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## Risks and Hedges of Providing Liquidity in Complex Securities: The Impact of Insider Trading on Options Market Makers

Stanislav Dolgoplov\*

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## ARTICLE

# RISKS AND HEDGES OF PROVIDING LIQUIDITY IN COMPLEX SECURITIES: THE IMPACT OF INSIDER TRADING ON OPTIONS MARKET MAKERS

*Stanislav Dolgoplov\**

### ABSTRACT

This Article analyzes the impact of insider trading on options market makers from the perspective of the characteristics of options as complex securities, the structural features of options markets, and the corresponding unique risks and hedges of these market participants. It is argued that options market makers, as opposed to their counterparts in equity markets, suffer unique substantial losses from insider trading, and evidence to support this proposition is offered. Judicial decisions on losses of options traders from insider trading are reviewed and critiqued in order to develop several elements of a methodology for calculating losses of options market makers. The uniqueness of risks and hedges of options market makers is further illustrated in the context of fraud-on-the-market.

### INTRODUCTION

The practice of “insider trading,” one form of “informed trading” in securities markets with asymmetrically distributed information, is the subject of fierce and protracted debate in fields such as securities regulation, economics, corporate governance, politics and, ethics.<sup>1</sup> The

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\* J.D. (the University of Michigan), M.B.A. (the University of Chicago), B.S.B.A. (Drake University), member of the North Carolina State Bar. The author thanks Henry G. Manne for his guidance in life and Taja M. Beane, Christopher Borgmeyer, Matthew Champagne, Christopher L. Culp, Barbara Garavaglia, Sarah A. Hall, Jeanne F. Long, Khalil Nicholas Maalouf, J. Adam Martin, Kirk Oldford, Christal Phillips, Todd Rich, Don Saverno, Ilya N. Shulman, Jeremy M. Suhr, and Sandra Zeff for their help and expertise.

1. For surveys of various perspectives on the subject, see Stephen M. Bainbridge, *Insider Trading*, in 3 *ENCYCLOPEDIA OF LAW AND ECONOMICS* 772 (Boudewijn Bouckaert & Gerrit De Geest eds., 2000); Stanislav Dolgoplov, *Insider Trading*, in

term “insider trading” typically encompasses transactions on company-specific, material nonpublic information obtained through employment status or special access to such information. This practice is probably as old as the existence of securities markets.<sup>2</sup> Insider trading is common in today’s sophisticated financial markets, given factors such as the availability of active and relatively anonymous trading venues, derivatives as a means of leverage, and frequent announcements which generate large price movements.<sup>3</sup> While several empirical studies suggest that insider trading regulation in the United States and abroad is somewhat effective, other studies point at unintended consequences of such regulation and even question its effectiveness and overall impact.<sup>4</sup>

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THE CONCISE ENCYCLOPEDIA OF ECONOMICS 276 (David R. Henderson ed., 2d ed. 2007); Henry G. Manne, *Insider Trading*, in 2 THE NEW PALGRAVE DICTIONARY OF MONEY & FINANCE 416 (Peter Newman et al. eds., 1992). The existing regulatory framework does not extend to most forms of informed trading in commodities markets, which probably should be classified as “outsider” rather than “insider” trading. See 6 ALAN R. BROMBERG & LEWIS D. LOWENFELS, BROMBERG AND LOWENFELS ON SECURITIES FRAUD & COMMODITIES FRAUD § 15:62 (2d ed. 2007); Sharon Brown-Hruska & Robert Zwirb, *Legal Clarity and Regulatory Discretion—Exploring Law and Economics of Insider Trading in Derivatives Markets*, 2 CAPITAL MKTS. L.J. 245, 254-55 (2007). An argument why taking advantage of informational asymmetry in markets for corporate securities is more questionable than in commodities markets, suggesting that corporate insiders are likely to manipulate stock prices via corporate disclosure to increase their trading profits in contrast to the inherent dispersion of information in commodities markets, was advanced as early as 1896. Henry Crosby Emery, *Speculation on the Stock and Produce Exchanges of the United States*, 7 STUD. HIST. ECON. & PUB. L. 283, 460 (1896).

2. One of the earliest documented episodes of insider trading occurred in the seventeenth-century England at the time of the emergence of joint-stock companies with freely transferable shares. See 1 WILLIAM ROBERT SCOTT, THE CONSTITUTION AND FINANCE OF ENGLISH, SCOTTISH AND IRISH JOINT-STOCK COMPANIES TO 1720, at 344 (1912) (describing the allegations that “large shareholders used the knowledge they obtained of the affairs of a certain company to make profits by speculation in the shares”).

3. For a recent commentary that addresses these factors and cites data suggesting that insider trading is still common, see Brent Shearer, *Forbidden Fruit*, MERGERS & ACQUISITIONS, Oct. 2007, at 66. For a recent source suggesting that insider trading may be on the rise, see *Illegal Insider Trading: How Widespread Is the Problem and Is There Adequate Criminal Enforcement?: Hearings Before the S. Comm. on the Judiciary*, 109th Cong. (2006).

4. For a brief survey of earlier empirical studies, see Stanislav Dolgoplov, *Insider Trading and the Bid-Ask Spread: A Critical Evaluation of Adverse Selection in Market Making*, 33 CAP. U. L. REV. 83, 147 n.302 (2004). Later—and revised—empirical studies include Arturo Bris, *Do Insider Trading Laws Work?*, 11 EUR. FIN.

