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ANNUAL REVIEW OF SECURITIES AND COMMODITIES LAW

VOLATILITY AND MARKET INEFFICIENCY: A COMMENTARY ON THE EFFECTS OF OPTIONS, FUTURES, AND RISK ARBITRAGE ON THE STOCK MARKET

THOMAS LEE HAZEN*

I. INTRODUCTION

Over the past several years the securities markets have been infused with options trading in order to provide an alternative way to participate in short-term investments in securities. Put and call options on individual securities allow investors to hedge their positions and thereby limit risk. While this may be true for some investors, much options trading has been on a speculative basis. Since its inception, public trading of options on securities exchanges has been an active financial market. The success of the options markets for individual securities paved the way for expansion into index options which are subject to Securities and Exchange Commission regulation and to futures contracts based on stock indexes, which are subject to the jurisdiction of the Commodity Futures Trading Commission.¹ The index markets permit investors to diversify their holdings by not tying their investment to the stock of a particular issuer. Index options are broadly-based indexes, the values of which are dependent upon the current per share price of the stocks the indexes comprise. By utilizing the index markets investors can take positions in groups of stocks tied to a publicly traded index option or futures contract. The index markets have provided additional opportunities for the new breed of arbitrageurs known as risk arbitrageurs.

The infusion of these highly leveraged investment vehicles into the financial markets has been accompanied by a parallel development: the advent of program trading systems which has accelerated due to the technology of the computer age. Over the past several years there have been violent swings in the stock markets that have been attributed to options

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1. See generally Gilberg, *Regulation of New Financial Instruments Under the Federal Securities and Commodities Laws*, 39 *VAND. L. REV.* 1599 (1986).

and futures expiration dates as well as to program trading. In October, 1987 the stock market witnessed its worst single day in history (on the highest volume in history) followed by several days of violent gyrations on record volume. This unprecedented market performance was the culmination of the increased volatility that has been building over the past several years. This article takes the position that such volatility is evidence of the markets' *inefficiency* in today's environment. Since options and financial futures do provide an important function in the marketplace, they should be retained. However, some type of regulation is necessary to preserve market efficiency as well as to restore investor confidence.

Options provide an important device for hedging long positions in securities. For example, an investor owning 1000 shares of ABC Co. stock, currently trading at \$12 per share, may want to limit the risk of a price decline. An appropriate hedge strategy would be to buy puts with a strike price of \$10 per share.² This would guarantee that at any time until the expiration date the investor could sell the stock for \$10 per share. Buying the put will involve the cost of the premium that the market has placed on the put and thereby the investor will have increased his total cost but will have limited the risk of loss. Another example is the investor who believes that the market is likely to decline and therefore has a large cash balance. In order to hedge against the possibility that her negative market outlook is wrong, she may want to purchase call options, in selected stocks or broader-based index options, which would allow her to participate in a market rise. The purchase of call options involves less cash than investing in the underlying stock but also is much more speculative since the investor stands to lose her entire investment if the option expires when the stock price is below the option exercise price. Program trading has developed as a new form of risk arbitrage whereby large volume traders who have seats on the exchanges, and therefore do not have to pay commission charges, take positions in both stocks and options. One strategy is for program traders to engage in "arbitraging between large baskets of stocks and positions in the index markets."³ In addition to the more speculative risk arbitrage transactions, more conservative investors have had a major impact in the index markets. Mutual funds and other money managers frequently use index futures and options as a means of hedging their portfolios through what is known as portfolio insurance. Since portfolio insurance alone is

2. For additional examples of option strategies and a more detailed analysis of the risks involved, see, e.g., UNDERSTANDING THE RISKS AND USES OF LISTED OPTIONS (Oct. 1982) (jointly prepared by the American Stock Exchange, Chicago Board Options Exchange, Pacific Stock Exchange, Philadelphia Stock Exchange, and the Options Clearing Corporation).

3. Hobson & Tosini, *Regulatory Issues Relating to Stock Index Futures and Option Markets*, 6 *Commod. L. Letter* 1 (1986); see also, e.g., Laderman & Frank, *How Chicago Zaps Wall Street*, *Bus. Wk.*, Sept. 16, 1986, at 95; Sebastian, *How Program Trading Works and Why it Causes Controversy in the Stock Market*, *Wall St. J.*, Jan. 10, 1986, at 19, col. 4; cf. Faust & Doukas, *Taking the Bite out of Stock Index Futures Arbitrage Volatility*, *Futures*, Dec., 1985, at 50.

now estimated to be a fifty billion dollar per year industry,⁴ it is clear that index related trading has had a major impact on the securities markets. This article addresses the problems raised by the new volatility of the markets. Specifically, the article addresses ways in which market efficiencies can be restored without losing the positive impact of options, futures, and the index markets.

II. AN OVERVIEW OF ARBITRAGE

This section compares the two basic types of arbitrage, pure arbitrage and risk arbitrage. First, pure arbitrage is a riskless transaction in which arbitrageurs are able to enter into simultaneous riskless transactions in order to take advantage of price variations in different markets. By thus taking advantage of market inefficiencies, pure arbitrage helps keep markets in proper balance.

A recently developing area has been so-called "risk arbitrage." In contrast to pure arbitrage, risk arbitrage is an investment technique whereby risk arbitrageurs take advantage of price discrepancies based on the market's assessment of various risks. When the arbitrageurs view the risk as overvalued by the marketplace they will step in. Risk arbitrage received its first publicity in the context of corporate takeovers in which the risk arbitrageurs take advantage of the price differential between the public markets and the price to be paid in connection with an announced merger or takeover. Risk arbitrage in the securities of takeover targets accounts for a major portion of the trading that takes place once a takeover offer has been made.⁵

As will be developed more fully below, risk arbitrage poses different problems than exist with pure arbitrage. Specifically, risk arbitrage poses a significant threat of market manipulation if not properly regulated.

