

A Proposed Methodology to Measure Damages for Option Traders Alleging Securities Fraud

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Abstract

There are well-known methodologies for measuring per-share damages to common stock in Rule 10b-5 claims of securities fraud. In this paper, we propose a methodology to measure the damages for an option trader alleging that the fraud also affected the value of her option. Consideration of the economic loss suffered by the option trader in conjunction with the standard out-of-pocket measure of loss under Rule 10b-5 leads to a set of rules for damages to option traders. The framework also serves as a basis from which rules for other derivative products may be derived.

The 1933 Securities Act and the 1934 Securities Exchange Act (the "Securities Acts") provide for damages in cases where a security has been traded at an artificial price due to fraud. Since the 1988 *Basic v. Levinson* decision, in which the Supreme Court accepted the fraud-on-the-market theory, there has been a large increase in securities fraud cases. Although many securities fall within the purview of the Securities Acts, most of the study of securities fraud has been focused on shares of stock. Recently, however, an increasing number of shareholder class actions, as well as cases for individuals, include options.¹

In this paper, we attempt to extend the analysis of securities fraud damages to transactions involving options. We focus first on transactions involving a call option in cases where the underlying stock price is inflated. While the analysis appears to generalize to other options, extensions to other derivative products may require additional considerations beyond the scope of this paper.

As of yet, there is little guidance on how to handle options in securities fraud suits.² As shown below, the calculation of damages is not as straightforward as one might think. This is true for both legal and economic reasons.

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The authors would like to thank Marcia Kramer Mayer, Louis Guth, Peter Rothmund, Tsvetan Beloreshki, and Christoph Muelbert at NERA for comments on the text and their work on the underlying analyses. We also thank two anonymous referees for comments.

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¹ Underlying data from a recent study found that 18% of securities class actions settled in 1998 included options and/or warrants. (Todd S. Foster, Denise N. Martin, Vinita M. Juneja, Frederick C. Dunbar, and Lucy P. Allen, "Trends in Securities Litigation and the Impact of the PSLRA", *Class Actions & Derivative Suits*, Summer 1999.)

² One notable exception is "Derivatives in Securities Class Actions," by Stephen E. Usher, published in *Litigation Services Handbook: The Role of the Financial Expert*, Roman L. Weil, Michael J. Wagner, and Peter B. Frank, Eds. (2001). This article discusses the magnitude of

In this paper, we discuss different methods of calculating damages to option traders with a securities fraud claim, focusing on various events that may or may not be considered transactions within the meaning of the Securities Acts and economically may or may not be a source of a damage claim. Specifically, we examine option purchases (sales), exercises (being exercised against), and cases where an option expires worthless due to a fraud. In each case, we focus principally on the economics of the damage calculation, with supporting discussion of how various legal theories may impact on that calculation. Where possible, we highlight the legal theory that best serves to fairly compensate option traders who have been damaged by fraud.

Damages to Option Purchasers and Sellers

We begin our analysis of the economic damages to option traders alleging securities fraud with the most obvious transaction: the purchase or sale of an option. As a concrete example, we examine an investor who purchases a call option at a time when the underlying stock price is artificially inflated by some fraud. We note that, with appropriate adjustments, similar results will hold for sellers as well as investors trading in puts.

An investor who purchases a call option has clearly engaged in a transaction in a security within the meaning of the Securities Acts. Moreover, based on the Black-Scholes or any other generally accepted option-pricing method, it is trivial to show that if the underlying stock price is inflated, then, *ceteris paribus*, the price of the call is inflated above its true value as well. Therefore, under the commonly-used out-of-pocket measure of damages in securities fraud cases,³ the investor suffered a loss when she purchased the call option equal to the level of the inflation in that option. As discussed below, calculating the inflation in the call by observing how its premium responded to events such as previous misstatements or later corrective disclosures, as is usually done with stocks, is an incredibly difficult, if not impossible, exercise. After reviewing the difficulties with such a methodology, we examine an alternative, calculating the inflation in the underlying stock price and using that information to determine the inflation in the option.

Option Inflation Based on Applying Event Study Techniques to Option Premiums

In cases of securities fraud, the most common and generally accepted technique for measuring stock price inflation is an event study. An analyst will typically use an event study to calculate the change in a stock's price upon a corrective disclosure as the first step in estimating the inflation in the

potential damages to investors in various derivative products in a case study and examines some of the legal arguments for including or excluding such claimants.