Outsiders' losses caused by insider trading is the crucial issue in the context of civil liability.<sup>5</sup> Early insider trading cases typically addressed face-to-face transactions which occurred in arguably deceptive circumstances and inflicted losses on readily identifiable individuals who were otherwise unlikely to consummate such transactions.<sup>6</sup> Much of the contemporary criticism relating to insider trading in organized markets was directed at speculation by corporate directors and managers because of the perceived inadequacy of disclosure and their incentives to manipulate stock prices to create profitable trading opportunities.<sup>7</sup>

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MGMT. 267 (2005); Art A. Durnev & Amrita S. Nain, *Does Insider Trading Regulation Deter Private Information Trading? International Evidence*, 15 PAC.-BASIN FIN. J. 409 (2007); Nuno Fernandes & Miguel A. Ferreira, *Insider Trading Laws and Stock Price Informativeness*, 22 REV. FIN. STUD. 1845 (2009); Aaron Gilbert et al., *Insiders and the Law: The Impact of Regulatory Change on Insider Trading*, 47 MGMT. INT'L REV. 745 (2007); Thomas Lagoarde-Segot, *Financial Reforms and Time-Varying Microstructures in Emerging Equity Markets*, 33 J. BANKING & FIN. 1755 (2009); Abraham Ackerman et al., *Insider Trading Legislation and Acquisition Announcements: Do Laws Matter?* (Feb. 1, 2008) (unpublished manuscript, on file with author), available at <http://ssrn.com/abstract=868708>; Bart Frijns et al., *Elements of Effective Insider Trading Laws* (n.d.) (unpublished manuscript, on file with author), available at <http://www.fma.org/Texas/Papers/ElementsInsiderTradingLaws.pdf>; Joseph K. Tanimura, *The Effects of Insider Trading Restrictions: Evidence from Dividend Initiations and Omissions (1935-1974)* (Mar. 14, 2009) (unpublished manuscript, on file with author), available at <http://ssrn.com/abstract=1359679>; Jin Xu, *New Evidence on the Effects of the Insider Trading Sanctions Act of 1984* (Feb. 2008) (unpublished manuscript, on file with author), available at <http://ssrn.com/abstract=1100641>.

5. The regime of civil liability for insider trading, which was not explicitly spelled out in the New Deal securities statutes, had started to develop in the 1940s and further expanded in the 1960s. See David S. Ruder, *Civil Liability Under Rule 10b-5: Judicial Revision of Legislative Intent?*, 57 NW. U. L. REV. 627 (1963). For an extensive analysis of the current regime of civil liability for insider trading, see WILLIAM K.S. WANG & MARK STEINBERG, *INSIDER TRADING* § 6:1 to :14 (2d ed. 2005 & Rel. 1 2006).

6. For the early scholarship analyzing the contemporaneous case law on insider trading, see Anson H. Bigalow, *The Relation of Directors of a Corporation to Individual Stockholders*, 81 CENT. L.J. 256 (1915); N.C. Collier, *Liabilities of Directors and of Trustees to Beneficial Owners Compared*, 74 CENT. L.J. 360 (1912); H.L. Wilgus, *Purchase of Shares of Corporation by a Director from a Shareholder*, 8 MICH. L. REV. 267 (1910).

7. See DANIEL RAYMOND, *THE ELEMENTS OF CONSTITUTIONAL LAW AND POLITICAL ECONOMY* 276 (Baltimore, Cushing & Brother, 4th ed. 1840); WILLIAM Z. RIPLEY, *RAILROADS: FINANCE AND ORGANIZATION* 208-16 (1915); Steve Thel, *The Genius of Section 16: Regulating the Management of Publicly Held Companies*, 42 HASTINGS L.J. 391, 428-34, 474-89 (1991); Form Letter from Brayton Ives, Salem T.

Furthermore, the intertwined issues of loss causation and estimation of damages are more problematic in organized markets.<sup>8</sup> From a static perspective, insider trading in organized markets is still a zero-sum game which redistributes wealth from outsiders to insiders,<sup>9</sup> but it is difficult to identify “losers” in both *actual* and *preempted* transactions, let alone calculate such losses.<sup>10</sup> Several publications in the 1960s and

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Russell & Donald MacKay, N.Y. Stock Exch., to listed companies (Oct. 11, 1875) (on file with author). At least some large companies chose self-regulation to limit potential insider trading. See WILLIAM Z. RIPLEY, MAIN STREET AND WALL STREET 206 (1927); *Directors' Ethics and Shareholders*, WALL ST. J., Apr. 18, 1928, at 3. On the other hand, insider trading was rationalized as an appropriate reward for otherwise nominally compensated directors actively involved in company affairs. See *Should Directors Speculate?*, 6 ANNALIST: MAG. FIN. COM. & ECON. 65, 65 (1915).

8. The leading precedent until the 1960s, *Goodwin v. Agassiz*, 186 N.E. 659 (Mass. 1933), refused to impose liability for insider trading in organized markets by stating that transactions “on the stock exchange are commonly impersonal affairs,” *id.* at 362, arguing that an insider’s disclosure of relevant information to the counterparty in such circumstances would be impracticable, *id.*, and asserting that “an equality as to knowledge, experience, skill and shrewdness” is impossible, *id.* at 363. For a rejection of the *Goodwin* approach in the administrative adjudication of the U.S. Securities and Exchange Commission (“SEC”) that laid the foundation for insider trading regulation, see *Cady, Roberts & Co.*, 40 S.E.C. 907, 914 n.25 (1961).

