Structural Equity Option Pricing: Implications for Credit Risk

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We propose a structural model for equity option pricing that incorporates stochastic volatility and time-varying asset jumps. Although the asset dynamics belong to the broad class of affine models, the resulting equity dynamics are non-affine, making traditional Fourier-based option valuation methods computationally intensive. We address this challenge by training a deep neural network to approximate the pricing function. Using liquid, exchange-traded equity options, we estimate key firm-level characteristics—namely, asset variance and market leverage—which we then use to derive an option-implied probability of default (PD). This PD partially co-moves with over-the-counter CDS spreads but exhibits persistent residuals that we link to intermediary constraints. Our approach yields a real-time, forward-looking, market-based measure of default risk that is, by design, unaffected by the illiquidity and frictions of the credit market.