³ See, for example, *Greene v. Occidental Petroleum Corp.* 541 F.2d 1335, 1341 (9th Cir. 1976) and Bradford Cornell and R. Gregory Morgan, "Using Finance Theory to Measure Damages in Fraud on the Market Cases," *UCLA L. Rev.*, 1990.

stock.⁴ He may then adjust the price change to remove concurrent industry and/or market effects, and may separate the resulting price decline into the part for which the defendant may be held liable and the additional portion, if any, that is not due to the fraud. The analyst then uses the inflation at the time of the disclosure to estimate the inflation at earlier times. Typically, this is done by assuming that in periods that do not contain any omissions, misstatements, or disclosures, inflation remains constant, either in dollar terms or as a percentage of the stock price.

Using a similar methodology to calculate the inflation in a call option is likely to be more complicated, and more subject to debate, than the analogous procedure for the underlying stock. The result is likely to be intractable.

Among the principal difficulties are the following:

- Unlike stock, options often do not trade every day, making estimates of both a market model and price reactions more difficult.
- If the option expires before the corrective disclosure, it becomes impossible to measure the change in the option's premium at the time of the corrective disclosure since the option was not trading at that point.⁵
- Parameters estimated from a market model are unlikely to remain constant as the option's time to maturity and the degree to which it is in or out of the money change.
- A premium response to a disclosure at one point in time may not reflect the effects the information in that disclosure would have had at a different point in time.

Given these difficulties, we now turn to our proposed methodology for measuring option inflation, tracing the

⁴ See Cornell and Morgan, *op. cit.*

⁵ This leads to the interesting legal question of whether option purchasers are entitled to all the inflation in the option at the time of purchase or only to that portion that could have left the option's premium before maturity. The former position is supported by a literal interpretation of the out-of-pocket loss definition: the difference between the premium and true value of the option at the time of purchase. The latter position is supported by one interpretation of plaintiff's loss causation requirement: if the fraud was not altered or revealed during the option's lifetime, then it can be argued that the fraud did not cause the option holder any damage. Courts have encountered similar situations in dealing with stock. For example, consider a case where a plaintiff spends \$1,000 to purchase shares of a company that later goes bankrupt, rendering those shares worthless. Suppose it is later proven that the stock price was inflated when plaintiff made her purchase, but that the company would have gone bankrupt and plaintiff's entire investment would have been lost even if there had been no fraud. Is plaintiff entitled to recover the amount by which she overpaid for her stock, or is her entire investment lost anyway with no legal avenue available for recovery? While the courts have considered such cases, unfortunately they have not reached a uniform conclusion. (See, e.g., *The Ambassador Hotel Company, Ltd. v. Wei-Chuan Investment*, 189 F.3d 1017, 1999: "In fact, some securities fraud cases do state that if the plaintiff would have lost its investment despite any misrepresentation by the defendant, plaintiff has failed to prove loss causation." A potentially opposing view is given in *Stanley Knapp v. Ernst & Whinney*, 90 F.3d 1431, 1996: "Plaintiffs who bought and sold stock before any corrective statements had been made and the stock price plummeted may have suffered losses as a result of market forces operating on misrepresentations.") Unless stated otherwise, for the purposes of this paper, we will consider the entire inflation in the option as our measure of damages.

effects of the fraud on an option by first examining the effects of the fraud on the underlying stock.

Option Inflation Based on Inflation in the Underlying Stock

A Simple Calculation

Fortunately, given the inflation in a stock, there is a rather straightforward way to calculate the inflation in any option whose premium is known or estimable. As discussed above, stock price inflation is often measured directly, generally through an event study, and the stock's true value is then calculated as the stock's observed price minus the measured inflation. For options, it may be easier to measure or calculate the option's actual price and its true value and then to take the difference between the two to determine the inflation in the option premium. One tool for doing so is the Black-Scholes formula, which relates a call's premium to the call's strike price, the price of the underlying stock, the call's time to maturity, the risk-free rate over the remaining life of the option, and the volatility of the underlying stock. The first four of these inputs are easily measurable. Often the volatility of the underlying stock is measured over some period of time and then plugged into the Black-Scholes formula. In an alternative calculation, one uses the call premium and the four measurable inputs to solve for what is called the underlying stock's "implied volatility."

