

## [If you start from the wrong place then you're never going to get to your desired destination](#) [1]

Written by [Tim Worstall](#) [2] | Wednesday 30 October 2013

Theoretical option price =  $pN(d_1) - se^{-rt}N(d_2)$

$$\text{where } d_1 = \frac{\ln\left(\frac{P}{S}\right) + \left(r + \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}$$
$$d_2 = d_1 - \sigma\sqrt{t}$$

The variables are:

$p$  = stock price  
 $s$  = striking price  
 $t$  = time remaining until expiration, expressed as a percent of a year  
 $r$  = current risk-free interest rate  
 $\sigma$  = volatility measured by annual standard deviation  
 $\ln$  = natural logarithm  
 $N(x)$  = cumulative normal density function

I do tend to like making fun of the economics leader writer of The Guardian, the history graduate Aditya Chakraborty. For his knowledge of the subject he covers is, how to put this, less than complete. For example, here he is [on finance](#) [3]:

In one of the world's elite institutions, the elites were taking a pasting ? from accountants, entrepreneurs and academics. They knew what they were on about, too. Given his turn on the mic, one biologist said: "I'll believe economists have reformed when the men behind Black and Scholes [the theory that helps traders value financial derivatives] have been stripped of their Nobel prizes."

No, that's not Chakraborty speaking there but the second sentence does show that he thinks that biologist had got it right. Which, sadly, he hadn't, as I've explained [elsewhere before](#) [4]:

Now if the crash had been caused by options, derivatives, high frequency trading (HFT), foreign exchange and so on then I'd be one of the first musing on something like the financial transactions tax as a way to curb these markets and thus make another crash less likely. But the thing is that the crash wasn't caused by any of these things. It was a straight old housing bubble helped along by an expansion of securitisation. And as we all know, if you misidentify the problem then you're most unlikely to be able to fix it. Which is why this is important.

Our professor has gone off on the popular narrative: all those people trading too much and too quickly were the underlying problem. But mortgages, the bonds made up of securitised mortgages (those CDOs), were very rarely traded. They were more normally created, sold once and then stuck in the basement vaults of those who bought them. This wasn't a highly traded market. Further, there was a mathematical error in this market but it wasn't Black-Scholes. It was that ?Gaussian cupola?: the measurement of how prices were or were not correlated. Turns out they were a lot more correlated than anyone thought but that's a result of a mistake in a different equation.

And even where there was something akin to a derivative, in the CDS market, it wasn't that people were using Black-Scholes, or even using it wrongly, that caused the problems. For the people who got into trouble were AIG Financial Products and the problem at AIGFP is that they were not treating their CDS contracts as derivatives whose value changed with underlying prices. Instead, they were treating them as insurance contracts they'd never have to pay out on. They were not

marking to market, were not evaluating potential losses on a rolling basis and therefore were not using Black-Scholes. If they had been they'd have realised their error rather earlier and quite possibly would not have had to run to the Feds for help.

Black Scholes is a method of valuing derivatives and the derivatives markets where they were using Black Scholes didn't cause the crisis. The one derivatives market where they were not using Black Scholes is one that did contribute to the crash. It seems most unkind to threaten to strip two Laureates of their Nobel for something that when people do use it doesn't cause crashes and when they don't can contribute to them.

There's a Richard Feynman line which seems appropriate here:

I believe that a scientist looking at nonscientific problems is just as dumb as the next guy

I have to admit that I tend to translate that slightly. An expert looking at issues outside his area of expertise is just as dumb as the next guy.

Whether they be historians or biologists.

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