Volatility of Interest Rates in the US After Covid-19: A Multivariate GARCH Analysis

Authors : Rodrigo Baggi Prieto Alvarez, José Dias Curto

Abstract : This study examines the volatility dynamics of U.S. Treasury rates from 1994 to 2024, with a focus on the shock induced by the Covid-19 pandemic. This market is considered the most important to monitor daily, as the yield curve of future interest rates is often referred to as "the mother of all curves" due to its importance in the pricing of all global risk assets. The period after 2020 was characterized initially by a stimulative monetary policy, synchronized across major global economies, with a rapid and significant reduction of interest rates by central banks and expansionary fiscal policy and increased government debt. In a subsequent phase, from 2021 to 2022, the end of lockdowns, the boost in income through public subsidies, and increased demand for goods, combined with logistical bottlenecks, resulted in the most significant inflationary shock in decades. The Federal Reserve (Fed) employed an abrupt tightening, raising short-term interest rates from 0.00% to 5.25% p.a. (the highest since the 2000s) at record speed (March 2022 to July 2023), and even before the monetary tightening, long-term interest rates had already been on an upward trend since 2020. The speed at which the Fed raised short-term interest rates has a significant impact on the level and the volatility of yields across other maturities. Estimating models as APARCH and DCC-GARCH, this paper explores the interplay between conditional variance in the 2-year Treasuries and key macroeconomic variables for the U.S., highlighting asymmetric shocks, feedback effects, and spillovers between Treasury markets and macroeconomic volatility. The results evidenced volatility peaks, particularly during the Covid-19 lockdown, and the statistical tests confirmed ARCH/GARCH effects, corroborating high persistence, i.e. future variance being strongly affected by past variance. The univariate models GJR-GARCH and APARCH allowed to verify the importance of asymmetry, that is, bad news have a greater impact than good news on the conditional volatility of future interest rates. Then, the multivariate DCC-GARCH model confirmed the spillover between the volatility of Treasuries and volatility of macroeconomic variables, indicating the time-varying conditional correlation between the variable's volatilities. Besides estimating a full specification for DCC-GARCH with all variables simultaneously, a robustness test with pairwise estimations confirmed the temporal dynamics of highly persistence volatility and corroborated the feedback effect between the 2-year Treasuries, the unemployment rate and expected inflation, suggesting that these variables are good predictors of the long-term interest rate, which is aligned with the Fed's dual mandate. The empirical results here are consistent with the literature and bring practical insights for risk management and investment strategies, supporting investors to better model asymmetry and downside risk in portfolios and to manage the interest rate risk by understanding how different maturities respond to economic conditions.

Keywords : volatility, US treasury, APARCH, DCC-GARCH, asymmetric shocks, spillover

Conference Title : ICBAF 2025 : International Conference on Banking, Accounting and Finance

Conference Location : Lisbon, Portugal

Conference Dates : February 03-04, 2025