In order to calculate the inflation in an option, an analyst can use the option's observed (inflated) premium and the observed (inflated) price of the underlying stock to calculate the implied volatility of the stock. He can then replace the inflated stock price with its calculated true value and use the Black-Scholes formula with the implied volatility to calculate a new, lower option premium. This new premium would represent the option's true value and the difference between the observed and true premiums would represent the inflation in the option. This procedure can be repeated to account for all individual transactions or for all days in the class period in a shareholder class action.

Accounting for Volatility

The reader may notice that in performing the calculation described above, we took the implied volatility from the inflated option premium and stock price and then plugged this same volatility into the Black-Scholes formula in order to determine the option's true value. This, of course, depends on the implicit assumption that the fraud did not affect the volatility of the underlying stock. This assumption can often be tested by comparing the implied volatilities of the underlying stock before and after a disclosure. If the underlying volatility has changed significantly, the analyst can then examine whether this was due to market and/or industry forces or was due to some non-fraudulent news. If the analyst determines that all or some part of the change in volatility is due to the disclosure of the fraud, he may wish to calculate a "true volatility" at the time the option was purchased.

As a first pass, if the inflation is likely to be a constant percentage of the stock price (e.g., because the fraud relates to the company's overall profit margin), then, following an initial price shock, the stock's volatility should be unaffected by the fraud. At the other extreme, if the inflation is likely to be a constant dollar amount (e.g., falsely claiming the existence of a product or deal with a known contribution to profit), then the stock's volatility probably will be affected by the fraud. If a change in volatility is measured following a disclosure, then the earlier actual implied volatility could be adjusted up or down by a constant percentage or percentage point difference to estimate the true volatility. To the extent that the actual implied volatility does not change much over time, these two choices should yield similar results. If the actual implied volatility was varying over time, the analyst should consider whether the causes of that variation are likely to impact on the addition or reduction of volatility due to the fraud. Analysis of the proper method for adjusting the volatility will likely depend on the specific attributes of the alleged fraud and the reasons that observed volatility varied in the case at hand. For the purposes of this paper, going forward we will take the simple assumption that volatility is unchanged by the alleged fraud.

Accounting for the Strike Price

It could be argued that the strike price of an option would have been set differently had the true value of the underlying security been known. Following this approach, the true (non-inflated) strike price would replace the actual (inflated) strike price in determining the option's true value. While a legitimate damage calculation could be performed based on this methodology, a call option with a different strike price is in fact a different security, and so this approach does not represent the out-of-pocket measure we discuss in this paper. We therefore do not include a discussion of such a methodology in this analysis.

Option Exercise: Is There a Damage?

Is the Exercise of an Option a Damageable Transaction?

Perhaps the first question to ask in looking at an option exercise is whether it represents a legally damageable transaction. To answer the question of whether a damage occurs upon exercise, we invoke the loss causation requirement of the Securities Acts. Specifically, we ask whether the transaction would have been made in the but-for world where there was no inflation in the underlying stock, and whether an economic loss resulted from the exercise of the option given that the underlying stock price was inflated. Sticking to our example of an investor who purchased a call option, let's assume that she purchased a call option with a strike price of \$8 prior to the existence of any fraud. Further assume that when our investor decides to exercise her option, the stock's true value was \$10, but that the stock was trading at \$20 due to the fraud. Should she be allowed to press a damage claim?

Legally, it would appear that the investor has engaged in a transaction: she has given up her call option and \$8, and received stock in exchange. On the other hand, the transaction described in the previous sentence is exactly what the plaintiff agreed to when there was no fraud. It then appears that the investor was not harmed by the fraud at all and therefore has no basis for a claim. (For those who would argue that such reasoning would appear to prevent purchasers of common stock from pressing a claim, we note that the key difference is that the \$8 price for the option exercise was set in a non-fraudulent transaction while the \$20 stock price was a product of the fraud. Another way of looking at this is to note that if the stock had been further inflated from \$20 to \$25, a stock purchaser would overpay by a greater amount and have a larger claim while the investor who exercises her previously acquired option presumably would not be able to claim larger damages under the out-of-pocket measure.)

If, on the other hand, we assume that the option above had been purchased while the stock *was* inflated, would the investor be entitled to damage compensation for the exercise given that the terms of the contract were set in a fraudulent environment? Because the value of an option is determined by, among other things, the terms of the exercise, we argue that as long as the investor is compensated for the initial purchase, as described above, and the exercise was still reasonable, she has no remaining claim. She has been fully compensated for the mispricing of the option due to the fraud, and any further claim on the option would lead to a double recovery.