9. For the presentation of this concept, known as the “Law of the Conservation of Securities,” see WANG & STEINBERG, *supra* note 5, § 3:3.5. See also Henry G. Manne, *In Defense of Insider Trading*, HARV. BUS. REV., Nov.-Dec. 1966, at 113, 114-15 (arguing that insider trading induces unfavorable transactions by short-term traders—not necessarily those who trade directly with insiders); Barry A. Goodman, Comment, *Insider Trading Without Disclosure—Theory of Liability*, 28 OHIO ST. L.J. 472, 477 (1967) (arguing that, with insider trading, “some investor would be substituted for the insider and the injury would be shifted to this investor”).

10. See WANG & STEINBERG, *supra* note 5, § 3:3.7. For the earliest academic works that pointed to the difficulty with identifying parties directly harmed by insider trading, see HENRY G. MANNE, INSIDER TRADING AND THE STOCK MARKET *passim* (1966); Jack M. Whitney II, *Section 10b-5: From Cady, Roberts to Texas Gulf: Matters of Disclosure*, 21 BUS. LAW. 193, 200-04 (1965); see also Donald C. Langevoort, *Investment Analysts and the Law of Insider Trading*, 76 VA. L. REV. 1023, 1047 (1990) (arguing that “measurable harm to individual investors from routine instances of insider trading is difficult to discern (or at most, terribly diffuse)”). The identification of persons harmed by insider trading has remained a problem, leading to the adoption of the controversial “contemporaneous trader” proxy. See Veronica M. Dougherty, *A [Dis]semblance of Privity: Criticizing the Contemporaneous Trader Requirement in Insider Trading*, 24 DEL. J. CORP. L. 83 (1999). In addition to the difficulty of identifying market participants who *traded* and were injured because of insider trading, *preempted* market participants do not have standing under *Blue Chip Stamps v. Manor*

1970s pointed to market makers<sup>11</sup> as a group *directly* harmed by insider trading.<sup>12</sup> This theoretical argument seemed to be quite insignificant in practice, and equity market makers themselves did not appear to be concerned about insider trading as such.<sup>13</sup> Yet, in later years, this

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*Drug Stores*, 421 U.S. 723 (1975).

11. Market makers—also known as “liquidity providers”—such as “specialists” on the New York Stock Exchange (“NYSE”), “dealers” on NASDAQ, or “market makers” on the Chicago Board Options Exchange (“CBOE”), create a continuous two-sided market by posting “bid” and “ask” quotes, matching incoming orders, and providing their own capital to absorb immediate order imbalances. For the statutory definition of the term “market maker,” see 15 U.S.C. § 78c(a)(38) (2006). For general sources on market makers, see ALLEN JAN BAIRD, *OPTION MARKET MAKING: TRADING AND RISK ANALYSIS FOR THE FINANCIAL AND COMMODITY OPTION MARKETS* (1993); LARRY HARRIS, *TRADING AND EXCHANGES: MARKET MICROSTRUCTURE FOR PRACTITIONERS* chs. 13, 24 (2003); MARKET MAKING AND THE CHANGING STRUCTURE OF THE SECURITIES INDUSTRY (Yakov Amihud et al. eds., 1985). From the standpoint of aggregate economic welfare, it is argued that “[t]he market maker in general adds to the stability, liquidity and transparency (i.e. price discovery mechanism) of financial markets.” EMERGING MKTS. COMM., INT’L ORG. OF SEC. COMM’NS, *THE INFLUENCE OF MARKET MAKERS IN THE CREATION OF LIQUIDITY* 2 (1999), available at <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD94.pdf>. See also JOHN FIELD, JUN., *FORTUNE’S EPITOME OF STOCKS & PUBLIC FUNDS* 8 (London, Sherwood, Gilbert & Piper, 14th ed. 1838) (arguing that “[t]he accommodation . . . afforded [by market makers] to the public is of the highest value”).

12. See Walter Bagehot (pseudo. for Jack L. Treynor), *The Only Game in Town*, FIN. ANALYSTS J., Mar.-Apr. 1971, at 12 (arguing that insider trading unfavorably affects inventories of market makers, forces them to increase bid-ask spreads, and thus decreases the market’s liquidity); Arthur Fleischer, Jr., *Securities Trading and Corporate Information Practices: The Implications of the Texas Gulf Sulphur Proceeding*, 51 VA. L. REV. 1271, 1299 n.130 (1965) (pointing to the problem “when the insider deals with . . . a specialist or . . . a market maker”); D. Jeanne Patterson, Book Review, 57 AM. ECON. REV. 971, 973 (1967) (reviewing MANNE, *supra* note 10) (arguing that insider trading harms “specialists . . . providing a continuous market in the shares of a corporation”).

13. See Dolgoplov, *supra* note 4 (analyzing evidence pertaining to losses of market makers from insider trading, finding very little evidence that such losses are significant for equity market makers, and identifying evidence of losses of options market makers). Interestingly, in one of the earliest insider trading cases, *Tucker v. Barker*, (1881) 16 L.J.R. 66, 1881 W. N. 120 (Ch. D.), which involved a claim against a director who had purchased several preferred shares based on inside information about a likely sale of the company, the plaintiff was probably a market maker because he was identified as a “stockjobber” in a secondary source. HENRY HURRELL & CLARENDON G. HYDE, *THE LAW OF DIRECTORS AND OFFICERS OF JOINT STOCK COMPANIES: THEIR POWERS, DUTIES AND LIABILITIES* 93 (4th ed. 1905). For further factual details, which

argument gained force. Frequent reports of substantial losses of options market makers<sup>14</sup> from insider trading<sup>15</sup> coincided with the emergence of exchange-traded standardized equity options.<sup>16</sup>

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suggest a face-to-face transaction in an illiquid market negotiated over a period of time, and excerpts from this unpublished opinion, a copy of which survives in neither the court records nor the National Archives of the United Kingdom, see *id.* at 93-94. The court, in a decision anomalous for its time, concluded that “an agent or a director of a company trafficking in the shares of the company cannot be allowed to make a profit unless the fullest explanation is given, and the utmost truth is told, and every fact necessary for the formation of a judgment . . . is presented.” *Id.* at 94.