A. Pure Arbitrage

Pure arbitrage is a transaction, or series of transactions, that enable the arbitrageur to profit from price differentials for the same item in parallel markets.⁶ Arbitrage is possible not only when the same item is traded in different markets but also when there is a market for an equivalent of the

4. McMurray, *CBOE Holds a Lead on Amex in Battle for European-Style Stock-Index Options*, Wall St. J., Dec. 15, 1986, at 46, col. 3.

5. See, e.g., Bleakley, *When Merger Plans Crash, Arbitrators Rush to Bail Out*, N.Y. Times, Jan. 13, 1985, sec. 4, at 8, col. 3; Stern, *Wall Street's New Synthetics*, FORBES, June 18, 1984, at 190; Wells, *Inside the Arbitrage Game*, 15 Inst. Investor 41 (1981).

6. See Exchange Act Release No. 34-15533, 3 Fed. Sec. L. Rep. (CCH) ¶ 22,808B (Jan. 29, 1979) (discussing "bona fide" and "risk" arbitrage). See generally M. EVANS, *ARBITRAGE IN DOMESTIC SECURITIES IN THE UNITED STATES* (1965). For a description of arbitrage in the foreign currency markets, see *Miller v. Wells Fargo Bank International Corp.*, 540 F.2d 548, 551-52 (2d Cir. 1976); cf. *People v. Vineberg*, 125 Cal. App.3d 127, 177 Cal. Rptr. 819 (1981) (fraudulent scheme involving precious metals arbitrage), cert. denied, 456 U.S. 945 (1982).

item in question as is the case with convertible securities,⁷ options markets,⁸ and the futures markets.⁹ One benchmark of pure arbitrage is a simultaneity in transactions which insures that the arbitrageur is engaging in a riskless enterprise.¹⁰ Both in theory and in practice, pure arbitrage performs a positive function by eliminating inefficiencies in parallel markets. The absence of market inefficiencies that lead to price differentials in parallel markets will necessarily deny the availability of opportunities for arbitrage.¹¹

For example, if gold is trading in the London spot market at \$400 per ounce, and is quoted in the New York spot market at \$398 per ounce, an arbitrageur could make a profit by purchasing New York gold and simultaneously selling London gold. Transaction costs such as brokerage commissions and delivery requirements render such an arbitrage transaction unprofitable to everyone but the professional who is able to eliminate, severely limit, or absorb his or her own transaction costs. The foregoing example shows how arbitrage can be used to take advantage of parallel markets.

Prior to the advent of the consolidated tape for trading in exchange-listed securities, it was possible to engage in similar transactions by entering simultaneous orders on the New York and Pacific stock exchanges.¹² Notwithstanding the advent of the consolidated tape and the move toward a national market system, inefficiencies in the securities markets may still give rise to opportunities for pure arbitrage such as those that may exist with regard to convertible securities.¹³

7. See *infra* note 13 (providing an example of arbitrage using convertible securities).

8. See generally Report of the Special Study of the Options Market to the Securities and Exchange Commission (1978).

9. See, e.g., Ingersoll & Sebastian, *SEC Staff Considering a Move to Lessen Stock Swings Tied to Triple Expirations*, Wall St. J., Sept. 29, 1986, at 93, col. 3; Laderman, *Follow the Spread or the Market Will Leave You Behind*, Bus. Wk., Dec. 29, 1986, at 84; Seligman, *Don't Fret About Program Trading*, FORTUNE, Oct. 18, 1986, at 88.

10. For example, in order to qualify for the arbitrage exemption from the Securities Exchange Act's prohibitions against insider short swing profits, it is necessary that both ends of the transaction be entered into simultaneously. 15 U.S.C. § 78p(e) (1982); 17 C.F.R. § 16e-1 (1986); *Lewis v. Dekcraft Corp.*, [1973-74 Transfer Binder] Fed. Sec. L. Rep. (CCH) 94,620 (S.D.N.Y. 1974); T. HAZEN, *HORNBOOK ON THE LAW OF SECURITIES REGULATION* § 12.7 (1985 & 1988 Supp.).

11. Such a move has taken place in the securities markets with the movement toward a more efficient market system. See, e.g., Asdrew, *Linking Trading in Stocks and Index Futures Riles Critics More than Prices*, Wall St. J., June 16, 1986, at 15, col. 1; Lee, *What's With the Casino Society?*, FORBES, Sept. 22, 1986, at 158; Malkiel, *Why Markets are Working Better*, Wall St. J., Aug. 22, 1986, at 10, col. 4.

12. In order to make the securities markets more efficient, there has been a move away from disjointed markets, toward a national market system. 15 U.S.C. § 78k-1(a) (1982). See generally Calvin, *The National Market System: A Successful Adventure in Industry Self-Improvement*, 70 VA. L. REV. 785 (1984); see also Macey & Haddock, *Shirking at the SEC: The Failure of the National Market System*, 1985 U. ILL. L. REV. 315.

13. This can be seen from the following example:

In the case of convertible debentures, arbitrage may occur when the debentures are

B. Risk Arbitrage

As noted in the previous section, the essence of a pure arbitrage transaction is not only the simultaneity of the transactions but also the riskless nature of the undertaking. Risk arbitrage, as the name implies, introduces elements of risk into transactions designed to take advantage of price disparities between markets.

1. Risk arbitrage in takeover stocks

A popular and widely-publicized type of risk arbitrage arises in the context of tender offers for publicly traded companies. Typically, when the issuer has agreed to a merger, or is the subject of a tender offer, the issuer's stock will trade below the tender offer price unless the market anticipates an increase in consideration.¹⁴ The differential between the merger or tender offer price reflects the risk that the transaction will not go through. Thus, as the name indicates, risk arbitrage differs from pure arbitrage in that the arbitrageur is incurring a risk—the risk that the merger or tender offer will not succeed, will be withdrawn, or will be set aside as illegal.¹⁵

There is some regulation of risk arbitrage in the the context of takeover stocks in the form of the SEC's prohibitions against hedged tendering and short tendering.¹⁶ The effects of risk arbitrage on the takeover market is currently under examination.¹⁷ The impact of risk arbitrage in the market for takeover stocks is only part of the problem addressed herein: the extent to which short-term market forces have become the primary factor in stock market performance.

