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## WHAT BUFFET SAID ABOUT SELLING PUTS

### INTRODUCTION

Warren Buffett famously called derivatives weapons of mass destruction while at the same time pursuing a put selling strategy on a vast scale. His annual letters to shareholders in the Berkshire Hathaway chronicle his own derivative exposure and contrasted his measured put selling strategy with what he saw as the over-leveraged, over-complex positions that he thought would be the downfall of large financial institutions. Here is a link to a very helpful site where you can download all his letters. This has been where we have extracted all the quotes below.

<http://www.berkshirehathaway.com/letters/letters.html>

### OUR IMPLEMENTATION OF WARREN BUFFETS POSITION

The letters are famously readable. If we were to sum up his position it is that he considers the risk-neutral pricing of long dated puts to be wrong. WB saw selling put options as a “value” investment. He thought that the high price that banks were prepared to pay for long dated puts meant that he expected to make money by selling these puts. Berkshire Hathaway’s unique position in the market meant that they were able to sell puts “naked” with no collateral, and so that is what he did. He did not hedge the positions, although he did tinker around with the positions.

In a way, we are disciples of his approach. We published a note on the pricing of puts that explores the same theme; <https://www.levendi-im.com/views/puts-wrong-price/> We don’t think that puts are the wrong price, the pricing of these puts makes sense for a bank that will hedge all their exposures. But we do agree, the way that puts are priced offers a fantastic investment opportunity for investors that are prepared to accept the risk that comes with an unhedged covered put strategy.

For us, the best way to implement the strategy is to invest in defined return instruments. These are bonds that offer enhanced returns BECAUSE there is an embedded short put in the structure. Like WB, we buy assets where we are selling medium dated puts. Unlike WB we are typically selling lower strike puts. These are safer but obviously the yield pick-up is smaller.

### BLACK SCHOLES IS WRONG

In his 2010 letter WB commented:

Both Charlie and I believe that Black-Scholes produces wildly inappropriate values when applied to long-dated options. We set out one absurd example in these pages two years ago. More tangibly, we put our money where our mouth was by entering into our equity put contracts. By doing so, we implicitly asserted that the Black-Scholes calculations used by our counterparties or their customers were faulty.



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Part of the appeal of Black-Scholes to auditors and regulators is that it produces a precise number. Charlie and I can't supply one of those. We believe the true liability of our contracts to be far lower than that calculated by Black-Scholes, but we can't come up with an exact figure – anymore than we can come up with a precise value for GEICO, BNSF, or for Berkshire Hathaway itself. Our inability to pinpoint a number doesn't bother us: We would rather be approximately right than precisely wrong.

John Kenneth Galbraith once slyly observed that economists were most economical with ideas: They made the ones learned in graduate school last a lifetime. University finance departments often behave similarly. Witness the tenacity with which almost all clung to the theory of efficient markets throughout the 1970s and 1980s, dismissively calling powerful facts that refuted it “anomalies.” (I always love explanations of that kind: The Flat Earth Society probably views a ship's circling of the globe as an annoying, but inconsequential, anomaly.)

Academics' current practice of teaching Black-Scholes as revealed truth needs re-examination. For that matter, so does the academic's inclination to dwell on the valuation of options. You can be highly successful as an investor without having the slightest ability to value an option. What students should be learning is how to value a business. That's what investing is all about.

## CRITICISM OF BLACK SCHOLES

In the 2008 letter here is the example WB uses to describe why risk neutral pricing is wrong:

The Black-Scholes formula has approached the status of holy writ in finance, and we use it when valuing our equity put options for financial statement purposes. Key inputs to the calculation include a contract's maturity and strike price, as well as the analyst's expectations for volatility, interest rates and dividends.

If the formula is applied to extended time periods, however, it can produce absurd results. In fairness, Black and Scholes almost certainly understood this point well. But their devoted followers may be ignoring whatever caveats the two men attached when they first unveiled the formula.