14. Options market makers post bid and ask prices for “plain vanilla” options, such as calls and puts, and certain combinations of “plain vanilla” options, such as straddles, strangles, butterflies, and time spreads. See SHELDON NATENBERG, *OPTION VOLATILITY & PRICING: ADVANCED TRADING STRATEGIES AND TECHNIQUES* 170 (rev. ed. 1994). There are various types of options market makers, which could be called “market makers,” “specialists,” “scalpers,” or “book runners,” with some options exchanges having “a crowd of marketmakers who trade on their own accounts [while others] employ a specialist system, with additional marketmaking provided by registered options traders who trade on the floor for their own accounts.” LOUIS LOSS & JOEL SELIGMAN, *FUNDAMENTALS OF SECURITIES REGULATION* 764-65 (5th ed. 2004). A specialist system is distinguished by the existence of a designated market maker enjoying certain exchange-granted privileges, such as an exclusive right to execute limit orders or a guaranteed portion of the order flow, and there is some empirical evidence that this arrangement may lower transaction costs in options markets. See Amber Anand & Daniel G. Weaver, *The Value of the Specialist: Empirical Evidence from the CBOE*, 9 J. FIN. MKTS. 100 (2006). For additional sources on options market makers, see BAIRD, *supra* note 11; ROBERT L. McDONALD, *DERIVATIVES MARKETS* ch. 13 (2d ed. 2006); NASSIM TALEB, *DYNAMIC HEDGING: MANAGING VANILLA AND EXOTIC OPTIONS* ch. 3 (1997); MICHAEL S. WILLIAMS & AMY HOFFMAN, *FUNDAMENTALS OF THE OPTIONS MARKET* ch. 10 (2001); William L. Silber, *Marketmaking in Options: Principles and Implications*, in *FINANCIAL OPTIONS: FROM THEORY TO PRACTICE* 485 (Stephen Figlewski et al. eds., 1990); Yusif E. Semaan & Luiren Wu, *Price Discovery in the U.S. Stock Options Market*, J. DERIVATIVES, Winter 2007, at 20.

15. See *infra* Section II.

16. The existence of options market makers is not a recent phenomenon. For instance, specialized intermediaries regularly posting bid and ask quotes for equity options existed on the London Stock Exchange (“LSE”) over a century ago. See CHARLES DUGUID, *THE STOCK EXCHANGE* 72 (1904); WALTER S. SCHWABE & G.A.H. BRANSON, *A TREATISE ON THE LAWS OF THE STOCK EXCHANGE* 56-57 (1905). On the other hand, such intermediaries probably had not emerged at the same time as options markets themselves. Although relatively active markets in equity options with a degree of standardization in options contracts and perhaps some specialization in transacting in such financial instruments had existed in Amsterdam and London by the end of the seventeenth century, these trading venues did not seem to have dealers providing truly continuous markets as opposed to mere active traders in options. See JOSEPH DE LA

The U.S. Congress codified the private right of action “in connection with a purchase or sale of a put, call, straddle, option, privilege” in 1984,<sup>17</sup> and, prior to this legislation, several courts had already established liability for trading options on inside information.<sup>18</sup> Courts also often recognized the economic utility of options markets instead of labeling these derivatives as purely speculative.<sup>19</sup> This existing case

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VEGA, CONFUSION DE CONFUSIONES 7-9, 24, 31-32 (Hermann Kellenbenz ed. & trans., Harvard Graduate Sch. of Bus. Admin. 1957) (1688); Anne L. Murphy, *Trading Options Before Black-Scholes: A Study of the Market in the Late-Seventeenth-Century London*, 62 ECON. HIST. REV. (S1 ISSUE) 8 (2009).

17. Insider Trading Sanctions Act of 1984, Pub. L. No. 98-376, § 5, 98 Stat. 1264, 1265 (codified at 15 U.S.C. § 78t(d) (2006)). For a discussion of how this legislation clarified the regulatory framework, see Steve Thel, *Closing a Loophole: Insider Trading in Standardized Options*, 16 FORDHAM URB. L.J. 573 (1988); William K.S. Wang, *A Cause of Action for Option Traders Against Insider Option Traders*, 101 HARV. L. REV. 1056 (1988).

18. See SEC v. Texas Gulf Sulphur Co., 258 F. Supp. 262 (S.D.N.Y. 1966), modified, 401 F.2d 833 (2d Cir. 1968) (en banc) (imposing liability on insiders for purchasing options in the open market while in possession of information about a rich ore deposit's discovery); O'Connor & Assocs. v. Dean Witter Reynolds, Inc., 529 F. Supp. 1179 (S.D.N.Y. 1981) (giving standing to sue insiders for purchasing options in the open market while in possession of information about an upcoming tender offer). The Supreme Court also observed the following:

[T]he holders of puts, calls, options, and other contractual rights or duties to purchase or sell securities have been recognized as “purchasers” or “sellers” of securities for purposes of Rule 10b-5, not because of a judicial conclusion that they were similarly situated to “purchasers” or “sellers” but because the definitional provisions of the 1934 Act themselves grant them such a status.

