

Full Title

Structural Asymmetry in Transatlantic Gas Markets: A Regime-Switching Analysis of Imported Volatility

Short Title

Asymmetry in Transatlantic Gas Markets

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Author Contributions

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Abstract

Transatlantic natural gas integration has created a *structural asymmetry* whereby volatility spills backward, disproportionately impacting asset valuations. To quantify this *imported volatility*, we employ the Generalized and Orthogonalized Forecast Error Variance Decomposition (FEVD), thereby decoupling financial risk spillovers from physical flows. We integrate these outputs into a regime-switching real options valuation (ROV) model spanning 2016–2025. The analysis indicates high financial connectedness (mean total connectedness index (TCI) = 14.78%) and a *crisis inversion* during market stress. EU volatility drives US storage injections ($\beta = -0.1098, p < 0.001$), while US physical flows exhibit variance spillovers below 2%. This asymmetric risk exposure generates divergent asset economics. US storage facilities capture an 11.07% flexibility premium. Conversely, EU mandate-driven assets yield a 1.52% premium. Challenging standard market convergence theories, these statistical findings demonstrate the necessity of pricing imported volatility and operational rigidity directly into financial energy risk models.

Keywords: Volatility Spillovers; Real Options Valuation; Financial Contagion; Valuation Under Uncertainty; Regime Switching; Commodity Risk Pricing

"Note: Full working paper available upon request. For the assigned discussant, the complete manuscript will be transmitted directly via email."