THE JOURNAL OF
DERIVATIVES

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REMINDER FOR A SPECIAL ISSUE

As I wrote last quarter, Frank Fabozzi, Editor of *The Journal of Portfolio Management*, and I will collaborate to create a Special Issue for *The Journal of Derivatives* with scheduled publication in June 2022. The issue's focus will be derivatives in the asset management world. Our authors will be practitioners and the mission will be educational.

WRONG IDEAS AND …

As I was pondering recently the quandary of LIBOR replacement, an old memory floated back to me. Back in the 1990s the US Treasury discussed at some length and then implemented a new type of debt: Treasury Inflation-Protected Securities (TIPS). TIPS are obligations of the US government, have a fixed coupon and original-issue maturities of 5, 10, and 30 years. Their distinctive feature is that the principal amount moves up and down with the CPI ("consumer price index"). The driving idea is that TIPS investors will have no, or at least less, inflation risk. Investors receive greater principal at maturity and larger coupon payments if CPI increases throughout the bond's life.

This Editor 25 years ago considered this TIPS proposal to be remiss, fatuous, and overly complex. In my mind there was an elegant and far superior solution: create a Treasury debt obligation with quarterly coupons set to the concurrent 3-month Treasury bill rates. It would have been a "Treasury floater" with great benefit to many investors. My strong view was that this Treasury floater would also provide excellent inflation protection.

But I was wrong! Official inflation in the US is now running at greater than 5% per annum. Three-month T-bill rates are 0.05% per annum—I'm off by a factor of 100!! Well, actually, my mistake is greater than that, but let's just stay with this memorable error of two orders of magnitude.

To understand better my mistake, I explain my thinking by reverting to the late 1970's and into the 1980's—a period with both high inflation and high interest rates. T-bill investors should demand yields that exceed projected inflation. With inflation at 10% pa, for example, why buy a T-bill that pays less than that? If the yield is less than inflation ("negative real interest rate"), then use that cash instead to buy something that rises with inflation (equities or durable non-financial assets). To entice the T-bill investors, the market should produce T-bill rates that are at least comparable to inflation.

My wrong-headed Treasury floater would, I thought, have maintained its par value over time while paying a coupon equal to or higher than the inflation rate. Such an instrument today, though, would pay just 0.05% pa as a coupon (while, most likely, maintaining its par value) rather than inflation's 5% pa.

... ECONOMISTS

What happened? Why did the world change? I blame the economists. That's not entirely fair; it's more of a conspiracy between economists and politicians. But "blame" is not the story I want to tell or the conclusion I want to draw here. Rather, there's a deeper and far more interesting insight than "blame" that one obtains by connecting three dots.

The first dot is my "wrong idea"—that is, we now have zero interest rates and rampant inflation. The second dot is the topic of Adam Fergusson's *When Money Dies* (hyperinflation of Germany and Austria in the period 1920–1923). This short and focused history is worthwhile to read and has no "grand theory" or "tortured logic" to distract the reader from the evidently simple cause and effect. For example, the author describes the President of the Reichsbank (the German Central Bank of that period), Rudolf Havenstein, as "the mad banker whose one object was to swamp the country in banknotes."

Finally, the third dot to connect is the regrettable but pervasive human tendency that Liaquat Ahamed discloses in *Lords of Finance: The Bankers Who Broke the World* (a financial history with focus on the decade following 1923). Havenstein did not "swamp the country in banknotes" because he was "mad"—he had a perfectly understandable reason. To learn and appreciate this reason is both clarifying and terrifying.

OUR NEW ARTICLES

The seven articles of this issue begin with Peter Carr and Andrey Itkin of the Tandon School of Engineering at New York University. They derive new analytical results for barrier and American options for the treatment of underlying equity options with an Ornstein-Uhlenbeck process. All relevant variables (interest rate, continuous dividend, volatility, and barrier) are time-dependent. Solutions are "semi-analytical" in that option values emerge as integral equations which require numerical resolution. The authors argue and demonstrate that numerical solution of the integral equations enjoy advantages over numerical treatment of the associated partial differential equations that the integral equations replace.

Dilip Madan and King Wang of the University of Maryland and Morgan Stanley, respectively, propose a new cross-asset hedge in which one hedges options on one asset with position in similar-maturity options of another related asset. Two implementations are the hedging of VIX and CBOE Skew Index options with SPY options. As there are coupled density functions to consider, the authors evaluate copula models and find that multivariate bilateral gamma models are preferable to both the Gaussian and t-distributions.

Tom Davis of FactSet Research Systems revisits binomial and trinomial trees that have proven effective for several decades in pricing securities with early exercise features such as callable bonds and American-exercise options. In lieu of the finite difference grid as the conceptual source of these trees, the author applies both a path integral formalism and a likelihood ratio. The alternative formulation efficiently calculates delta risk sensitivity.

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Athanasios Fassas of the University of Thessaly studies the introduction of Micro E-Mini index futures (Chicago Mercantile Exchange) for several US equity indices. These "micro" futures contracts, one-tenth the size of the related E-Mini contracts, appear to be highly successful in attracting investors and, hence, enhancing information transmission. Though new, the Micro E-Mini contracts make the greatest contribution to price discovery for three of the four equity indices in this article.

Holger Fink of the Munich University of Applied Sciences adds a second jump process to a fractional Levy model with the goal of enabling an equivalent martingale measure. The transformed Levy process gives more flexibility for determining the model—standard or fractional—that best fits a relevant data set. The author provides an application to S&P 500 market data.

Kazuhiro Takino of the Nagoya University of Commerce and Business studies the impact of non-cash versus cash collateral for derivative transactions such as interest rate swaps. The nature of the posted collateral, its yield, and the repo yield for the collateral impact derivative pricing. As one might suspect, the author imposes a multi-curve framework to accommodate the diverse yields and claims improved agreement with market pricing.

Joe Pimbley of Maxwell Consulting, LLC maps the American exercise boundary of the equity put option for the (constant) interest rate and volatility Black-Scholes-Merton parameters. This research is a "derivative" of the Tom Little discovery and explanation of the ansatz for the free boundary ("The Free Boundary for the American Put Option," *The Journal of Derivatives*, Winter 2020). The ansatz is highly accurate with insignificant computation time.

TOPICS: *Statistical methods, derivatives, options, interest-rate and currency swaps, quantitative methods, statistical methods, risk management, credit risk management, fixed income and structured finance**

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Editor