Blue Chip Stamps v. Manor Drug Stores, 421 U.S. 723, 751 (1975).

19. See, e.g., Fry v. UAL Corp., 84 F.3d 936, 938 (7th Cir. 1996) (noting that options contribute to “maintaining the efficiency of the securities markets”); Deutschman v. Beneficial Corp., 841 F.2d 502, 506 (3d Cir. 1988) (arguing that options permit market participants “to engage in hedging transactions, which are . . . risk reducing”); Tolan v. Computervision Corp., 696 F. Supp. 771, 776 (D. Mass. 1988) (citing empirical studies to suggest that options “may decrease the price-volatility of the underlying securities . . . [and] increase trading volume of the underlying security, thereby increasing stock liquidity”); see also Elizabeth M. Sacksteder, Note, *Securities Regulation for a Changing Market: Option Trader Standing Under Rule 10b-5*, 97 YALE L.J. 623, 632 (1987) (arguing that the existence of options “enhances the depth and liquidity of the stock market, maximizing stock prices and lowering the corporation's cost of capital”) (footnotes omitted); Stewart Mayhew, *The Impact of Derivatives on Cash Markets: What Have We Learned?*, at i (Feb. 3, 2000) (unpublished manuscript, on file with author), available at <http://media.terry.uga.edu/documents/finance/impact.pdf> (presenting a comprehensive summary of



law, however, yields no comprehensive analysis of the unique nature of losses of options market makers, given their trading strategies and risk exposures. The same doctrinal void exists with respect to losses of options traders more generally.

This Article analyzes the impact of insider trading on options market makers and argues that these market participants, as opposed to their counterparts in equity markets, suffer unique substantial losses from this practice. Section I maintains that the nature of options explains the uniqueness of losses of options market makers. Section II contends that losses of options market makers are evident from the frequent occurrence of insider trading in options markets, as suggested by numerous empirical studies, the position taken by the options industry, numerous relevant lawsuits, and other evidence. Section III reviews and critiques the existing judicial decisions with respect to calculations of losses of options traders from insider trading and develops several elements of a methodology for calculating losses of options market makers. Section IV explores the boundaries of the fraud-on-the-market doctrine and asserts that this context, also stemming from informational asymmetry, further illustrates the uniqueness of risks and hedges of options market makers. This Article concludes by analyzing the importance of the cost that insider trading imposes on options market makers and arguing for the recognition of their unique risks and hedges in civil litigation.

#### I. EXPLANATIONS FOR THE UNIQUENESS OF LOSSES OF OPTIONS MARKET MAKERS FROM INSIDER TRADING

This Section maintains that the nature of options explains the uniqueness of losses of options market makers. Part A describes the alleged harm to market makers from insider trading in the context of equity markets and argues that the magnitude of this harm is negligible. Part B maintains that the characteristics of options as complex securities, the structural features of options markets, and the process of providing liquidity in these financial instruments expose options market makers to unique losses compared to their counterparts in equity markets.

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theoretical and empirical studies on the impact of derivatives, including options, on markets in underlying assets and concluding that “[t]he empirical evidence suggests that the introduction of derivatives does not destabilize the underlying market [and] tends to improve the liquidity and informativeness of markets”).

A. Alleged Harm to Market Makers in the Context of Equity Markets

The belief that insider trading directly damages all market makers and imposes a cost on securities markets in the form of higher bid-ask spreads has influenced academics and regulators.<sup>20</sup> In many markets, any insider *always* trades directly with a market maker—or at least preempts him from making a favorable trade—because the latter, as a marginal trader, absorbs with his capital *all* immediate order imbalances, and this argument appears to demonstrate the existence of actual losses inflicted on market makers.<sup>21</sup>

The claim that market makers incur substantial harm appears largely illusory in the context of equity markets both before and after the emergence of insider trading regulation.<sup>22</sup> In fact, some researchers were puzzled why the failure to reach an equilibrium bid-ask spread appropriately compensating a market maker in the presence of informed trading does not occur “[i]n real-world markets.”<sup>23</sup> The argument that market makers are always marginal traders damaged by insiders’ transactions ignores that a typical equity market maker manages his inventory, i.e., a buffer absorbing order imbalances, to adjust his risk exposure. This practice suggests that insider trading does not necessarily have an adverse impact on this inventory when the relevant piece of information is absorbed by the market.<sup>24</sup> Historically, equity market

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20. See Dolgoplov, *supra* note 4, at 92-107.

21. See BERNHARD BERGMANS, *INSIDE INFORMATION AND SECURITIES TRADING: A LEGAL AND ECONOMIC ANALYSIS OF THE FOUNDATIONS OF LIABILITY IN THE U.S.A. AND THE EUROPEAN COMMUNITY* 128 (1991) (arguing that “specialists and market makers committed to trade the other side of unmatched transactions . . . are the only ones who are really ‘caused’ to trade [with insiders] even in the absence of inducing price effects”).

22. See Dolgoplov, *supra* note 4, *passim*.

23. Hans R. Stoll, *Alternative Views of Market Making*, in *MARKET MAKING AND THE CHANGING STRUCTURE OF THE SECURITIES INDUSTRY*, *supra* note 11, at 67, 78.

