan Greenspan famously described the U.S. bond market as a “conundrum.” Although the Fed raised its policy rate at each meeting over the previous year, Chair Greenspan observed, the yield on the 10-year Treasury note was essentially unchanged – and the yield curve was flat as a pancake.

Of course, when the leader of the world’s most important central bank scratches his head in public, many people get to work. One of those people was then Fed Governor Ben Bernanke. He delivered a speech soon after Greenspan’s testimony, arguing that low long-term bond yields were largely due to elevated global savings. This was especially true, Governor Bernanke noted, in fast-growing Asian economies, such as China, that were generating massive trade surpluses (denominated in dollars) and recycling those surpluses into the U.S. bond market as a store of value - under the expectation that the prevailing equilibrium of low growth, low inflation, and low interest rates would persist.

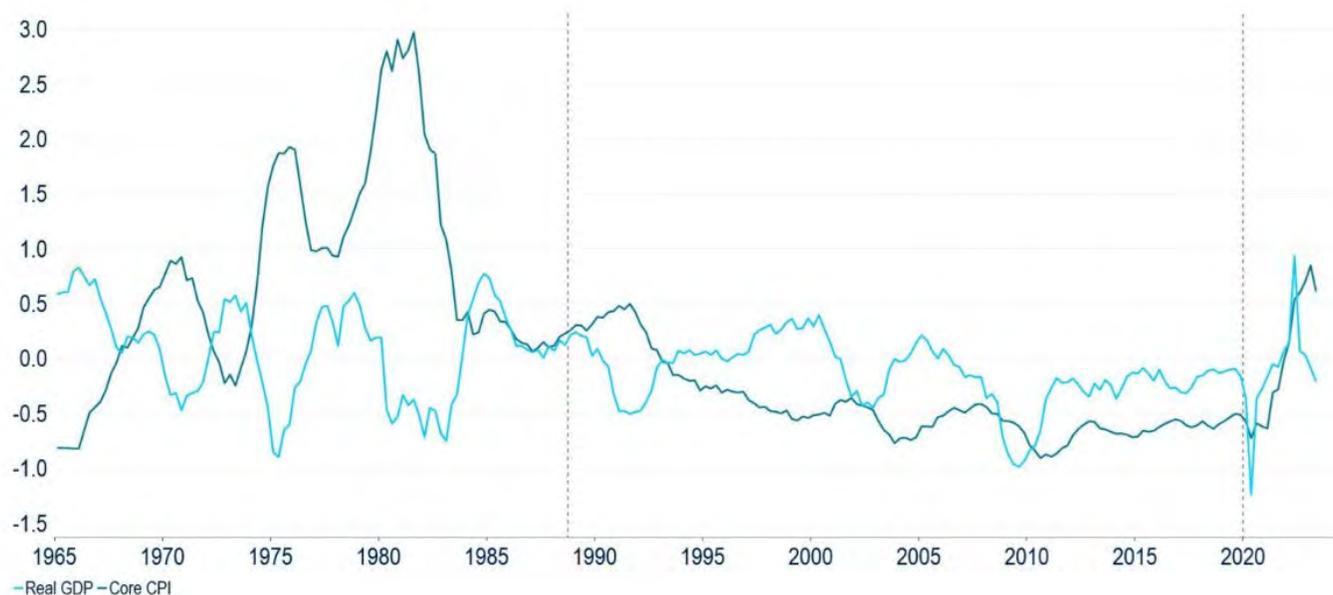
It was a fair assumption to make. After all, this was the heyday of “Great Moderation” in the global economy and a unipolar moment in world history. Inflation had been falling for 25 years. Growth was low but stable. Financial crises were a fading memory. The U.S. federal government’s budget had been in surplus earlier in the decade, after which Treasury stopped issuing the 30-year bond. Central banks across the globe had earned unprecedented credibility to fine tune the economy like a machine. In fact, the mainstream press lionized Chair Greenspan as a maestro.