It's often useful in testing a theory to push it to extremes. So, let's postulate that we sell a 100-year \$1 billion put option on the S&P 500 at a strike price of 903 (the index's level on 12/31/08). Using the implied volatility assumption for long-dated contracts that we do, and combining that with appropriate interest and dividend assumptions, we would find the “proper” Black-Scholes premium for this contract to be \$2.5 million.

To judge the rationality of that premium, we need to assess whether the S&P will be valued a century from now at less than today. Certainly, the dollar will then be worth a small fraction of its present value (at only 2% inflation it will be worth roughly 14¢). So that will be a factor pushing the stated value of the index higher. Far more important, however, is that one hundred years of retained earnings will hugely increase the value of most of the companies in the index. In the 20th Century, the Dow-Jones Industrial Average increased by about 175-fold, mainly because of this retained-earnings factor.

Considering everything, I believe the probability of a decline in the index over a one-hundred-year period to be far less than 1%. But let's use that figure and also assume that the most likely decline –



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should one occur – is 50%. Under these assumptions, the mathematical expectation of loss on our contract would be \$5 million ( $\$1 \text{ billion} \times 1\% \times 50\%$ ).

But if we had received our theoretical premium of \$2.5 million up front, we would have only had to invest it at 0.7% compounded annually to cover this loss expectancy. Everything earned above that would have been profit. Would you like to borrow money for 100 years at a 0.7% rate?

Let's look at my example from a worst-case standpoint. Remember that 99% of the time we would pay nothing if my assumptions are correct. But even in the worst case among the remaining 1% of possibilities – that is, one assuming a total loss of \$1 billion – our borrowing cost would come to only 6.2%. Clearly, either my assumptions are crazy, or the formula is inappropriate.

The ridiculous premium that Black-Scholes dictates in my extreme example is caused by the inclusion of volatility in the formula and by the fact that volatility is determined by how much stocks have moved around in some past period of days, months or years. This metric is simply irrelevant in estimating the probability weighted range of values of American business 100 years from now. (Imagine, if you will, getting a quote every day on a farm from a manic-depressive neighbor and then using the volatility calculated from these changing quotes as an important ingredient in an equation that predicts a probability-weighted range of values for the farm a century from now.)

Though historical volatility is a useful – but far from foolproof – concept in valuing short-term options, its utility diminishes rapidly as the duration of the option lengthens. In my opinion, the valuations that the Black-Scholes formula now place on our long-term put options overstate our liability, though the overstatement will diminish as the contracts approach maturity.

Even so, we will continue to use Black-Scholes when we are estimating our financial-statement liability for long-term equity puts. The formula represents conventional wisdom and any substitute that I might offer would engender extreme skepticism. That would be perfectly understandable: CEOs who have concocted their own valuations for esoteric financial instruments have seldom erred on the side of conservatism. That club of optimists is one that Charlie and I have no desire to join.

## THE 2008 LETTER

Here is the section where WB sets out his position:

Derivatives are dangerous. They have dramatically increased the leverage and risks in our financial system. They have made it almost impossible for investors to understand and analyze our largest commercial banks and investment banks. They allowed Fannie Mae and Freddie Mac to engage in massive misstatements of earnings for years. So indecipherable were Freddie and Fannie that their federal regulator, OFHEO, whose more than 100 employees had no job except the oversight of these two institutions, totally missed their cooking of the books.

Indeed, recent events demonstrate that certain big-name CEOs (or former CEOs) at major financial institutions were simply incapable of managing a business with a huge, complex book of derivatives. Include Charlie and me in this hapless group: When Berkshire purchased General Re in 1998, we knew we could not get our minds around its book of 23,218 derivatives contracts, made with 884



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counterparties (many of which we had never heard of). So, we decided to close up shop. Though we were under no pressure and were operating in benign markets as we exited, it took us five years and more than \$400 million in losses to largely complete the task. Upon leaving, our feelings about the business mirrored a line in a country song: “I liked you better before I got to know you so well.”