2. Options, futures, indexes, and risk arbitrage

Increases in the popularity of the options markets, in general, and the index markets, in particular, have presented new opportunities for risk

selling at a price lower than the equivalent amount of common stock. The arbitrageur will buy the bonds and sell the stock, making a profit equal to the price differential.

For example, if a debenture selling at 1200 is convertible into 40 shares of common stock selling at 30 1/2, the arbitrageur can buy a debenture and sell the equivalent amount of common stock (40 shares), making a gross profit of 20 dollars per bond. Henry, *Activities of Arbitrageurs in Tender Offers*, 119 U. PA. L. REV. 466, 467 (1971).

14. The stock may trade above the merger or tender offer price when the market values the price as insufficient and places a higher value on the stock in anticipation of a counter offer or increase in the amount of the consideration offered. Exchange Act Release No. 34-15533 (Jan. 29, 1979) 3 FED. SEC. L. REP. (CCH) ¶ 22808B (discussing risk arbitrage).

15. Invalidity of the proposed acquisition under the antitrust laws is one such risk, as was recently the case with Standard Oil of California's acquisition of Gulf Oil Corp.

16. See, e.g., Demott, *Current Issues in Tender Offer Regulation: Lessons From the British*, 58 N.Y.U.L. REV. 945, 998-1003 (1983). The SEC has denominated a number of tender offer practices as manipulative. For example, SEC Rule 10b-4 prohibits the practice of short tendering. 17 C.F.R. 240.10b-4 (1986); see *infra* notes 22-24 and accompanying text.

17. There have been conflicting views concerning the desirability of regulating risk arbitrage in the context of tender offers. See generally Henry, *Activities of Arbitrageurs in Tender Offers*, 119 U. PA. L. REV. 466 (1971); Comment, *Should Tender Offer Arbitrage be Regulated?*, 1978 Duke L.J. 1000.

arbitrage. For example, investors with a large capital stake are able to take advantage of the "spread" between the cash value of the indexes and the futures or options price. Additionally, investors owning stocks represented by the index options or futures can hedge their investments through their positions in the underlying securities by taking positions in the derivative investments provided by stock options, index options, and futures. Investors have worked out systems for program trading in the underlying securities based on movements in the index options and futures.¹⁸ For example, money managers can hedge their portfolios by taking "synthetic" positions in index options or futures. A synthetic position consists of a spread between the same index option at two different strike prices. This type of portfolio insurance is now estimated to be at least a fifty billion dollar per year industry.¹⁹

C. Regulation of Risk Arbitrage

Although it is generally conceded that pure arbitrage has a beneficial effect on the markets, not all arbitrage is condoned. Thus, for example, pure arbitrage is indeed riskless and is exempt from the Securities and Exchange Act's prohibitions against short-swing profits by officers, directors, and ten percent beneficial owners of the issuer's stock.²⁰ In contrast, risk arbitrage is subject to abuse based on misuse of inside information and therefore is subject to the short-swing prohibitions.²¹ Similarly, in Rule 10b-4 the SEC has outlawed hedged tendering and short tendering in connection with tender offers for the stock of a corporate takeover target.²² Short tendering consists of tendering shares that are not owned with the hope of covering the tender in the open market at a lower price. Hedged tendering consists of tendering shares when the owner of the shares has written call options against the shares.²³ When a tender offer is made, the price of the stock usually trades below the offer price unless the market anticipates that a competing tender offer or other market force will result in the price of the offer being raised.²⁴ Short tendering would permit large risk arbitrage positions to assure the success of a tender offer without the arbitrageur having to make the up-front investment of purchasing the shares tendered. Were short tendering and hedged tendering not prohibited, arbitrageurs'

18. See *infra* notes 42-44 and accompanying text.

19. See McMurray, *CBOE Holds a Lead on Amex in Battle for European-Style Stock—Index Options*, Wall St. J., Dec. 15, 1986, at 46, col. 3.

20. 15 U.S.C. § 78p(e) (1982).

21. T. Hazen, *supra* note 10, at § 12.7.

22. 17 C.F.R. § 240.10b-4 (1986). Hedged tendering and short tendering are most effective in the context of a tender offer for less than all of the outstanding shares where a surplus of tendered shares will result in the tenders being accepted on a pro rata basis.

23. See T. Hazen, *supra* note 10, at §§ 11.15, 12.1.

24. If the price of the tender offer is raised, or if the terms are otherwise varied, any person tendering shares is entitled to the highest price rather than being limited to the terms of the offer at the time of tender. 15 U.S.C. § 78n(d)(7) (1982).

desire to lock in a profit could guarantee the success of a tender offer. The SEC has thus taken the position that natural market forces, rather than speculators engaging in risk arbitrage, should determine the success of tender offers.

There is some evidence that risk arbitrage positions involving stock options and the index markets, which involve tying the position to the underlying stocks, can result in artificially volatile price swings.²⁵ SEC Rule 10b-4's prohibitions against short tendering and hedged tendering recognize that in some contexts arbitrage transactions can be manipulative and artificial rather than consistent with natural market forces and the promotion of market efficiency.²⁶ The question thus presented is: how is program trading and risk arbitrage based on the index markets any more consistent with an efficient market than hedged or short tendering in connection with tender offers?