Meanwhile, political and geopolitical cross currents were calm. In the U.S., the central players in both the Republican and Democratic parties were centrists. Voting patterns in Congress across the aisle only differed at the margin. At a global level, the world was still reaping dividends from the end of the cold war. Francis Fukuyama’s best-selling book, *The End of History*, captured the zeitgeist of the moment. Many believed the contest of ideologies was over. The notorious “isms” of the 20th century - communism, nationalism, and totalitarianism - were out. Democratic capitalism and global supply chains were in. Indeed, China joined the World Trade Organization in 2001, fulfilling Deng Xiaoping’s dream from two decades prior. Russia joined the rich club of democracies in 1997 to make the G7 the G8. The BRICS were the equivalent of the Beatles among emerging economies, lifting hundreds of millions out of poverty. Europe was forging a path towards union with the introduction of a common currency in 1999. And the entire world was being lifted by a technology-led productivity boom.

Not even two decades later, it’s a laughable understatement to quip that “things have changed.” It might be more accurate to say, “things have fallen apart.” We’re now in a global environment with more complexity and uncertainty than the world has experienced in at least three decades and arguably since the end of World War II. Unlike the era of Great Moderation, when growth, inflation, and rates settled into a low-volatility equilibrium, we must now acknowledge the possibility of vastly different combinations of growth and inflation outcomes - with vastly different policy implications - plus more frequent regime

shifts across these macroeconomic paradigms. Figure 1 reflects the shift from the era of Great Moderation to a far more uncertain macroeconomic environment.

FIGURE 1: Regime Shift—The end of the Great Moderation introduces an era of volatility in U.S. growth and inflation (z-score)



Source: PGIM Fixed Income and Macrobond. Volatility measured as the two-year moving average of the deviations of annualized quarterly changes from the mean.

Against this backdrop, we've explicitly adopted a probabilistic, scenario-based approach to forecasting macroeconomic and market outcomes. After all, market prices are themselves nothing more than a weighted synthesis of expectations formed by millions of market participants. **Our objective is to anticipate how shifts in expectations may reprice markets over the forecast horizon. The output is a set of projections for how portfolios are likely to perform - particularly to the upside and downside - under a range of macroeconomic scenarios.**

We're taking this approach for two reasons. First, to avoid over-reliance on a single base-case scenario and the false precision of point forecasts. Second, to incorporate a sense of humility into forecasting by forcing us to imagine a full distribution of potential outcomes.

Implementing a Scenario-Based Approach

In terms of how we implement the framework, we start by designing and assigning probabilities to a handful of macroeconomic scenarios that we think markets may price over our forecast horizon.¹ **The primary value in this step is the process of identifying the relative probabilities across scenarios; the specific probabilities assigned to each scenario are secondary** (for most recent scenarios, see our [Quarterly Outlook](#) and the Appendix to this post). We then translate our probability distribution of macroeconomic scenarios to expected returns for a set of asset classes. **When our probability-weighted return expectations differ from market pricing of these asset classes, we see investment opportunity.**

As we map out macroeconomic scenarios, we aim for them to be distinct enough to capture potential regime shifts, without seeking to be fully exhaustive of all possible outcomes. Our assessment of the macroeconomic outlook, which is based on analysis of demand- and supply-side factors that drive growth and inflation outcomes, anchors the probabilities that we

assign to each scenario. But our approach also incorporates other important drivers, such as monetary and fiscal policy reaction functions as well as geopolitical developments, to reflect the complexity of the market environment.

Building on our probability distribution of scenarios, we can then consider a broad range of “what if” risks, including those with “fat” tails, as an overlay to the symmetry of risks. Indeed, there will always be very low-probability events - both positive and negative - with potentially game-changing macroeconomic and market-related effects. While we tend not to incorporate these tails explicitly as standalone scenarios in our framework (unless their probability exceeds a minimal threshold, usually around 5%), we force ourselves to imagine and flesh out how these scenarios might unfold with tabletop and “pre-mortem” exercises that seek to identify leading indicators for disruptive events.

