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DEDICATED ISSUE: MEMORIAL TO PETER CARR

To honor the life of the renowned financial derivatives expert Peter Carr, *The Journal of Derivatives* will dedicate the Winter 2022 issue to his memory. The NYU Tandon School of Engineering convened the *Peter Carr Memorial Conference* in early June of this year. Several of the presentations will appear in the JOD dedicated issue as published articles. An august, highly esteemed panel of guest editors is now directing the review and selection process. The guest editors, all colleagues of Peter, are Andrey Itkin and David Shimko of NYU Tandon, Alex Lipton of Abu Dhabi Investment Authority, Fabio Mercurio of Bloomberg, and Liuren Wu of Baruch College.

HISTORY AND FINANCE

For financial analysts, researchers, and executives of all career stages, there is a huge torrent of data and information to ingest daily. What I've learned is that one may often use stories to understand data and information. Such stories may be mental models or mental images that one forms while reading and interpreting data. The human brain will process data more efficiently when it uses stories, models, or images to give context and structure to the data. The added efficiency and clarity can be quite valuable, but there's always the danger of adopting wrong or incomplete stories, models, and images, which lead to mistaken interpretation.

I focus here on stories and, further, on stories from the past, rather than our own contemporary mental models. Stories from the past—that's what history is. Doug Lucas, an ex-colleague of mine, recently created *Stories.Finance* to record eyewitness history of exciting, instructive Wall Street events. As with all good history, one learns what actual (not ideal) human beings do when confronted with various business and life challenges. Knowing the theory is good; understanding the practice is better.

WRONG-WAY RUBLE FORWARD

Wrong-way credit risk in a derivative transaction exists when one of the parties to the trade is more likely to default when the trade has negative value to this party. It is natural and simplest, in creating a model of derivative counterparty risk, to assume that the default of one or both parties to the trade is independent of the state of the trade. But this assumption is spectacularly wrong in certain cases, such as 2008 super-senior credit default swaps.

An excellent early example of wrong-way credit risk was the ruble forward of the Russian GKO trade of the 1990s. Western financial institutions purchased short-term, ruble-denominated debt of the Russian government (GKOs) because annualized yields far exceeded those of almost all other sovereign borrowers. But these institutions did not want the ruble foreign exchange risk, so that they sold forward the ruble to the GKO

THE JOURNAL OF
DERIVATIVES

maturity in exchange for the US dollar or another major currency. The straightforward derivative idea was that the investors would receive ruble payments at GKO maturity and immediately pay these rubles into the ruble forward to receive the prespecified payment in the non-ruble currency.

But Russian banks were the counterparties that would accept the rubles and pay the Western currency. That was the wrong-way aspect. If and when the ruble had lost value between trade inception and GKO maturity, the investors relied on the Russian banks to pay away the higher-value foreign currency in exchange for rubles. But weakening of the ruble was a predictably correlated event with greater failure risk of the Russian banks. That's precisely what happened in 1998: the ruble depreciated and the Russian banks failed.

You'll find this specific story at *Stories.Finance*! The version of this account at *Stories.Finance*, however, does not emphasize the theory of wrong-way credit risk. As in many cases, the "big picture" and practical aspects are more important and understandable than theory.

OUR NEW ARTICLES

Leading the six articles of this issue, Jean-Philippe Aguilar of Société Générale and Justin Kirkby of Intercontinental Exchange advocate and adopt the bilateral gamma stochastic process for the closed-form pricing of vanilla options. As the authors explain, bilateral gamma permits the imposition of distinctive behavior of positive and negative jumps that is observed empirically. The Mellin transform and calculus of residues enable analytical solutions in the form of fast-converging infinite series. The authors claim high accuracy and efficiency for short-tenor option valuation.

Zhiwen Dai, Lingfei Li, and Gongqiu Zhang of the Chinese University of Hong Kong present and consider the use of neural networks for solving the quadratic hedging of derivatives on a basket of securities by deep learning. The authors compare three neural network types and develop guidance for the best type choice in different situations. The implementation details for deep hedging procedures (network structure, bootstrapping approach, and analysis in multidimensional cases) are both interesting and useful for practitioners.

Sara Wagner of the Banque Internationale à Luxembourg; Theo Vermaelen, of INSEAD; and Christian C. P. Wolff, of the University of Luxembourg, study European bank issuance of contingent convertible (CoCo) hybrid securities. CoCos behave as debt in the sense that banks receive investor funds and agree to pay interest and repay the principal at stated maturity. Yet these instruments also have the equity-like property of suffering writedown (forced principal reduction) in a specified prescriptive manner when the issuing bank suffers financial deterioration) that is less severe than debt default. The authors study the characteristics of banks that correspond to greater or lesser issuance of CoCos. The issuing banks appear not to use CoCos in a manner that optimizes capital structure.

Andrey Itkin, of New York University, and Dmitry Muravey, of Moscow State University, apply the general integral transform technique to the pricing of barrier options under the time-dependent SABR stochastic volatility model. As in past research projects, sometimes with colleagues, in which these authors created and

THE JOURNAL OF
DERIVATIVES

refined the technique, the result is a semi-analytical solution for which a numerical component is highly efficient. The authors compare results to those from a more conventional finite difference (numerical) approach.

Grzegorz Krzyżanowski, of Wroclaw University of Science and Technology, and Andrés Sosa, of the University of the Republic (Uruguay), propose an extension to the classical Black-Derman-Toy (BDT) interest rate model by permitting jumps to zero (emulating policy actions of central banks). As a tree model, this method is adaptable to a wide variety of interest rate options. As editor, I also appreciate the inclusion of pseudo-code to assist the article's explanation for implementation.

Yaacov Z. Bergman, of the Hebrew University, and Alberto Bueno-Guerrero, of IES Francisco Ayala, consider some high-level mathematical properties for the value of financial derivatives based on underlying diffusion processes. These properties take the forms of bounds, asymptotic results, monotonicity, and convexity. The authors' work is an extension of their prior research, as well as that of Ekstrom and others of past decades. In formulating one particular result, the authors permit an option itself (rather than the market security underlying the option) to pay a dividend proportional to option value. Though arguably just a mathematical curiosity, the possibility is interesting to ponder!

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Editor