III. OPTIONS, FUTURES, AND PROGRAM TRADING

A. *The Options and Financial Futures Markets—An Overview*

Not so many years ago the lifeblood of the securities markets was the long-term investor who selected stocks based on the issuer's long-term prospects. This investment objective held true for both individual and institutional investors.²⁷ However, in recent years there have been dramatic changes in the market's complexion and make-up. In 1973 the securities markets expanded to include the public trading of put and call options.²⁸

25. See Report of the Presidential Task Force on Market Mechanisms (Jan. 12, 1988); Gilpin, *Traders Cross Fingers in the "Witching" Hour*, N.Y. Times, June 20, 1986, § 4, at 1, col. 1. The Chairman of the SEC has stated his belief that index trading played a role in the highly volatile market of late October, and early November, 1987. See Stock Index Futures Contributed to Market Volatility, Ruder Says, 19 Sec. Reg. & L. Rep. (BNA) 1683-84 (Nov. 6, 1987); see also Ruder Addresses Impact of Derivative Index Trading, Fed. Sec. L. Rep. (CCH) Report Bulletin No. 1255, 12-13 (October 21, 1987).

In fact, following "black Monday," the New York Stock Exchange sought a voluntary halt to program trading. See NYSE Limits Program Trading, Cuts Hours for Three Days, 19 Sec. Reg. & L. Rep. (BNA) 1604-06 (Oct. 23, 1987). The markets gave a negative reception to the resumption of program trading. See 58.85 Drop Puts Dow at 1,900.20—Full Program Trading, Dollar Worry Buyers, N.Y. Times, Nov. 10, 1987, at 33, col. 6. *But cf.* Index Arbitrage Played Small Role in Market Volatility, CFTC's Hineman Says, 19 Sec. Reg. & L. Rep. (BNA) 1667-68 (Oct. 30, 1987); see also *infra* notes 33-36 and accompanying text.

26. A response by the SEC signaled its receptivity to risk arbitrage using index option. A significant letter exempts the unwinding of index positions from the "down tick" prohibition applicable to short sales of securities generally. See *Merrill Gets SEC Exemption From Short-Sale Rule for Index Arbitrage*, SEC. WK., Dec. 22, 1986, at 1. See *infra* notes 66-68 and accompanying text.

27. See Laderman, Weiss, Frank, Cahan & Cunes, *Those Big Swings on Wall Street*, Bus. WK., April 7, 1986, at 34; Sebastian, *supra* note 3.

28. See Exchange Act Release No. 34-9985 [1972-1973 Transfer Binder], Fed. Sec. L. Rep. (CCH) ¶ 79,212 (Feb. 1, 1973). See generally Report of the Special Study of the Options Markets to the Securities and Exchange Commission, *supra* note 8, at 1; see also *supra* note 2 and accompanying text.

A call option is a contract under which the seller or writer of the option agrees to sell the underlying security to the call option buyer at the "strike price." Each call option has an expiration date. For publicly traded options, the expiration date is the third Friday of a designated month. A put option entitles the seller, or writer, of the put option to purchase the security from the put option buyer at the exercise price before the expiration date. The seller of a put or call option will receive a premium that depends upon the relationship of the strike price to the current market price of the underlying security and the length of time until the expiration date.

Public options trading is regulated by the SEC in its oversight of the national securities exchanges on which the options are traded.²⁹ SEC regulation imposes certain price and volume requirements for the underlying security as a prerequisite to trading options in that security. The SEC requires disclosures as to the particular risks of options trading and supervises surveillance of the options market.³⁰

This regulation has been an important factor in maintaining a stable market, but there has been some fall-out in terms of the impact on the securities markets in general. Specifically, as discussed more fully below, many stock traders, especially institutions and money managers, have trading positions that balance stock and options positions. This strategy has resulted in program buy and sell systems.³¹ Also, since many investors are playing the spreads between the index option or cash futures prices and the underlying stock values, options expiration dates frequently trigger large market swings.³²

While some maintain that there has not been any such increase in volatility,³³ the public and regulators are aware of dramatic changes in the

29. Securities options are currently traded on the Chicago Board of Options, American, Pacific, Philadelphia, Midwest, and New York exchanges.

30. See Report of the Special Study of the Options Market, *supra* note 8.

31. "For example, portfolio insurance programs which resemble classic hedging techniques, may exacerbate market swings since such programs signal a sale of stocks following a decline of specified index and purchases of stocks when the value of the index is rising." Hobson & Tosini, *supra* note 3, at 13.

32. See, e.g., Laderman & Frank, *supra* note 3, at 95.

33. See, e.g., Edwards, *Stock Index Futures and Stock Market Volatility: Evidence and Implications*, 6 COMMOD. L. LETTER 3 (1986). As other commentators have explained:

Countering this general perception that the stock market has become more volatile in recent years, certain empirical analyses tend to indicate that, on balance, stock market volatility has not been particularly high over the last two years when stock index futures and option activity has increased dramatically. Further, significant reversals in actual stock index levels have not occurred in the one- or two-day periods following sharp changes in the indices on several non-expiration days in 1986. This suggests that such changes have not been aberrations relative to market fundamentals. Some analysts have thus characterized stock index derivative markets as more finely tuned and quickly responsive measures of overall stock market sentiment rather than as independent causes of changing stock market prices.

Hobson & Tosini, *supra* note 3, at 13 (footnotes omitted) (citing L. BIRINYI & H.N. HANSON, MARKET VOLATILITY; AN UPDATED STUDY (Salomon Brothers, Inc., 1986); M.A. ZURACK, HAS

market environment. Thus, for example, there are various proposals being considered to eliminate the volatility.³⁴ Although the new volatility in the markets may in large part be attributable to options and futures expiration dates, that is not the only source. As one observer has pointed out, there is a new state of mind in the market that makes the securities markets more closely resemble the short-term and heretofore more volatile commodity markets.³⁵ It has also been suggested that as the fundamentals (or technical health) of the equity markets affect securities trading, emphasis on index options and other derivative investments will magnify the effect of reactive price swings.³⁶ It is submitted that the shift to short-term trading, triggered in large part by the options markets, has led to significant inefficiencies in the market.