From Macroeconomic Scenarios to Asset Class Views

Our asset class views are a collection of price forecasts and expected returns under each scenario over one year, using probability-weighted macroeconomic assumptions as the key input to generating fair value estimates. In most cases, our fair value models rely on regression analysis that links asset prices to a variety of macro and market variables with which they have an intuitive statistical relationship.² We complement the fair value analysis with other potential drivers (e.g., secular factors, financial imbalances, and market technicals) that we think also influence asset prices over our forecast horizon. The model output consists of asset prices and expected returns for each asset class across all scenarios - in other words, a probability distribution of asset prices and expected returns across scenarios (Figure 2).

FIGURE 2: Macro scenarios and other inputs form the basis of our probabilistic assessment of expected returns.

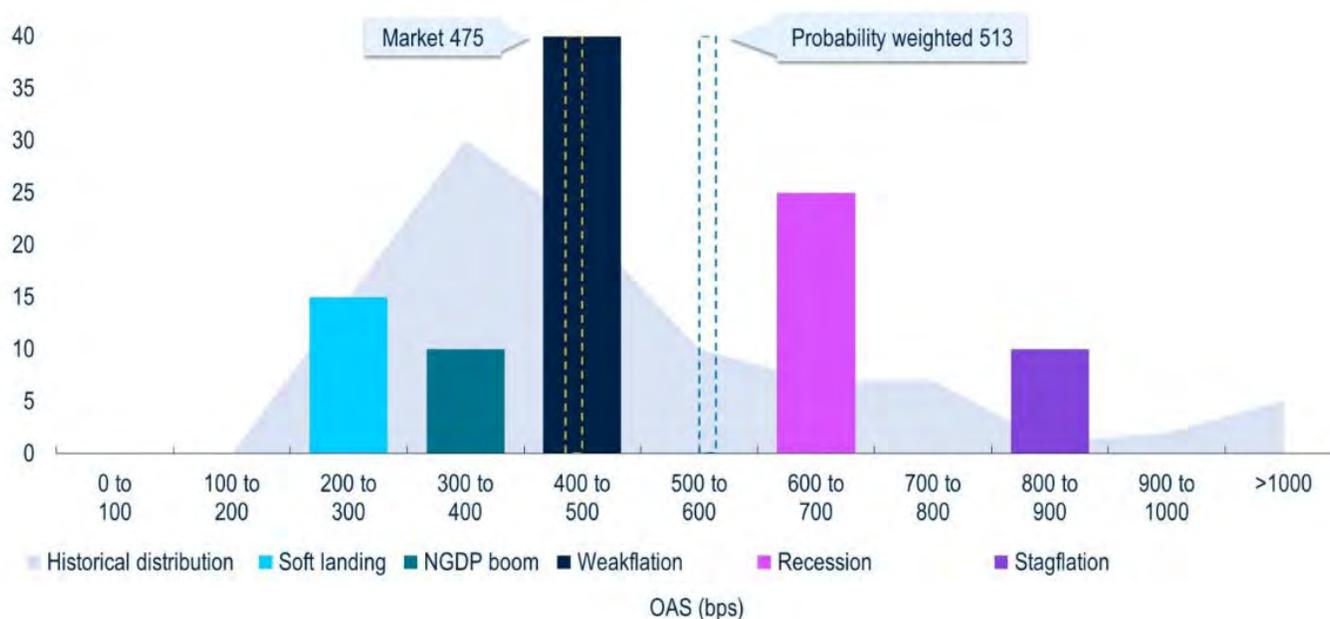


Source: PGIM Fixed Income.

The resulting distribution of asset prices has rich information content that we use to inform our market views. For example, we can summarize the information with a measure of central tendency, such as the probability-weighted average of asset prices. This constitutes our “best guess” forecast for each of the asset classes that we follow. This measure may deviate from our base case forecast if the alternative scenarios have a significant upside or downside skew relative to it. **By comparing our “probability-weighted” forecast with market prices, we can immediately see whether our views are bullish or bearish relative to the market.** And we can also assess factors behind the views. For example, is it a high-conviction, directional view reflected in our base case? Or is it a view mostly derived from the balance of risks of our scenarios? Finally, our framework also allows us to study the potential upside or downside in asset prices associated with our scenarios.