We believe that the proper legal bases for whether an option exercise constitutes a transaction for which a damage claim can be pressed should be based on whether an economic loss has been suffered specifically due to the exercise. In particular, the analyst should be concerned with whether the fraud has left the investor in a better or worse position than she would have been in the absence of the fraud. We address this issue in more detail below.

Economics of Damages to Option Exercisers

Exercise Would Still Be in-the-Money in the But-For World

We first consider the case where even in the but-for world, where the stock price was not inflated; the call exercise could still have been a rational transaction because the stock price exceeded the call's strike price. To illustrate our assumptions, consider Figure 1 below.

Figure 1

Time	A	B	C
Observed Stock Price	10	20	10
Stock True Value	10	10	10
Call Strike	8	8	
Observed Call Premium	9	12	
Call True Value	9	2	

Consider an investor who purchases a call option at time A, when there is no fraud. Suppose that she decides to exercise her call option at B, when the call matures, and when the stock is inflated.⁶ Finally, suppose that she holds the stock received in the exercise past the corrective disclosure, finally selling it at C.

In actuality, our investor paid \$9 for the call, paid another \$8 to exercise the option, and received \$10 when she sold the stock, all for a net loss of \$7. Had our investor engaged in these same transactions in the but-for world, she would have had the same cash flows, and the same \$7 net loss. Therefore, she has not been economically damaged by the fraud.

Exercise Would Be Out-of-the-Money in the But-For World

Consider now a similar example, but where exercise would probably not have been rational in the but-for world.

Figure 2

Time	D	E	F	G
Observed Stock Price	10	20	10	12
Stock True Value	10	10	10	12
Call Strike	12	12		
Observed Call Premium	7	8		
Call True Value	7	0		

In this example, our investor purchased the call at D, exercised at E (when the call matures), and sold the stock at F. Thus, our investor paid \$7 for the call, paid \$12 to exercise, and finally received \$10 for selling the stock, resulting in a net loss of \$9.

What would have happened in the but-for world? The investor still would have bought the call for \$7. At E, however, she certainly would not have exercised her option, which would have meant paying \$12 to acquire a stock then worth \$10. There are two reasonable alternative courses of action that the investor could have taken in the but-for world. The first assumes that if the call were out of the money, the investor would never have exercised the call or otherwise acquired the stock. Her net loss is then \$7, \$2 less than in the actual world. The second alternative follows from the assumption that a proper but-for scenario requires the investor to still acquire the stock. So, in the but-for world, she buys the stock on the open market for \$10, its true value, at E, and then presumably sells the stock at F. Her net loss in this case is again \$7. At his point, it would seem like there is no difference in the damages, \$2, calculated under the two scenarios.

Suppose, however, that rather than selling at F, our investor had sold at G. Her actual net loss would have been \$7; under the first alternative (never acquire stock), her net loss would be \$7, implying no damage; under the second

⁶ The exercise need not be made at maturity for the analysis presented here to hold. An exercise before maturity can be rational, for example, for non-tradable options.

(buy stock at E), her loss would have been \$5, again implying a \$2 damage. The difference between these results and those discussed in the previous paragraph is due to a change in the true value of the stock from \$10 to \$12. Since securities fraud damages under the out-of-pocket measure are typically predicated on changes in inflation and not on changes in a stock's true value, the second alternative, which assumes that rather than exercising the investor would have bought on the open market, is more in line with the out-of-pocket measure of damages, which is essentially based on changes in inflation.

As such, our proposed damage rule for option exercises is as follows⁷:

- If the option would have been in the money in the but-for world at the time of exercise, there is no damage.
- If the option would have been out of the money in the but-for world at the time of exercise, the damage claim equals the difference between the strike price and the stock's true value at the time of exercise.

It is important to note here that if any subsequent sales of shares acquired through exercise are made at a point when the stock price is still inflated, the investor has received a benefit on those sales that should be used to offset the damage claim from the option purchase and/or exercise.

Finally, we note that one of the benefits of assuming that the investor would have purchased the stock if the option would have been out of the money is that it keeps the stock portion of her transactions unchanged between the actual and but-for worlds. In both cases, she acquires the stock at E and sells it at F (or G). One problem with this analysis, however, is that in cases where the option was not about to expire, it leaves the investor with an unused call option. In some cases, the but-for world will have this option expire in the money unexercised. While this is an undesirable result, the alternative would be to somehow decide whether and when the call would be exercised and, if exercised, whether and when the shares acquired would be sold. On the whole, we feel that it is better to not attempt such a speculative exercise which would have the investor potentially engaging in two stock acquisitions (a stock purchase at the time she actually exercised and an exercise of the option at some alternative date) unless there is strong evidence that she would have done so.