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Considering the ruin I’ve pictured, you may wonder why Berkshire is a party to 251 derivatives contracts (other than those used for operational purposes at MidAmerican and the few left over at Gen Re). The answer is simple: I believe each contract we own was mispriced at inception, sometimes dramatically so.

I both initiated these positions and monitor them, a set of responsibilities consistent with my belief that the CEO of any large financial organization must be the Chief Risk Officer as well. If we lose money on our derivatives, it will be my fault.

Our derivatives dealings require our counterparties to make payments to us when contracts are initiated. Berkshire therefore always holds the money, which leaves us assuming no meaningful counterparty risk. As of yearend, the payments made to us less losses we have paid – our derivatives “float,” so to speak – totaled \$8.1 billion. This float is similar to insurance float: If we break even on an underlying transaction, we will have enjoyed the use of free money for a long time.

Our expectation, though it is far from a sure thing, is that we will do better than break even and that the substantial investment income we earn on the funds will be frosting on the cake. Only a small percentage of our contracts call for any posting of collateral when the market moves against us. Even under the chaotic conditions existing in last year’s fourth quarter, we had to post less than 1% of our securities portfolio. (When we post collateral, we deposit it with third parties, meanwhile retaining the investment earnings on the deposited securities.) In our 2002 annual report, we warned of the lethal threat that posting requirements create, real-life illustrations of which we witnessed last year at a variety of financial institutions (and, for that matter, at Constellation Energy, which was within hours of bankruptcy when MidAmerican arrived to effect a rescue).

Our contracts fall into four major categories. With apologies to those who are not fascinated by financial instruments, I will explain them in excruciating detail.

We have added modestly to the “equity put” portfolio I described in last year’s report. Some of our contracts come due in 15 years, others in 20. We must make a payment to our counterparty at maturity if the reference index to which the put is tied is then below what it was at the inception of the contract. Neither party can elect to settle early; it’s only the price on the final day that counts.

To illustrate, we might sell a \$1 billion 15-year put contract on the S&P 500 when that index is at, say, 1300. If the index is at 1170 – down 10% – on the day of maturity, we would pay \$100 million. If it is above 1300, we owe nothing. For us to lose \$1 billion, the index would have to go to zero. In the meantime, the sale of the put would have delivered us a premium – perhaps \$100 million to \$150 million – that we would be free to invest as we wish.

Our put contracts total \$37.1 billion (at current exchange rates) and are spread among four major indices: the S&P 500 in the U.S., the FTSE 100 in the U.K., the Euro Stoxx 50 in Europe, and the Nikkei





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225 in Japan. Our first contract comes due on September 9, 2019 and our last on January 24, 2028. We have received premiums of \$4.9 billion, money we have invested. We, meanwhile, have paid nothing, since all expiration dates are far in the future.

Nonetheless, we have used BlackScholes valuation methods to record a yearend liability of \$10 billion, an amount that will change on every reporting date. The two financial items – this estimated loss of \$10 billion minus the \$4.9 billion in premiums we have received – means that we have so far reported a mark-to-market loss of \$5.1 billion from these contracts.

We endorse mark-to-market accounting. I will explain later, however, why I believe the BlackScholes formula, even though it is the standard for establishing the dollar liability for options, produces strange results when the long-term variety are being valued. One point about our contracts that is sometimes not understood: For us to lose the full \$37.1 billion we have at risk, all stocks in all four indices would have to go to zero on their various termination dates. If, however – as an example – all indices fell 25% from their value at the inception of each contract, and foreign-exchange rates remained as they are today, we would owe about \$9 billion, payable between 2019 and 2028. Between the inception of the contract and those dates, we would have held the \$4.9 billion premium and earned investment income on it.

We have told you before that our derivative contracts, subject as they are to mark-to-market accounting, will produce wild swings in the earnings we report. The ups and downs neither cheer nor bother Charlie and me. Indeed, the “downs” can be helpful in that they give us an opportunity to expand a position on favorable terms. I hope this explanation of our dealings will lead you to think similarly.

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