Fatal Shore -- Black-Scholes and High Finance

Tom Carter

Fall, 2008

Stock tip:
Surest way to make money in the stock market?

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Buy low, sell high!

High finance tip:
Surest way to make money in high finance?

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(Note: see S&L bailout in late 80's, and current trillion $ bailout . . .)

This is sort of a joke :-)

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only not so funny, given
today's financial world . . .

Black-Scholes Options Pricing Model

- An “axiomatized” approach to “determining” the value of a financial derivative.
- Vastly increased the development of new financial derivatives.
- Led people to the idea that they could more directly quantify risk,
- And thus, to “hedging” models and derivatives.

But . . . let's look briefly at some of the "axioms"

- There is a completely safe (e.g., "FDIC insured savings account") fixed rate asset available.
- There are "frictionless" markets (i.e., we can buy or sell any instrument at any time in any amount).
- There are no transaction costs.
- No "arbitrage" (there are no financial instruments that provide "risk free" profits above the fixed rate asset).

Do any of these "axioms" hold in the real world?

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All right, what about the next set?

- Variability is continuous (and possibly even smooth?) -- allows us to work in continuous time.
- The distribution is "stable" (i.e., the distribution of the variability does not change over time).
- Increments are independent (i.e., variability does not depend on history – there is no "memory" in the distribution).
- The distribution has a finite mean and finite variance.

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  The distribution goes through "regimes -- see the recent past months, with very large variability . . .

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Real stock prices have "memory" -- investors exhibit "herd behavior" so that if prices recently went down, they are more likely to go down again . . .

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  Real market distributions appear not to have "bounded" variance. During recent months, the stock market has "set new records" for rises and drops in price. As time goes by, the variance "continues to grow" -- so a reasonable model of variance is that it is "unbounded" -- in other words, the distribution exhibits a "power law" form . . .

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Black-Scholes and the Modern Era of high finance

- With the introduction and development of the Black-Scholes style of financial analysis, a new era of high finance took over.
- Financial derivatives of various sorts were created, with the idea that mathematical analysis allowed the separation of risk.
- New developments included things like CDOs (collateralized debt obligations) and CDSs (credit default swaps).

Black-Scholes and the Modern Era of high finance

- Regulation was reduced, and new financial institutions like hedge funds were created.
- Scholes and Merton were awarded the Nobel prize in 1997 for "a new method to determine the value of derivatives" (Merton extended Black-Scholes to include stocks paying dividends; Black died in 1995, so didn't share in the prize).
- Scholes and Merton were principals in Long Term Capital Management (LTCM) - a hedge fund.

Black-Scholes and the Modern Era of high finance

- But not everything worked as planned . . .
- In the late 80's, savings and loans collapsed, leading to a taxpayer "bailout" -- estimated (by the FDIC) to have cost taxpayers approximately $124 billion.
- In 1994, Orange County, California, went bankrupt after investing in various financial derivatives.

Black-Scholes and the Modern Era of high finance

- In 1998, LTCM collapsed, almost resulting in a taxpayer "bailout" -- narrowly averted by a rescue effort by major banks.
- But, faith in the new techniques of quantitative analysis and financial derivatives using a variety of value modeling systems (often extensions of Black-Scholes) continued and grew.

Black-Scholes and the postmodern era of high finance

- But, in 2008, we appear to have entered the postmodern era of high finance.
- Instead of the Derridean deferral of meaning, which is never present, we have a deferral of value, which seems never present.
- Financial institutions suddenly realized that they didn't believe in the value of financial instruments, and thus the instruments were seen as not having a determinate value.