These inefficiencies can result in substantial losses to unwary investors who get caught in the backlash from options trading. For example, it has been observed that the index markets have turned investors away from long-

THE STOCK MARKET BECOME MORE VOLATILE SINCE THE INTRODUCTION OF STOCK INDEX FUTURES CONTRACTS? (Goldman Sachs, 1985)); *see also* B. COLLINS, AN EMPIRICAL ANALYSIS OF STOCK INDEX FUTURES PRICES (Columbia Futures Center Working Paper No. 135, 1986); J. MERRICK, VOLUME DETERMINATION IN STOCK AND STOCK INDEX FUTURES MARKET: AN ANALYSIS OF ARBITRAGE AND VOLATILITY EFFECTS (Salomon Brothers Center, New York University, Working Paper No. 374, April 1986); H. STOLL & R. WHALEY, EXPIRATION DAY EFFECTS OF INDEX OPTIONS AND FUTURES: SUMMARY AND CONCLUSIONS OF THE EMPIRICAL ANALYSIS AND AN EXAMINATION OF PROPOSED CHANGES IN EXPIRATION PROCEDURES, (Owen Graduate School of Management, Vanderbilt University, 1986).

It is not surprising that many of the foregoing sources are associated with or sponsored by members of the professional trading community.

34. *See* Ingersoll & Sebastian, *supra* note 9, at 6; *see also infra* notes 58-66 and accompanying text.

35. Byrne, *Program Trading—A Trader's Perspective*, 6 *COMM. L. LETTER* 9, 10-11 (1986). According to Byrne,

[m]y own unproven view is that stock index futures have introduced what I call a commodities mindset into the equity market. Traditional commodity traders tend to have a very short-term time horizon and rely heavily on technical analysis and trend-following systems. They seem to thrive on sudden, sharp price movements and on price trends that continue as far as possible in one direction. Such price behavior may be good for professional traders and may even be good for common stocks so long as prices are going up. But this commodity mindset may be dangerous when prices are dropping.

36. Hobson & Tosini, *supra* note 3, at 12-13:

If stock market prices generally rise or fall as a result of, for example, a shift in market fundamentals, speculative and hedging transactions in derivative markets may be reflected rapidly in price changes in these markets. If the prices of derivative contracts reflect discounts or premiums to stock market prices that are sufficiently large, arbitrage activity—either the establishment of new arbitrage positions or the unwinding of previously established positions—is likely to be triggered. The stock purchases or sales that constitute the “cash legs” of such arbitrage transactions will then tend to move stock prices in a direction consistent with the initial shift in fundamentals. And such transactions may lead to further rounds of speculative hedging and cash-futures arbitrage activity, resulting in large swings in stock prices.

See also, e.g., Laderman, *supra* note 9, at 84.

term investment strategies traditionally associated with stocks, to the short-term speculation more frequently associated with commodity futures.³⁷ Since the options markets can, and do in large part, provide a useful function, the solution is not to disband those markets. Rather, the solution lies in regulating the traders who engage in such program and options related buying and selling. Such regulation would keep the market more efficient with regard to the fundamental factors affecting investors³⁸ instead of reacting wildly to short-term indicators. Briefly put, the efficient capital market hypothesis is that stock prices accurately reflect expert analysts' valuation of the totality of publicly available information.³⁹

With regard to the bulk of day-to-day trading, there has been a shift away from the long-term with investors' now focusing on the short-term. The shift has resulted from many factors including the highly competitive nature of the mutual fund industry as well as other aspects of investment management and the concomitant emphasis on favorable quarterly reports. In order to show favorable reports and attractive portfolios, many fund managers feel compelled to dress up their portfolios. Thus, institutions are motivated to engage in significant amounts of short-term trading. Additionally, the rapid rise of the options markets for securities,⁴⁰ as well as the acceptance of the commodities futures market as an alternative investment, have further refocused the markets' emphasis on the short-term.

Put and call options on individual securities allow investors to hedge their positions and thereby limit risk. Investors with long-term positions in securities can use put and call options to take a short-term hedge against their long-term investments. Thus, for example, investors holding a long-term position in a stock can write call options against the stock in order to protect themselves against a short-term decline. Alternatively, investors

37. See Byrne, *supra* note 35.

38. See, e.g., J. FRANCIS, INVESTMENT ANALYSIS AND MANAGEMENT 651-61 (1979); J. LORIE, P. DODD & M. KIMPTON, THE STOCK MARKET: THEORIES AND EVIDENCE 56, 65 (2d ed. 1985); Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383 (1970); Friend, *The Economic Consequences of the Stock Market*, 62 AM. ECON. REV. 212 (1972); Note, *The Efficient Capital Market Hypothesis, Economic Theory, and Regulation of the Securities Industry*, 29 STAN. L. REV. 1031 (1977). For critical views of the efficient capital market hypothesis, see, e.g., Gordon & Kornhauser, *Efficient Markets, Costly Information and Securities Research*, 60 N.Y.U.L. REV. 761 (1985); Wang, *Some Arguments That the Stock Market is not Efficient*, 119 U.C. DAVIS L. REV. 341 (1986); see also Givoly & Lakonishok, *The Information Content of Financial Analysts' Forecasts of Earnings: Some Evidence on Semi-Strong Efficiency*, 1 J. ACCTG. & ECON. 165 (1979); Lowenstein, *Pruning Deadwood in Hostile Takeovers: A Proposal for Legislation*, 83 COLUM L. REV. 249, 276-89 (1983).

39. As one court has summarized the efficient capital market hypothesis: economists have now amassed sufficient empirical data to justify a present belief that widely-followed securities of larger corporations are "efficiently" priced: the market price of stocks reflects all available public information and hence necessarily, any material misrepresentations as well.