Is There a Damage if the Fraud Causes an Option to Expire Worthless?

The final case we examine is when a fraud causes an option to expire worthless. As an example, consider an investor who purchases a put option with a strike price of \$12 at a time when there is no fraud. Suppose that at maturity, the stock's true value is \$10 but that a fraud has inflated the market price of the stock to \$20. In the actual world, the

investor allows the put to expire worthless, rather than pay \$20 on the open market to acquire a stock that she can then sell at \$12 according to the terms of the put. However, in the but-for world, she would presumably pay \$10 to acquire the stock and then exercise the put so as to obtain a \$2 profit. Clearly, then, the investor has been damaged by the fraud.

The first question we face is whether the expiration of the put is a legal "transaction" covered by the Securities Acts. In fact, because nothing is exchanged when the put expires worthless, the investor is really claiming that the fraud misled her into not engaging in what would have been a profitable transaction in the but-for world. The courts have generally not looked favorably on a claim that but for a fraud a transaction would have occurred, regarding such claims as inherently speculative. However, in the case where an investor was faced with a clear decision to engage in a transaction at a certain point or throw away a valuable asset (i.e., have an in-the-money option expire unexercised), that argument carries less force. Moreover, any options that would expire sufficiently in the money⁸ are automatically exercised upon expiration by the OCC unless instructed otherwise. Therefore, a claim that an investor would not have exercised a reasonably in-the-money option at expiration is actually the more speculative position.⁹ If we accept that an in-the-money option would generally have been exercised rather than allowed to expire worthless, then an investor should be able to make a damage claim for options that expired worthless due to the fraud. The damage claim is simply the amount by which the option would have been in the money in the but-for world.¹⁰

Finally, we note that an investor who writes an option will benefit if the fraud causes the option to expire worthless. Presumably, in the but-for world the option would have been exercised (and we assume at expiration). The investor was then benefited by the amount that she saved by not being exercised against. As above, we would calculate that benefit, which could be used to offset damages from other transactions by the same investor, as the amount that

⁸ According to Options Clearing Corporation rules, \$0.125 for institutions and \$0.375 for individuals.

⁹ Of course, the investor may have exercised before expiration in the but-for world. However barring evidence of a trading strategy (e.g., instructions to a broker about when to exercise), the determination of when the investor would have exercised is typically a highly uncertain endeavor. A recent ruling in the Supreme Court of Delaware, *Duncan v. TheraTx 775 A.2d 1010* (2001), argued that where a defendant's actions resulted in a "restriction on a stockholder's ability to sell his or her shares ... the stockholder is not required to show that she actually would have sold the shares," thereby resolving the uncertainty in favor of the plaintiff. Here we can rely on such reasoning to support the straight-forward position that, at the very least, the plaintiff would not have stood by and let options with positive value expire without exercise. A potentially more aggressive, and more speculative, approach would be to let the plaintiff assume she would have exercised her options and sold at some other point in time.

¹⁰ One might note a contrast with the previous section, where we argued against determining when an option would have been exercised in the but-for world. The difference is that in that section we were dealing with what would have been a second stock acquisition for an investor who may not have ever planned to make two acquisitions. In this section, we are only concerned with whether an option purchaser would have exercised her option once, which was presumably the point in acquiring the option in the first place.

⁷ This is the basic damage claim, ignoring any limitations placed, for example, by the 90-day bounce-back provision of the 1995 Private Securities Litigation Reform Act.

the option would be in the money at maturity in the but-for world.

Conclusion

Based on the analyses discussed above, we conclude that an investor can be damaged upon the purchase or sale of an option and whenever an option is (is not) exercised because it was (was not) in the money solely due to fraud. Under an out-of-pocket method that recognizes all inflation in a security at the time of a transaction, damages for purchases or sales of options should equal the difference between the option premium and the option's true value at the time of the transaction. For option exercises, damages should only accrue if the option would not have been in the money in the but-for world. In that case, the damage should equal the amount by which the option would have been out of the money. Finally, when an option expires worthless *due to the fraud*, damages should be allowed, with the amount of the damage equal to the amount that the option would have been in the money in the but-for world. The formalization of these rules would provide clear and correct guidance for the calculation of damages for option transactions.