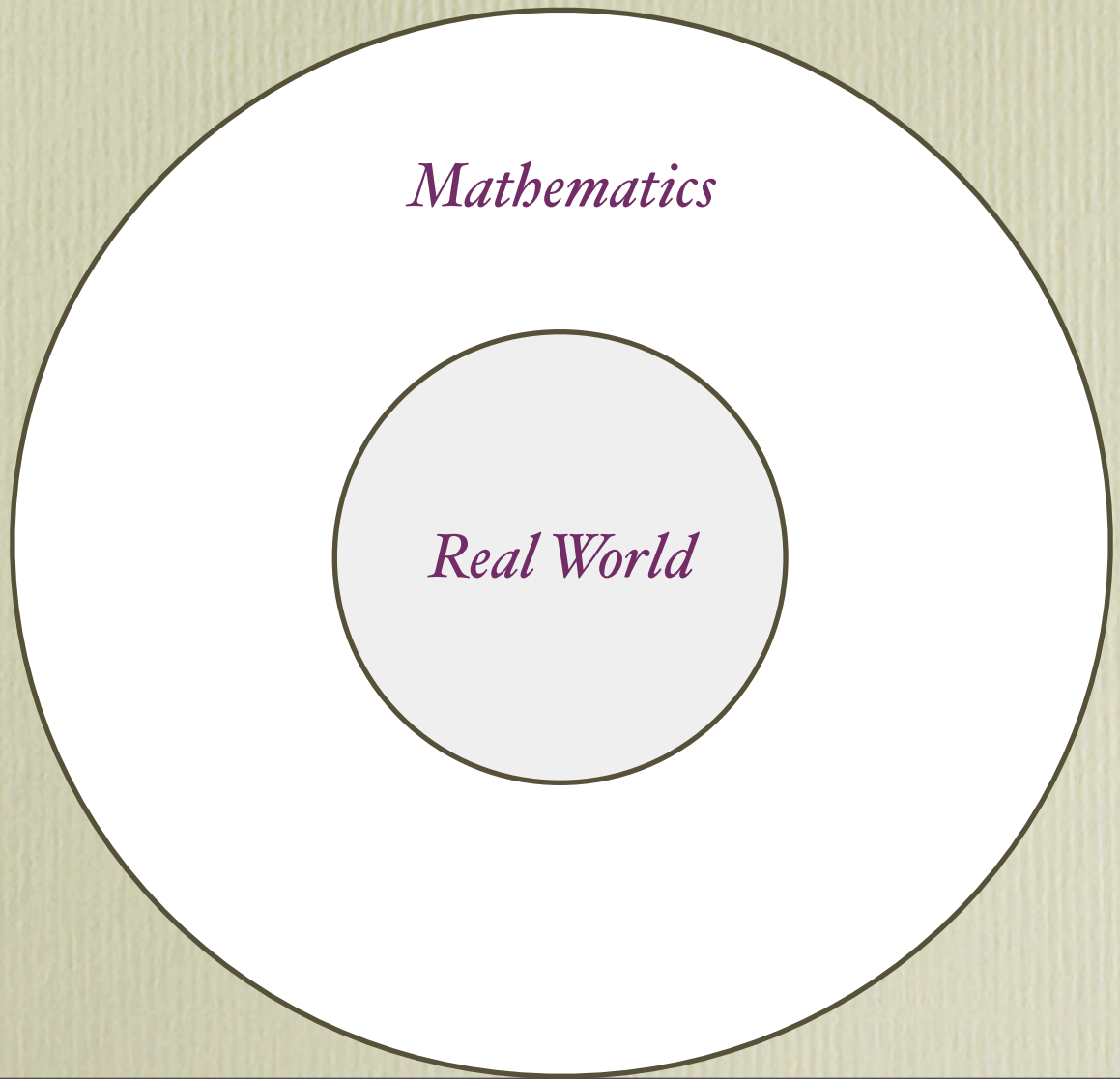
Black-Scholes and the postmodern era of high finance

- Even the Treasury Department has acknowledged that there is no simple determinate value for various financial derivatives . . .
- The $700 billion "bailout" was supposed to be used for a TARP (troubled asset relief program). But, Treasury has concluded they can't figure out what price to pay for the "troubled assets" . . .
- So, apparently, they're just "forcing nine major banks to take the money" !!!!

