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There's nothing more exciting than a Call for Papers! You'll see in this publication the announcement for *Physics and Financial Derivatives* —a special issue of our journal. Please help us publicize the request for specialized article submissions. Discuss this Call with your friends and colleagues. Share it in your favored social media platforms. Don't hesitate to conceive and create your own paper!

Our guest editors for *Physics and Financial Derivatives* are Andrey Itkin (also a JOD board member), Alexander Bogdanov, and Alex Lipton. I'll leave further details to the announcement you'll see in these pages. It pleases me to predict that our financial expert readers will learn some physics while our numerous physics expert readers will learn more finance.

RISK-FREE RATE

There's an immensely important development in the world of derivatives that understandably receives little comment. This development is the change in risk-free interest rates for essentially all currencies. The apparent absence of notice is understandable due to slow and delayed implementation. To ease this brief discussion, I focus on interest rates of the US dollar (USD).

The London Inter-Bank Offered Rate (LIBOR) and the Federal Funds Overnight Index Swap (FF OIS) are fading away.[1] For varying purposes and timeframes, these interest rates have played the critical role of the risk-free rate in derivative theories and models. One could claim with justification that these theories and models should work well with any and all valid choices of risk-free rate. But still! It's reasonable for derivatives experts to take great interest in what bank regulators and bankers are doing to "our" risk-free rates.

I have two thoughts to express. The first is praise and the second is criticism. My praise is that there existed a lengthy consultation period regarding the replacement of LIBOR and establishment of a risk-free rate. The Alternative Reference Rate Committee (ARRC), a creation of the Federal Reserve Board and the Federal Reserve Bank of New York, led this public consultation, published several important commentaries,

[1] See, for example, "The Fed is trying to replace a decades-old benchmark rate—here's what you need to know," *Business Insider*, April 4, 2018, at https://www.businessinsider.com/a-new-benchmark-rate-is-replacing-libor-heres-what-you-need-to-know-2018-4.

and ultimately announced consensus decisions.[2] The various publications of the ARRC include a wealth of information, data, context, and insight.

My criticism is that the ARRC made the wrong choice! Well, perhaps my statement of objection is too strong. I'll retreat a bit and write instead that my judgment differs. The ARRC chose a new "Secured Overnight Financing Rate" (SOFR) as both the new benchmark (LIBOR replacement) and risk-free rate. Since SOFR is an overnight rate, it cannot directly serve as a benchmark or discount rate for any tenor beyond one day. Hence, this choice relies on a futures market to develop that will create a "term SOFR" for tenors such as one month, three months, *et cetera*.[3]

But, instead, why not make the simple substitution of US Treasury rates for LIBOR? I'll forego giving my and others' arguments for and against Treasuries with just one exception. As an earlier ARRC report indicates,[4] Treasuries are an excellent choice in this quest with just one dominant concern: ARRC members are wary of the market movements of Treasury rates. Treasury rates exhibit "safe haven" behavior, for instance.

My judgment, frankly, is: "I love markets!" For me it is a strength, rather than a weakness, that a dynamic, traded market determines the universal benchmark and risk-free rate. There's much more to this dispute that I'll leave unspoken. What strikes me most clearly in this topic is the fascination of the financial world. This is actually a profound question: what should the risk-free rate be?

OUR NEW ARTICLES

The seven articles of this issue span a wide range of interests including real estate, currencies, "regulatory capital" bonds, and equity options. Fabozzi (EDHEC Business School), Shiller (Yale University), and Tunaru (University of Kent) provide a review of the history, market, and pricing of real estate derivatives. Though derivatives in general constitute a large portion of the financial world, these authors demonstrate that the penetration of derivatives has much more room to grow in the areas of commercial and residential property markets. Real estate risk is prevalent in all major economies. An improved ability for investors, and even homeowners, to hedge and incur real estate risk through derivatives would constitute a monumental benefit. Professors Fabozzi and Tunaru are esteemed JOD editorial board members and Professor Shiller is a 2013 Nobel laureate.

Zhao, Chatterjee, Lonon, and Florescu (Stevens Institute of Technology) describe their methodology to price non-linear derivatives written on realized variance. This work is an expansion of the authors' prior research in pricing variance, gamma, and corridor swaps with multinomial trees (published in JOD in 2017, Vol. 25, No. 2). The article proposes a new "Bermudan variance swaption" as one of several products for which the multinomial tree technique is efficient and accurate.

Khah (University of Luxembourg), Vermaelen (INSEAD), and Wolff (University of Luxembourg) explain the empirical dependence of contingent capital (CoCo) bond prices on various explanatory variables. As a guide to the study, the authors apply an equity derivatives model of De Spiegeleer and Schoutens. The discussion of history and structure of these contingent capital securities is interesting. Like the TALF ("Term Asset-Backed Loan Facility") program in the US, contingent capital securities are a government/regulator intervention for bank funding that employs derivative and structured finance concepts.

Lera, Leiss, and Sornette, all of ETH Zurich with Sornette also having affiliation with the Swiss Finance Institute, model the dynamics of currency exchange rates in the presence of "target zones" of the relevant central banks. The authors promote the concept of "mirrored options" to create the boundaries inherent in the target zone levels. They are inspired by the "method of images" that is highly useful in some physics problems. The authors claim to estimate the fundamental value of

[2] See, for example, "ARRC Releases Second Report on Transition from LIBOR," FRBNY Press Release, March 5, 2018, at https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2018/ARRC-second-report-press-release.

[3] See, for example, the ARRC web page at https://www.newyorkfed.org/arrc/index.html.

[4] "Interim Report and Consultation," ARRC, May 2016, at https://www.newyorkfed.org/medialibrary/microsites/arrc/files/2016/arrc-interim-report-and-consultation.pdf?la=en.

the Hong Kong dollar "that is hidden by the target zone peg" to the US dollar.

F. Wu, X. Diao, and C. Wu (Antai College of Economics & Management) create an approximation for pricing and hedging basket options. The driving concept is the matching of an arbitrary number of moments of a shifted log-normal distribution. The study's examples and discussion focus on the mapping of the first four moments. The numerical study is exhaustive and provides good validation of the quasi-analytic approximations.

Nagy (Budapest University of Technology and Economics) and Ormos (J. Selye University, Bratislava) seek to create an arbitrage-free volatility surface fitting methodology when the associated option market is illiquid. The authors propose and discuss several data weighting approaches to penalize price ambiguity. A significant result is that implied vega weights with L1 optimization outperform the more classical L2 optimization. The article tests the fitting of surfaces empirically with a sample of (illiquid) option quotes of S&P 500 companies.

Godin (Concordia University) derives a closed-form solution to a minimal-variance hedging problem in discrete time. The author builds on prior research of a more general version of his stated problem and succeeds in extending the analytical aspect for a subset of the general version. The article also demonstrates sensitivity analyses for the optimal hedging capital and initial hedge ratio with respect to model parameters.

Joseph M. Pimbley
Editor