Figure 3 helps illustrate some of these concepts using our probability distribution of option-adjusted spreads (OAS) for European high yield. Our base case has a 40% probability and our OAS forecast associated with it is not very different from the market spread. Our probability-weighted average OAS is wider than in the base case because it is “skewed” to the right by two bearish (wider spreads) scenarios (Recession and Stagflation) that have 25% and 10% probability mass, respectively. This suggests that our bearish view on European high yield credit spreads is driven by this scenario “asymmetry,” rather than by the base case forecast. **In other words, our scenarios flag a 35% chance of wider spreads that we would be ignoring had we only presented a point estimate based on our base case. Finally, and critically, Figure 3 also gives us a sense of the upside-downside potential for spreads across scenarios. Our widest spread level (between 800-900 bps) is more extreme, relative to market pricing, than our tightest one (between 200-300 bps).**

FIGURE 3: Example of a Base Case and Alternative Scenarios for a Spread Product (probability, %)



Source: PGIM Fixed Income as of June 2023.

Updating our Views

We update our forecasts periodically (at least quarterly) to reflect relevant incoming information. This means that our views evolve over time as we assess and incorporate relevant macroeconomic and market developments. In the current data-dependent environment, these updates could include more changes to the scenarios relative to expectations under less-volatile conditions.

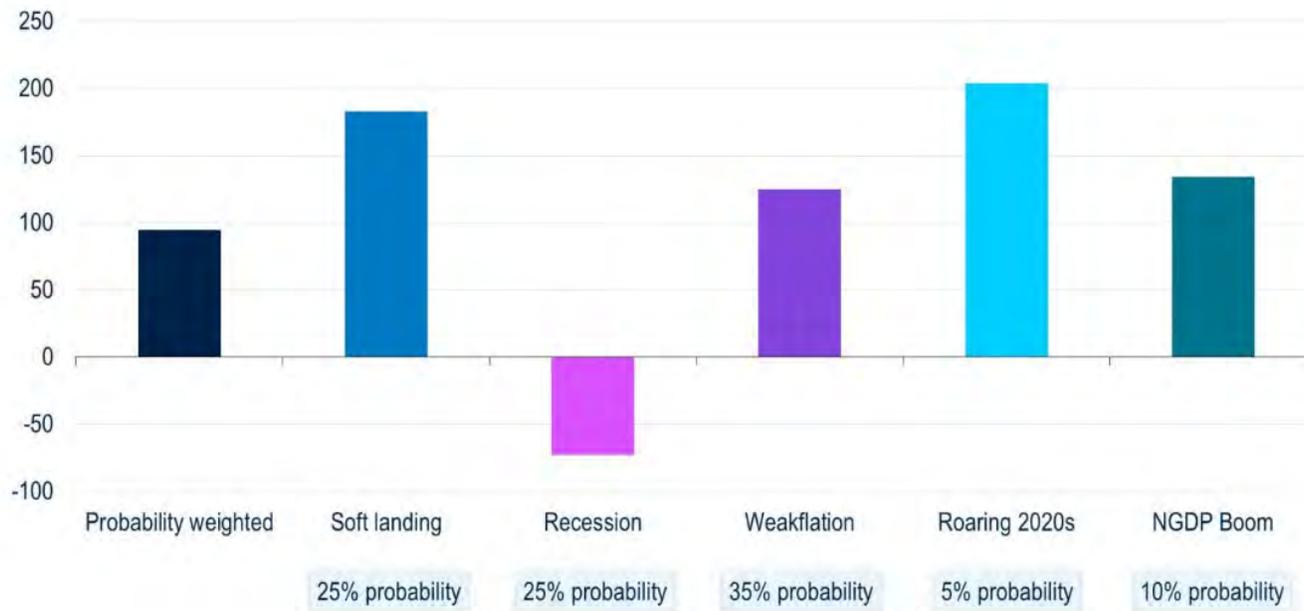
That said, as long-term investors, we strive not to change our scenario assumptions unless warranted by a shift in the assumptions, risks, and /or implications of macroeconomic fundamentals. Moreover, it's important to emphasize that adjustments to our forecasts are independent of current market pricing and reflect changes to the outlook over the forecast horizon based on incoming information.