In re LTV Securities Litigation, 88 F.R.D. 134, 144 (N.D. Tex. 1980).

40. REPORT OF THE SPECIAL STUDY OF THE OPTIONS MARKET *supra* note 8.

desiring to purchase a security but believing that the price will drop can sell put options exercisable at the price they are willing to pay. When an investor believes a stock is under priced he or she may wish to purchase a call option. However, such a position would be speculative since, if the stock does not reach the exercise price before the expiration date, the investor loses the entire investment.⁴¹

B. *The Current Market Environment*

1. *Index arbitrage and program trading*

Some options are based on indexes comprising certain stocks. Others are broad-based market indexes such as the Value Line index and one based on the Standard & Poor 500 index. Some indexes are based on narrower composite indexes such as those paralleling the Standard & Poor 100 index and those approximating the Dow Jones Industrial Average. In addition there are industry-based indexes such as the technology index. A parallel development has occurred in the futures markets with the advent of financial futures.

In addition to futures based on government securities, there are now publicly traded futures contracts based upon the same types of indexes that form the basis for options. In addition to straight futures contracts, there is now a public market for options on futures. It is argued that all of these financial instruments make the market more efficient by providing alternative investments that help keep the markets on a more even keel.⁴² Money managers have taken advantage of these new investment vehicles. Many mutual funds have arisen in connection with the options markets. Additionally, the options and financial futures markets provide a new way for money managers to diversify and hedge their portfolios.

Widely followed options and futures indexes have also provided a new mechanism for traders who base their investments on the markets' technical factors rather than on the fundamentals of the underlying securities or commodities. The computer age has aided these technical investors in that simultaneous investments across several markets are now much more accessible.

Program trading involves the use of computers to track price discrepancies between index futures contracts, index options, and the cash value of the stocks underlying the indexes. A computer driven program permits the large investor to monitor the relative prices of index futures, options and the cash value of the index.⁴³ When it appears that there is a discrepancy

41. See generally P. JOHNSON, *COMMODITIES REGULATION* (1982); Gilberg, *supra* note 1.

42. See e.g., J. BURNS, *A TREATISE ON MARKETS: SPOT, FUTURES, AND OPTIONS* (1979); Malkiel, *supra* note 11, at 16.

43. See *Investment Technology: Is Your Stock Broker User Friendly?*, *The Economist*, Oct. 25, 1986, at 79.

between the option or futures premium and the cash value, the trader will lock in a profit by arbitraging one against the other. For example, if the futures price is discounted below the cash value of the index,⁴⁴ the trader who is long in the stocks will begin a "sell program" in which he or she will sell the stock and buy the discounted futures contract. When the futures are trading at a premium above the cash value, the trader will begin a "buy program" which consists of selling the futures contract and buying the stocks that the index comprises.

The newly developed index funds have further magnified the effects of program trading. Successful program trading, as is the case with any type of arbitrage, requires large volume transactions with low individual transaction costs. Furthermore, it would take an investment of approximately twenty-five million dollars to invest in the stock underlying the Standard & Poor 500,⁴⁵ one of the popular indexes that forms part of the basis for index futures and options arbitrage. Thus, program trading is not a viable route for most individual investors. The index funds permit individual investors to participate in program trading by pooling their investments into a fund managed by an investment advisor who invests in indexed stocks, futures, and options in accordance with the program trading guidelines discussed above.

2. *The market impact of index arbitrage and program trading*

In addition to the foregoing program trading systems, other systems have been developed to help balance stock market movements. One result has been that when analysts' technical systems issue a buy or sell signal, the markets react in a very volatile manner. Also, on the third Friday of each month when options are set to expire, there have been some truly exceptional market reactions. This is especially true on "triple witching" days when options, index options, and index futures all expire.⁴⁶

It is ironic that financial instruments whose justification is the increase of market efficiency have been accused of having quite the opposite effect in terms of increasing volatility and wide swings in both market averages and individual securities.⁴⁷ Such an environment is nothing more than a trap for the unwary individual investor. There have been a number of proposals for dealing with the volatility created by program trading. These proposals include requiring arbitrageurs to disclose all long and short

44. Such a discount would reflect a futures traders' collective decision that the cash market will drop over time.

45. See Seligman, *supra* note 9, at 88.

46. For example, on December 19, 1986, there was a record 118 million shares traded in the last hour of trading. See McMurray, *CBOE Rejects "Triple Witching" Plan Made by Chicago Merc to Cut Volatility*, Wall St. J., Jan. 9, 1987, at 31. However, unlike most of the prior triple witching Fridays, this action was not accompanied by a precipitous sell-off in the stocks. *Id.*

47. Hobson & Tosini, *supra* note 3; see also, e.g., Laderman & Frank, *supra* note 3, at 95; Sebastian, *supra* note 3 at 19, col. 4; cf. Faust & Doukas, *supra* note 3 at 50.

positions in order to help the market anticipate the reaction as the options and futures expire or become due.

Computerized trading and computerized execution of trades permit high volume traders who do not have to absorb the costs of retail commissions to execute trades within nanoseconds.⁴⁸ The leverage of options and futures magnifies the impact of such trading on the market, especially when risk arbitrageurs and index funds, as well as other institutional investors, are using the underlying securities to hedge or straddle their investments.

Statistical evidence tends to indicate that program trading has a tremendous impact on the equity markets. For example, it has been said that on the average, program related trading accounts for twenty-five percent of stock volume in any given week.⁴⁹ However, the evidence to date is inconclusive as to whether that impact can be translated directly into increased volatility. For example, the SEC's preliminary review of the 114 point decline in the Dow Jones Industrial Average on January 23, 1987 did not reveal any relationship to program trading.⁵⁰ Perhaps, more will be learned from studies relating to the wild market swings of October, 1987. Notwithstanding the evidence of a direct link to program trading, an SEC official commented that the leverage created by index arbitrage increases the potential for such volatility and further that it is "foolish" to ignore the psychological impact that program trading has on investors and the market.⁵¹ It has been suggested, however, that the burden of proof should fall on those seeking to regulate index related arbitrage.⁵² The market's performance since October 19, 1987 may go a long way toward satisfying that burden.