24. Dolgoplov, *supra* note 4, at 110-14. The existence of inventory management via adjustments of bid and ask prices by “jobbers,” i.e., market makers, on the LSE was noted a long time ago: “[W]hen [jobbers] find that their books are to a large extent ‘all one way’ they . . . quote[] prices which prevent their being either saddled with large lumps of stock which they have little chance of disposing of . . . or . . . of being made ‘bears’ against their will.” *Money-Market and City Intelligence*, *TIMES* (London), July 16, 1884, at 11. See also HENRY KEYSER, *THE LAW RELATING TO TRANSACTIONS ON THE STOCK EXCHANGE* 27 (London, Henry Butterworth 1850) (“The mere jobber generally tries to make his account even, to buy as much as he sells, or sell as much as

makers—including NYSE specialists—have not expressed any special concern about insider trading.<sup>25</sup> One significant exception relates to block transactions by “block dealers”/“upstairs dealers”/“upstairs market makers,” as it is common knowledge that many of these market participants try to identify and avoid information-based orders.<sup>26</sup>

Empirical studies attempting to prove that insider trading—along with informed trading more generally—increases bid-ask spreads in equity markets,<sup>27</sup> including numerous bid-ask spread decomposition studies aiming to quantify the “adverse selection” component,<sup>28</sup> seem to have confused informed trading with price volatility,<sup>29</sup> and other empirical research has further compromised the validity of this hypothesis.<sup>30</sup> Attempts to validate the link between informed trading and liquidity by showing a correlation between the adverse selection component and an estimate of the “probability of informed trading” variable<sup>31</sup> are also problematic for methodological reasons.

In addition to a wide variation of estimates of the “adverse selection” component, this component also captures forms of informed

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he buys . . .”).

25. Dolgoplov, *supra* note 4, at 108-10.

26. For an empirical analysis of this phenomenon, see Brian F. Smith et al., *Upstairs Market for Principal and Agency Trades: Analysis of Adverse Information and Price Effects*, 56 J. FIN. 1723 (2001). For a discussion of inventory management-related problems associated with block trades, see Dolgoplov, *supra* note 4, at 113-14.

27. See Dolgoplov, *supra* note 4, *passim*.

28. For a summary of empirical bid-ask spread decomposition studies and their respective estimates of the adverse selection component, see *id.* at 150-62. For a sample of recent studies, see Timotheos Angelidis & Alexandros Benos, *The Components of the Bid-Ask Spread: the Case of the Athens Stock Exchange*, 15 EUR. FIN. MGMT. 112 (2009); Charlie X. Cai et al., *Trading Frictions and Market Structure: An Empirical Analysis*, 35 J. BUS. FIN. & ACCT. 563 (2008); Kee H. Chung et al., *Specialists, Limit-Order Traders, and the Components of the Bid-Ask Spread*, 39 FIN. REV. 255 (2004); Brian Prucyk, *Specialist Risk Attitudes and the Bid-Ask Spread*, 40 FIN. REV. 223 (2005); Baljit Sidhu et al., *Regulation Fair Disclosure and the Cost of Adverse Selection*, 46 J. ACCT. RES. 697 (2008).

29. Dolgoplov, *supra* note 4, at 130-33, 172-74. The fact that volatility increases the relevant bid-ask spread, then called the “jobber’s turn” or the “turn of the market,” was described as early as 1875. See ARTHUR CRUMP, *THE THEORY OF STOCK EXCHANGE SPECULATION* 124-26 (London, Longmans, Green & Co., 4th ed. 1875).

30. See Dolgoplov, *supra* note 4, at 162, 171-74.

31. See Kee H. Chung & Mingsheng Li, *Adverse-Selection Costs and the Probability of Information-Based Trading*, 38 FIN. REV. 257 (2003); Joachim Grammig et al., *Knowing Me, Knowing You: Trader Anonymity and Informed Trading in Parallel Markets*, 4 J. FIN. MKTS. 385 (2001).

trading other than insider trading. Indeed, market makers in both equity and options markets are likely to be harmed by trading on short-lived information stemming from non-instantaneous dissemination of public announcements, advance knowledge of certain trading trends or incoming orders, or certain advantages in acquiring, processing, and aggregating public information.<sup>32</sup> The nature of trading on such short-lived information makes it much harder for a market maker to rebalance his inventory, and this harm might be compounded by the staleness of bid and ask quotes: "Even though the market maker's price is valid for only a few seconds, market makers can thus be expected to being 'picked off' when information comes out during that time and the market maker cannot officially change his quotes."<sup>33</sup> Similarly, taken as a whole, existing case studies of unregulated and weakly regulated securities markets do not lend strong support to the view that insider trading harms equity market makers and increases bid-ask spreads.<sup>34</sup>

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32. Perhaps the impact of this type of trading is captured in empirical studies that link informed trading and liquidity via such factors as anonymity of transactions and reputation of intermediaries or propose an information-based explanation for the practice of price improvements offered by market makers to selected traders. See Robert Battalio et al., *Reputation Effects in Trading on the New York Stock Exchange*, 62 J. FIN. 1243 (2007); Kaun Y. Lee & Kee H. Chung, *Information-Based Trading and Price Improvement*, 36 J. BUS. FIN. & ACCT. 754 (2009); Erik Theissen, *Trader Anonymity, Price Formation and Liquidity*, 7 EUR. FIN. REV. 1 (2003); Andrew C. Waisburd, *Anonymity and Liquidity: Evidence from the Paris Bourse* (Jan. 2003) (unpublished manuscript, on file with author).