Applying our Framework at a Portfolio Level

Our framework allows us to carry out sensitivity analysis at a portfolio level. Our tools allow us to extend our “what if” analysis to track the expected performance of complex, multi-sector portfolios in each of our scenarios. We have designed these tools to be interactive, so our portfolio managers can also assess the sensitivity of their portfolios to different

assumptions in the scenario probabilities, as well as to changes in portfolio allocations. Finally, as with the asset class-specific analysis, these tools also allow us to assess the upside and downside in potential portfolio performance across all scenarios (Figure 4).

FIGURE 4: Example of Potential Active Returns Across Scenarios in a Multi-sector Portfolio³



Source: PGIM Fixed Income as of June 2023.

Concluding Thoughts

The uncertainty inherent in a paradigm shift is two-fold: it's not only the unknown that lies ahead, but it's the familiarity of what's left behind. As the global economy moves past the relative stability of the Great Moderation, it's now progressing through an era of historic complexity where point forecasts simply fail to capture the range of potential outcomes. By assigning probabilities to macroeconomic scenarios and market outcomes, we can readily identify investment opportunities when our probability-weighted return estimates differ from market pricing, and our portfolio managers can test the sensitivity of their portfolios under various macro scenarios.

Indeed, in this environment, the biggest shortcomings of risk management will not be failures of memory, but rather those of imagination. Our North Star is to continually ask “what if?” in an effort to avoid surprises and to be prepared when the unexpected inevitably arises.

Appendix

United States - Potential Scenarios and Probability

Weakflation (35%)

Tight monetary, fiscal, and credit conditions combine to weaken growth to just above flat. Meanwhile, the labor market remains solid enough to keep services inflation too high and persistent for the Fed to reduce policy rates from the peak by more than 50-75 basis points. Risk assets perform reasonably well, though high inflation prevents longer-maturity yields from rallying.

Recession (25%)

The labor market runs out of steam, denting income and spending just when the combined weight of tight monetary, fiscal, and credit conditions begins to mount. Unemployment rises abruptly and inflation falls with a lag, leading to a substantial Fed easing cycle starting in Q4 2023 and extending to below neutral rates. U.S. rates rally and risky assets correct lower.

Soft Landing (25%)

Growth remains resilient near or even above trend levels (1.6-1.8%), while inflation converges decisively towards the 2% PCE target. Banking woes ease and the labor market softens but remains robust enough to power consumption. The Fed cuts rates as inflation cools and growth remains resilient. Favorable environment for interest rates and risk assets.

Nominal GDP Boom (10%)

The economy demonstrates historic levels of insensitivity to interest rates, with growth re-accelerating above trend while inflation stays well above 2%. Above-target inflation means the Fed keeps nudging policy towards a tighter stance, leading to higher rates relative to forwards. Rates curve stays inverted. Mixed performance by risky assets.

Roaring 2020s (5%)

U.S. growth accelerates above trend, supported by high productivity growth as the dividend of public investments, and diffusion of AI and other technologies. Inflation drops rapidly as productivity gains ease labor shortages and generate a positive supply shock, allowing the Fed to ease policy towards a neutral stance. All financial assets rally strongly.

1. While we are investors who seek to deliver strong performance over long-term horizons, for the purpose of our scenario analysis, we use a one-year forecast horizon.
2. These include, for example, the Fed policy rate as well as inflation and growth forecasts for our U.S. 10-year Treasury model.
3. See the Appendix for definitions of the scenarios listed.

Source(s) of data (unless otherwise noted): PGIM Fixed Income, as August 1, 2023.

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