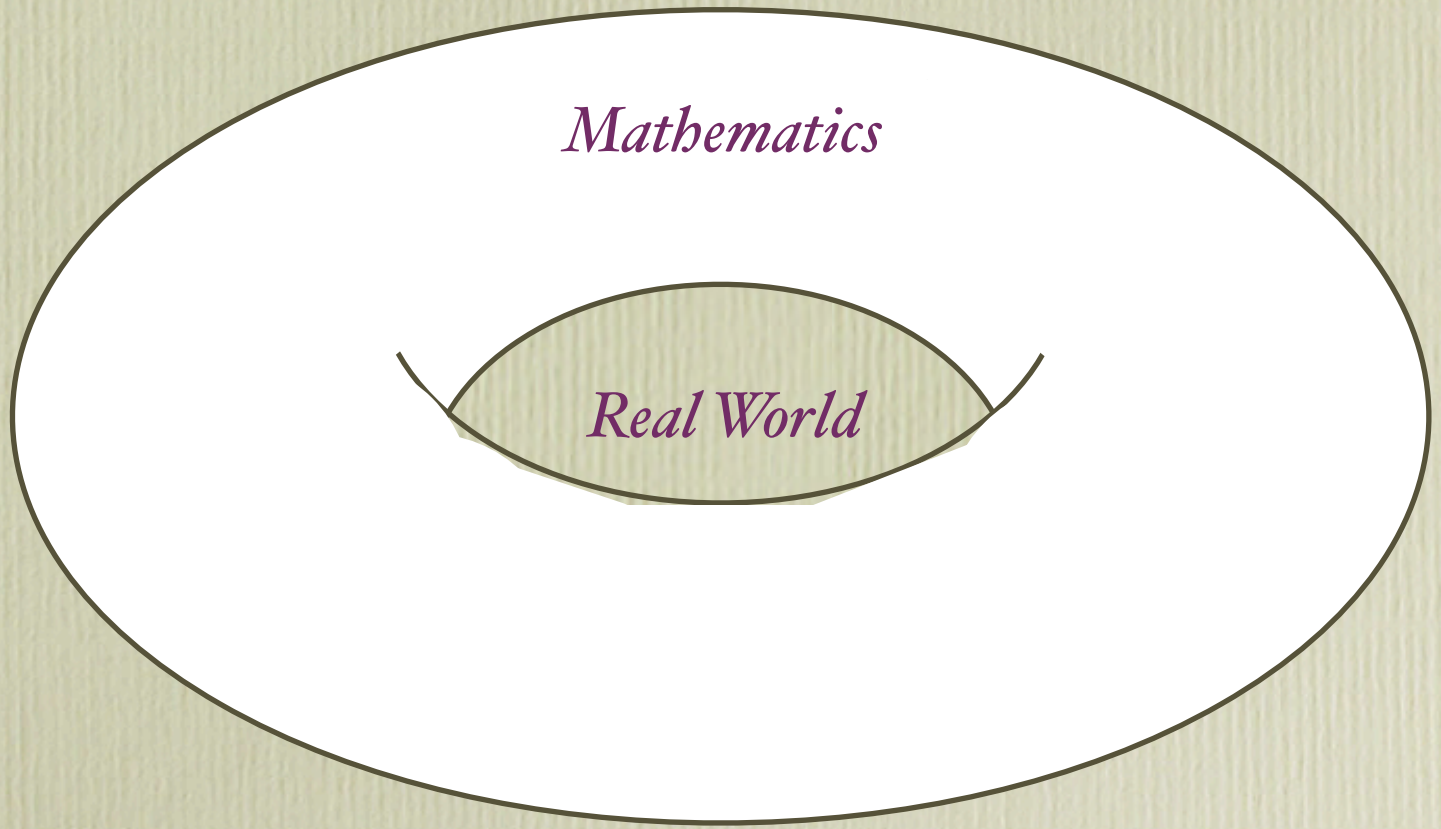
Black-Scholes and the postmodern era of high finance

- Oh, well . . .

A large part of the problem is believing that "getting the math right" gets it all right:



But is this really . . .



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