33. TALEB, *supra* note 14, at 61. For instance, one category of equity market makers, NASDAQ dealers, had expressed concerns about the costs imposed by "bandits" operating on the Small Order Execution System ("SOES"), but these "SOES bandits" were short-term parasitic traders who exploited inflexible quotes but did not have any fundamental "inside" information. Dolgoplov, *supra* note 4, at 109 n.119. See also *Timpinaro v. SEC*, 2 F.3d 453, 455-56, 458 (D.C. Cir. 1993) (discussing potential harm from SOES trading to NASDAQ dealers that might increase bid-ask spreads); George J. Benston & Robert A. Wood, *Why Effective Spreads on NASDAQ Were Higher Than on the New York Stock Exchange in the 1990s*, 15 J. EMPIRICAL FIN. 17 (2008) (presenting an empirical link between SOES trading and bid-ask spreads on NASDAQ). A similar trading platform on the CBOE, the Retail Automated Execution System ("RAES"), resulted in complaints of CBOE market makers about losses inflicted by "RAES bandits." See Erin Arvedlund, *Options Arbitrage for the Masses*, THESTREET.COM, Jan. 22, 2000, <http://www.thestreet.com/story/866958/1/options-arbitrage-for-the-masses.html>; Mark Longo, *Time-Price Priority Gains: Customer Priority in Options Markets Comes Under Pressure*, TRADERS MAG., Feb. 2007, at 1.

34. One study analyzed the Berlin Stock Exchange in the late nineteenth and early

Furthermore, empirical studies that capture the correlation between greater informational advantages enjoyed by certain equity market makers and greater liquidity<sup>35</sup> do not necessarily reflect the informed trading effect.<sup>36</sup>

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twentieth centuries and concluded that, in this very active—and unregulated—securities market, “trading costs were low . . . in the decades before World War I, even by modern US standards and certainly by recent German standards.” Thomas Gehrig & Caroline Fohlin, *Trading Costs in Early Securities Markets: The Case of the Berlin Stock Exchange 1880-1910*, 10 REV. FIN. 587, 589-90 (2006). Puzzled by this result, the study hypothesized that “the Berlin banks may have intervened in price determination as informed market makers and thereby reduced adverse selection costs.” *Id.* at 610. By contrast, a related study of the NYSE argued that the adverse selection component of bid-ask spreads for a representative sample of common stocks increased from 49% in 1900 to 69% in 1910. Caroline Fohlin et al., *Liquidity and Competition in Unregulated Markets: The New York Stock Exchange Before the SEC* 44 tbl.4 (Feb. 2009) (unpublished manuscript, on file with author), available at <http://ssrn.com/abstract=1341629>. This result is surprising because of the lack of evidence that NYSE specialists were concerned about insider trading. The obtained results also displayed several inconsistencies when broken down by subgroups. *See id.* at 22-23, 44 tbl.4. Furthermore, the study’s bid-ask spread decomposition methodology ignored the existence of the inventory holding component, which probably distorted the results. *See* Dolgoplov, *supra* note 4, at 173 n.502. Another study examined the modern Prague Stock Exchange, a weakly regulated market where insider trading is common, and concluded that the adverse selection component averages at 17%, a surprisingly low—and even lower—estimate compared to similar empirical studies analyzing more strictly regulated securities markets in the United States. Jan Hanousek & Richard Podpiera, *Informed Trading and the Bid-Ask Spread: Evidence from an Emerging Market*, 31 J. COMP. ECON. 275, 295 (2003). On the other hand, a study of the weakly regulated Mexican Stock Exchange concluded that the adverse selection component of the bid-ask spread averages at 95%. Ana Cristina Silva & Gonzalo Chavez, *Components of Execution Costs: Evidence of Asymmetric Information at the Mexican Stock Exchange*, 12 J. INT’L FIN. MKTS. INSTITUTIONS & MONEY 253, 265 (2002). Inconsistent results produced by these studies probably reflect the unreliability of existing bid-ask spread decomposition methodologies. *See* Dolgoplov, *supra* note 4, at 149-62, 172-74.

35. *See* Shantaram P. Hegde & Robert E. Miller, *Market-Making in Initial Public Offerings of Common Stocks: An Empirical Analysis*, 24 J. FIN. & QUANTITATIVE ANALYSIS 75 (1989) (discussing underwriting activities); Leonardo Madureira & Shane Underwood, *Information, Sell-Side Research, and Market Making*, 90 J. FIN. ECON. 105 (2008) (discussing specialization in securities research); H. Nejat Seyhun, *Insider Trading and the Effectiveness of Chinese Walls in Securities Firms*, 4 J.L. ECON. & POL’Y 369 (2008) (discussing board representation).

36. *See* Dolgoplov, *supra* note 4, at 128 n.220.

B. Significance of the Characteristics of Options as Complex Securities,  
the Structural Features of Options Markets, and the Process of  
Providing Liquidity in Options

Losses of options market makers are different from losses of equity market makers because of the differences between these two types of financial instruments.<sup>37</sup> A typical option is a complex security with a payoff linked to a future characteristic of the relevant underlying security and a predetermined expiration date, and it is usually created by a party other than the issuer of the underlying security. Options are also more volatile and hence riskier than their underlying securities because of an inherently higher leverage: "Options are highly leveraged instruments [whose values] characteristically shrink or explode at rapidly changing and sometimes greater rates than the underlying instrument."<sup>38</sup> Non-linearity of options is not just a mathematical concept; it is engrained in the minds of professional traders: "Options are *multidimensional and nonlinear*. . . . That's what makes options what they are, and that's what makes the options business different from other businesses."<sup>39</sup>

Options market makers have to take positions in a variety of options on the same underlying security rather than simply match incoming trades in the same asset, as equity market makers do. As one commentator observed,

[Options] market makers must use their own capital to complete anywhere from 40% to 100% of trades in the options in which they make markets. That's because buyers and sellers of options can pick and choose between dozens of options positions on the same stock with a variety of strike prices and expiration dates, making it

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37. While the leading treatises on the subject argue that insider trading harms market makers, they offer credible evidence of harm pertaining *only* to options market makers. 18 DONALD C. LANGEVOORT, INSIDER TRADING REGULATION, ENFORCEMENT AND PREVENTION § 1.3 (2009); WANG & STEINBERG, *supra* note 5, § 3:3.6.