There is a division among the commentators as to the extent of the adverse effects, if any, of program trading. Dean Malkiel's observation is that volatility has not increased in the past few years.⁵³ His claim is that

48. A nanosecond is a high technology term, literally meaning one-one billionth of a second, that captures the virtual simultaneity of actions.

49. See Sebastian, *supra* note 3, at 19. See also Report of the Presidential Task Force, *supra* note 25.

50. *SEC Review Shows Jan. 23 Market Plunge Not Caused by Program Trading*, SEC. WK., Feb. 9, 1987, at 9. The SEC is also analyzing the 121 point decline in the Dow average on September 11 and 12, 1986. *Id.* The results of this and similar analyses will be reported to Congress. See *Dingell Blasts SEC, Exchanges for Inaction on Recent Market Gyration*s, SEC. WK., Feb. 2, 1987, at 1.

51. *SEC Review Shows Jan. 23 Market Plunge Not Caused by Program Trading*, *supra* note 50, at 9; see also *Average Investor May Shun Stock Market Following Last Week's Volatility*, SEC. WK., October 26, 1987, at 1.

52. "Such fears (of plunging markets) are purely speculative. In theory, it is just as likely that day-to-day volatility attracts investor interest, increasing the liquidity of the stock market and lowering capital costs. Surely, then, the burden of proof rests with those who would limit trading in the index futures. The plunging Dow only looks scary." Editorial, *Behind the Owl in the Dow*, N.Y. Times, June 11, 1986, at 34, col. 1.

The fallacy in the argument, above, is that the risk is not only one of a sharp decline but of volatility in general. A further flaw is the belief that the market is being driven by forces unrelated to the fundamentals of the underlying investments.

53. Malkiel, *supra* note 11, at 16, col. 4 (the author is dean of the Yale University School of Organization and Management).

overall volatility has, in fact, been lower than in the early-1980s although there may appear to be higher volatility on a day-to-day basis due to what he describes as the "scale effect."⁵⁴ By way of example, he suggests that a daily Dow Jones Industrial Average move of twenty points today is less significant than a ten point move when the Dow was at less than one-half of its current level.

While this is certainly true on a percentage basis, the absolute numbers reflect dollar gains or losses. The market's performance in late October, 1987 questions the conclusion that there has not been an increase in volatility. Further, today's average volume is significantly higher than in past years. Thus, any move in the averages represents more than in the past in terms of the dollar impact on investors. Dean Malkiel concludes that the index markets make the market more efficient but that the inability to meet the volume of orders that arise in connection with expiration dates presents problems. He therefore recommends public disclosure of such order imbalances so that investors can adjust accordingly.⁵⁵

Professor Stoll has argued that while volatility may increase in connection with triple witching expiration Fridays, there is no significant impact on individual stock prices.⁵⁶ The assumption behind such an argument is that individual traders who invest on the basis of fundamental rather than technical factors are not affected since they should not be swayed by such technical movements.⁵⁷ Investors who decide to trade on more technical factors are opening themselves up to the risks of the new volatility.⁵⁸ However, investors trading only on fundamentals stand to be injured by large price swings unless they "stay at home" on expiration days and during periods when program buy or sell trading has been initiated. The problem is that without disclosure of order imbalances and trading programs, the investor does not know about such activity until after the fact. Accordingly, the investor relying on fundamentals may not have only his or her entry and exit prices affected by the new volatility but also may have to time enter and exit from the market in accordance with the technical traders' activity. Another criticism of the impact of program trading and index arbitrage is that it places the short-term fate of the market into the hands of a relatively few, but very powerful, money managers.⁵⁹

3. *Proposed regulatory responses*

The SEC and the exchanges have voiced concern over the impact of computerized trading and the impact on the market, especially in connection

54. *Id.*

55. *Id.*

56. See Laderman, *Those Big Swings on Wall Street*, Bus. Wk., April 7, 1986, at 32.

57. See Marcial, *Playing a Roller-Coaster Market*, Bus. Wk., Sept. 29, 1986, at 94.

58. Jonas & Farrel, *Program Trading: Let the Little Guy In*, Bus. Wk., Sept. 29, 1986, at 100.

59. See Laderman, *supra* note 56, at 36.

with options and futures expiration dates.⁶⁰ The SEC has suggested seeking (at least on a voluntary, experimental basis) disclosure of all open orders to be executed on the close of trading on options expiration dates.⁶¹ Disclosure of order imbalances sufficiently ahead of the close of trading on expiration days would give arbitrageurs, program traders, and other investors ample opportunity to place their off-setting orders.⁶² It is thought that disclosure would let the market anticipate the last minute trading rather than experience volatile price and volume swings at the stock market's closing.⁶³ Under the proposal which would be initially implemented as a voluntary experiment, major imbalances in orders to be executed on the close of trading for selected actively traded stocks would be disclosed at 3:30, which is one-half hour before closing.⁶⁴ SEC Chairman Ruder has also suggested trading halts to help curb volatility resulting from program trading.⁶⁵

An alternative solution offered by the New York Stock Exchange would be to tie the price of index options and futures to the opening of trading on Friday rather than to its closing.⁶⁶ An SEC official has proposed brief, simultaneous trading halts in trading on both the stock and index markets.⁶⁷ The Chicago Mercantile Exchange initially proposed daily limits on price moves of index futures as a way to control volatility, but that suggestion has since been withdrawn.⁶⁸ The market activity in October, 1987 has led to renewed talk of daily limits and the possibility of other trading halts. Although such measures would certainly help soften the impact of program

60. See Laderman & Cahan, *The Triple Witching Hour: Trying to Make it Less Spooky*, Bus. Wk., Sept. 22, 1986, at 32; *SEC Asks Big Board to Test Proposal Aimed at Curbing Sharp Price Swings*, Wall St. J., Sept. 11, 1986, at 45, col. 1; *SEC Staff Seeks Big Board Test in Price Swings*, Wall St. J., Sept. 9, 1986, at 3, col. 4; *Exchanges Lean Towards Friday Afternoon Solutions to Program Trading*, SEC. Wk., Aug. 4, 1986, at 1.

