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Editor's Letter

Stephen Figlewski

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1120 Avenue of the Americas, 6th floor,
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Every quarter when it is time to write the Editor's Letter, I begin by looking at how volatility has been behaving. And pretty much every time, I end up with the feeling that I can't explain what I'm seeing. For a number of years, up to the present day, the economic and political outlook for the U.S. and the rest of the world has appeared very unsettled. Budget battles in Washington have led to both threatened and actual shutdowns of the federal government. There were sovereign debt problems in Europe; millions of refugees have been fleeing the Middle East and Central America; there was an election shock in the U.S. and similar "populist" surprises in European elections, not to mention Brexit. Trade agreements were broken and abandoned, as were the Paris Climate Accord and the nuclear deal with Iran; existential questions have arisen about the Korean peninsula, Crimea and Ukraine, NATO, and the European Community; tariffs were imposed not just on important imports from China, but also on our European trading partners, with threats of more to come. Precedent-shattering Presidential "tweets" have been tossed out, then quickly modified, or restated, or fudged, or reversed, while much of the world was still reacting in horror to the original tweet. Today's tweet-du-jour, for example, suggested that the White House favored another government shutdown to make Congress fund the Mexican border wall. And yet through all of this, both implied volatility and realized volatility in the stock market have remained far below their historical averages nearly all of the time. Major real-world economic and political uncertainty never seems to translate into real or expected risk for stocks. The bull market in stock prices seems invincible. In which case, the bear market in volatility is probably invincible, too.

In my last Editor's Letter, I wondered whether the record-breaking two-day market collapse back in February might be ushering in a new regime of volatility at more customary levels. Seeking some evidence for that hypothesis, I compared the behavior of the SPX and VIX indexes before and after the February market break. My non-rigorous impression is that *maybe* the market has gotten a little more lively. From July 31, 2017 to February 1, 2018, implied volatility as measured by the VIX index averaged 10.7 and daily realized volatility of the S&P 500 index was an astonishingly low 7.2 percent at an annual rate. After February's mini-crash, the VIX and realized volatility have been higher, averaging 16.6 and 15.3, respectively. While this seems like a sharp increase in risk, these values are still below the long-term averages from 1990 up to July 2017, of 17.8 and 19.5 for realized and implied volatilities. So, maybe the recent increase is nothing more than reversion toward the mean.

Then I wondered if market-moving tweets were leading to more price jumps in the market than before. Skewness of returns became a little more negative, moving from −0.43 to −0.70 after February. High average kurtosis would reveal if the tails of the returns distribution were getting fatter from an increase in the number of jumps, but kurtosis went down by two-thirds after February, from 6.6 to 2.1. Nor were there an unusual number of tail events since the mini-crash. In short, maybe volatility has increased from last year's exceptionally low level, but for the most part, the statistics don't really show a major change in real or expected market risk after the sharpest stock market drop in history (in index points).

And yet, regardless of the evidence that volatility sellers earned positive variance risk premia both before and after February 2018 (not counting the market break), I still think it is awfully risky to sell volatility below 10%. Then again, I have consistently expected higher volatility than what has occurred, and I have been consistently wrong.

Turning to this issue of *The Journal of Derivatives*, we start with a new idea on fitting option pricing models to market data. An option is a derivative whose value depends on the price and volatility of its underlying asset, so models are tested by estimating the asset's returns process and checking how well option prices match the model values. Discrepancies are treated as flaws in the model, which theoretically should all be zero. Chang, Cheng, and Fuh weaken that assumption. By allowing pricing errors for both the stock and its options, their model introduces slack in the statistical relationships that leads to a much better fit.

The next paper, by Russo and Staino, presents an extended general purpose "forward-shooting grid" lattice model that can handle stochastic stock prices, volatility, and interest rates—three stochastic factors at the same time—while retaining the efficiency and flexibility of the tree structure that limits the number of node calculations as the number of time steps increases. A key trick in the paper is to treat the stock price as an "auxiliary" variable, while volatility and interest rate are the primary state variables. The third article, by Crespo and Huang, shows a new way to extract a "risk neutral density" from a set of option market prices using ℓ_1 trend filtering. The technique is not complicated, and it can yield a remarkable increase in accuracy.

Dealing with credit risk for a sovereign borrower presents a difficult valuation problem, because the outcome if the sovereign is unable (or refuses) to pay is much less well-defined than for a corporate borrower. Typically, loan terms are renegotiated when things get bad enough; for example, it becomes obvious that the borrowing country's GDP growth is so weak that full repayment is questionable. The principal amount may be reduced ("forgiveness"), or an incentive in the form of a reward for full repayment may be offered ("repayment award"). Sun and Chen model hitting the critical point where loan conditions are modified as a down-and-in put option, which yields a valuation model for vulnerable sovereign debt and, importantly, a proof that forgiveness is a better strategy for the lenders than a repayment award.

Finally, our last research article refutes a recent assertion in the literature that the most senior tranche in a debt securitization should bear a larger risk premium than a comparably rated single name bond, because default will only occur in an "economic catastrophe" that, by its nature, is systematic risk of a major loss. In contrast, Blöchlinger proves that increased diversification of risks within a CDO pool always reduces average risk for the senior-most tranche, even though the marginal dollar of principal at the attachment point goes up.

We end this issue on a sad note. Peter Christoffersen, one of the most productive and creative researchers in our field and an Associate Editor of JOD, passed away on June 22, 2018, at the height of his career. I invited three of Peter's close friends, students, and coauthors, Bo Young Chang, Kris Jacobs, and Chay Ornthanalai to share a few reflections on Peter, and I have added a few comments of my own on his work. He will be greatly missed.

Once again, here we are in the middle of summer, but by the time you are reading this, it will be the start of another new school year for many of us. Best wishes for the year to everyone.

Stephen Figlewski
Editor