

# The Clever Mathematics Behind Wall Street Intrigue

**The Money Formula: Dodgy Finance, Pseudo Science, and How Mathematicians Took Over the Market.** By Paul Wilmott and David Orrell. Wiley, Cornwall, UK, June 2017. 264 pages. \$34.95.

As with almost everything else, mathematics can be corrupted by big money. *The Money Formula: Dodgy Finance, Pseudo Science, and How Mathematicians Took Over the Market* lays bare the mathematical abuses behind the trillion-dollar swindles in London and on Wall Street. These are the false assumptions and claims used to bait both investors and the public, the “innovations” (mathematical models and algorithms) that hide risk and shift it to consumers while pretending to do the opposite. Meanwhile, greed, corruption, and regulatory capture—among other things—seem to prevent beneficial reforms from occurring. The lack of enforced ethical standards in economics and finance is no accident, and the possibility of even bigger financial crashes and scandals looms in the future.

Paul Wilmott and David Orrell are both respectable applied mathematicians, authors, and critics; Wilmott is the consummate insider (or “quant”) while Orrell is the outsider, having already tackled academic economics in his insightful book *Economyths*. Their chatty dialogue explains the key role of the Black-Scholes formula in setting realistic prices for various kinds of financial options, but also emphasizes its limitations, so often ignored in practice. The authors are astonished by the number of quants who actually believe in the *efficient market hypothesis*, but note how it excuses all manner of selfish behavior; the extraordinary pay and bonuses don’t hurt.

Wilmott exposes a litany of “mathematical tricks for betting on the markets,” noting that traditional quant concepts like *modern portfolio theory* and *value at risk* tend to “fail just when you need them most...when

apparent stability breaks down.” However, he notes that hedge funds are good at looking “for small pockets of predictability... while they last.” They mostly exploit financial derivatives, which are often “used to make highly leveraged bets — so models are critical for risk assessment.” Wilmott’s description of the now-infamous *collateralized debt obligations* and *credit default swaps* reveals that these derivatives functioned as a kind of pyramid scheme to shift risk from insiders at the top of the pyramid to dupes at the base, with toxic mortgages camouflaged by corrupt credit rating agencies. Yet the mystique of the clever mathematics has served, quite literally, as “the perfect get-out-of-jail card.”

Meanwhile, Orrell wonders at the feasibility of modeling markets as a type of physical system (à la Issac Newton). The empirical and mathematical answer is that markets exhibit “complex dynamics that resist numerical prediction,” with power law distributions replacing Gaussians

— not at all surprising in view of the variety of irrational actions identified by behavioral economists like Daniel Kahneman and Amos Tversky. Even savvy investors need to heed John Maynard Keynes’ admonition that “markets can remain irrational longer than you can stay solvent.” Wilmott and

Orrell cite mathematical biology as a better example of applied mathematics. Good biological models are not based on Newton-type scientific laws; instead, statistics and observations inform simple mathematical formulae that offer key qualitative insights into particular situations. In finance and economics, such models could be tailored to the chaotic patterns of real-world economic behavior (booms, busts, unpredictability, etc.) and some such attempts have been made,

along the lines of *The Origin of Wealth* by Eric Beinhocker.

In the future, we might also get insights and guidance from comprehensive explorations and simulation of big data using higher-dimensional nonlinear networks and systems, despite their black box nature. For example, hurricane tracking is done manually by eyeballing a selection of Monte Carlo simulations of complex forces and building off past experience. Why not employ similar methods for economic and financial forecasting to continually update

vastly more realistic models of risk?

Wilmott and Orrell also fail to mention one of our biggest challenges — the need to identify and utilize better tools, not just interest rates, to guide the economy. For example, Modern Monetary Theory provides a sound basis for restoring the tools of

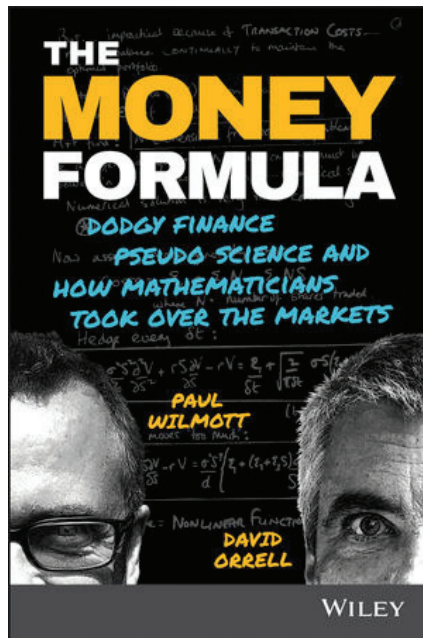
fiscal policy in general, and the government as *employer of last resort* in particular. In *With Liberty and Dividends for All: How to Save Our Middle Class When Jobs Don’t Pay Enough*, Peter Barnes demonstrates universal ownership of wealth-generating assets for the same purpose. In addition, the Federal Reserve could be pouring money directly into infrastructure public banks to develop renewable energy, affordable housing, and public transit, instead of pumping it into Wall Street to support speculation.

In essence, financial economics could be facilitating the economy that we need, rather than an economy of greed. While the authors do hint at the possibility of monetary reform, they mostly offer worthy (but familiar) prescriptions, such as breakup of big banks, stronger regulation, a financial transaction tax, simplicity, and transparency. The need for a political revolution to overcome big money’s power to resist even the most commonplace reforms is the unaddressed problem. Strangely, Wilmott and Orrell do not cite other insider critiques, such as Yves Smith’s blog—“NakedCapitalism.com”—or *ECONned*, her book focused on the 2008 financial crash. Ultimately though, *The Money Formula* does offer quantitative types a much better understanding of what we’re up against, and provides an opening for some “beyond Wall Street” sequels.

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## BOOK REVIEW

By Richard H. Burkhart



*The Money Formula: Dodgy Finance, Pseudo Science, and How Mathematicians Took Over the Market.* By Paul Wilmott and David Orrell, courtesy of Wiley.