While at one time it appeared that the options and futures exchanges were supportive of at least minimal corrective action, the Chicago Board of Options Exchanges has recently come out in opposition, denying the existence of an options expiration related problem. See McMurray, *supra* note 46, at 31. Additionally, the New York Futures Exchange has postponed consideration of the New York Stock Exchange's proposal to change the expiration procedure for stock index futures so as to key the expiration to opening rather than closing stock prices. See *NYSE Board Balks at Changing Stock Index Expiration to Opening Prices*, SEC. Wk., Jan. 12, 1987, at 1.

61. *SEC Staff Seeks Big Board Test in Price Swings*, *supra* note 60, at 3.

62. *'Triple Witching' Didn't Bewitch Market: Regulators Aren't Sure Who Gets Credit*, Wall St. J., Sept. 22, 1986, at 42.

63. *SEC Staff Seeks Big Board Test in Price Swings*, *supra* note 60, at 3.

64. *SEC Asks Big Board to Test Proposal Aimed at Curbing Sharp Price Swings*, *supra* note 60, at 45.

65. See *Ruder Suggests Trading Halt as One Way to Control Program Trading Volatility*, 19 Sec. Reg. & L. Rep. (BNA) 1622-23 (Oct. 10, 1987).

66. *SEC Staff Seeks Big Board Test in Price Swings*, *supra* note 60, at 3.

67. See McMurray, *SEC Aide Offers Way to Curb Price Swings*, Wall St. J., March 20, 1987, at 13, col. 5.

68. McMurray, *Chicago Merc Seeks to Curb Market Swings*, Wall St. J., Feb. 12, 1987, at 3, col. 4; McMurray, *SEC Aide Offers Way to Curb Price Swings*, *supra* note 67.

trading, they would not alter the fact that the securities markets will continue in large part to be driven by short-term and technical factors. Both of these factors operate against market efficiency since an efficient market reflects a balance between fundamental and technical factors rather than an imbalance favoring the side of technical indicators as magnified by program trading.

As pointed out above, the SEC and the exchanges are currently considering a variety of proposals to regulate, or at least require, certain disclosures concerning options and index related transactions. In addition to the risk arbitrage regulation discussed directly above, there are some scattered regulations that apply specifically to, or have particular impact upon, options and index related transactions. An analysis of these regulations will show whether the current regulatory environment is accommodative, neutral, or hostile to option and index related arbitrage.

In a relatively recent no-action letter, the SEC granted an exemption from the short sale rules to accommodate index related arbitrage.⁶⁹ Selling short is an investment strategy for investors who predict that the price of a given security will decline. Selling short involves selling shares that one does not own. This is accomplished by borrowing shares for immediate delivery with the intent of covering the short position at a later date (and, one hopes, at a lower price). Short selling is a speculative way for an investor to take the position that a security's price is likely to drop. While the securities are borrowed in order to cover the short position, the investor is charged interest in the margin account until the short position is covered by purchasing the security.⁷⁰ The SEC prohibits investors from entering into short sale transactions (that is, selling securities that they do not currently own) on a down tick in a falling market.⁷¹ The no-action letter exemption permits the unwinding of positions related to index arbitrage without regard to the down tick rule. This exemption is obviously accommodative to index related risk arbitrage. Refusal to grant such an exemption would add another risk to index arbitrage, thus making it a less desirable form of investment.

IV. CONCLUSION

The past decade has brought a dramatic shift in emphasis in the securities and other financial markets. We have recently witnessed unprecedented market swings. The continuing development of new, highly leveraged in-

69. See *Merrill Gets SEC Exemption From Short-Sale Rule for Index Arbitrage*, *supra* note 26, at 1; see also Exchange Act Release No. 34-20715 [1983-1984 Transfer Binder], Fed. Sec. L. Rep. (CCH) ¶ 83, 504 (March 6, 1984) (exemption from "tick" provisions, applicable to certain arbitrage-related transactions).

70. Short sales are regulated by SEC rules 10a-1 and 10a-2. 17 C.F.R. §§ 240.10a-1, 10a-2 (1986). See generally T. Hazen, *supra* note 10, at § 10.12.

71. 17 C.F.R. § 240.10a-1(3)(b) (1986); see Exchange Act Release No. 34-20715 [1983-1984 Transfer Binder], Fed. Sec. L. Rep. (CCH) ¶ 83, 504 (March 6, 1984) (exemption from "tick" provisions applicable to certain arbitrage-related transactions).

vestment vehicles such as index options magnifies the impact of this shift. Further magnification is provided by the increased daily trading volume in the securities markets. Additionally, many observers believe that there has been a parallel increase in market volatility.

Regulators, Congress, and commentators are currently undertaking a significant examination of the need to regulate the index markets, program trading, and risk arbitrageurs in general. There is considerable concern that in the absence of regulation the markets are not efficient. As a result of the perceived inefficiencies, many observers sense decreasing investor confidence in long-term investments and increasing potential for injury to investors who lack sufficient sophistication or risk bearing ability but nevertheless venture into the short-term oriented market environment. The stock market performance over the past few months has further highlighted the new volatility. It is difficult to accept such violent market swings as a byproduct of an efficient market. Legislators and regulators should think long and hard before dismissing the need for controls on the limits of risk arbitrage, program trading, and the proliferation of new investment vehicles. The current market environment calls for increased, not decreased, regulation.