38. BAIRD, *supra* note 11, at 6. The standard approach to estimating option values is the Black-Scholes-Merton option pricing model. Fisher Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637 (1973); Robert C. Merton, *Theory of Rational Option Pricing*, 4 BELL J. ECON. & MGMT. SCI. 141 (1973).

39. MARTIN P. O'CONNELL, THE BUSINESS OF OPTIONS: TIME-TESTED PRINCIPLES AND PRACTICES 7 (2001).

practically impossible to match each transaction . . . .<sup>40</sup>

Likewise, one options market maker noted that

[t]he multitude of strikes and calendar series . . . may easily push the distinct options traded into hundreds for each underlying instrument, many of which may not trade on a regular basis. While an underlying-asset market maker is always a scalper on a short-term basis, this observation is not necessarily true of options market makers. . . . Option market makers assume a large carryover risk that other financial dealers may not, and this longer-term assumption of risk may affect dealer price.<sup>41</sup>

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40. Suzanne McGee, *Where Have the Inside Traders Gone? Options Markets Are Their New Home*, WALL ST. J., Apr. 23, 1997, at C20.

41. BAIRD, *supra* note 11, at 5. This observation is confirmed by empirical studies suggesting that equity market makers can rebalance their inventories relatively quickly. Similar studies of futures markets come to the same conclusion, which is consistent with the fact that futures contracts with the same expiration date have only *one* price as opposed to options on the same stock with the same expiration date but *different* exercise prices. For such studies of equity and futures markets, see Alex Frino et al., *Life in the Pits: Competitive Market Making and Inventory Management—Further Australian Evidence*, 9 J. MULTINAT'L FIN. MGMT. 373 (1999) (evidence from the Sydney Futures Exchange); Joel Hasbrouck & George Sofianos, *The Trades of Market Makers: An Empirical Analysis of NYSE Specialists*, 48 J. FIN. 1565 (1993) (evidence from the NYSE); Gregory J. Kuserk & Peter R. Locke, *Scalper Behavior in Futures Markets: An Empirical Examination*, 13 J. FUTURES MKTS. 409 (1993) (evidence from the Chicago Mercantile Exchange); Steven Manaster & Steven C. Mann, *Life in the Pits: Competitive Market Making and Inventory Control*, 9 REV. FIN. STUD. 953 (1996) (same); William L. Silber, *Marketmaker Behavior in an Auction Market: An Analysis of Scalpers in Futures Markets*, 39 J. FIN. 937 (1984) (evidence from the New York Futures Exchange); Andy Snell & Ian Tonks, *Determinants of Quote Price Revisions on the London Stock Exchange*, 105 ECON. J. 77 (1995) (evidence from the LSE); Yiuman Tse, *Market Microstructure of FT-SE 100 Index Futures: An Intraday Empirical Analysis*, 19 J. FUTURES MKTS. 31 (1999) (evidence from the London International Financial Futures and Options Exchange); Marios Panayides, *The Specialist's Participation in Quoted Prices and the NYSE Continuity Rule* (Yale Int'l Ctr. for Fin., Working Paper 04-05, 2004), available at <http://ssrn.com/abstract=492423> (evidence from the NYSE). However, affirmative obligations imposed on certain market makers, such as NYSE specialists, can interfere with the process of inventory management. See Marios A. Panayides, *Affirmative Obligations and Market Making with Inventory*, 86 J. FIN. ECON. 513 (2007). The only empirical study known to the author suggesting that options market makers are able to "end the trading day with very low levels of inventory in order to mitigate their exposure to overnight inventory holding risk" analyzed commodity rather than equity options. Naomi Boyd, Market Makers in

Another options market maker made a similar remark: “I can count on one hand the number of times the option gods smiled upon me in such a way as to allow me to immediately scalp an option. . . . Market makers joke that very low-volume options trade ‘by appointment only.’”<sup>42</sup> Similarly, two industry professionals observed that “[t]wo-sided order flow is generally more common in larger issues that have greater volume . . . . [F]or most options market makers, however, two-sided order flow is rare.”<sup>43</sup> As a consequence, an options market maker “may end up owning or shorting contracts that he or she must be prepared to hold for long periods of time (even to expiration) unless he or she wishes to liquidate to other market makers, thus giving up the edge.”<sup>44</sup> On the other hand, despite the illiquidity of individual options, the inventory holding risk of options market makers may be somewhat mitigated:

Although order flow for any particular strike price and expiration date might very well be sparse, the order flow for all options on a particular underlying asset is much larger. Because options are derivative assets, all options on the same underlying asset are very close substitutes for each other. Marketmakers take advantage of this relationship to reduce their inventory risk.<sup>45</sup>

Overall, options market makers have problems with managing their inventories because they deal in a variety of relatively illiquid options offered on the same equity instrument.<sup>46</sup> Inventory management also has an influence on certain characteristics of such options,<sup>47</sup> and, as one

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Options Markets: An Investigation of the NYMEX Natural Gas Market 36 (n.d.) (unpublished manuscript, on file with author), *available at* [http://www.fma.org/Texas/Papers/Market\\_Making\\_in\\_Options\\_Markets\\_FMA.pdf](http://www.fma.org/Texas/Papers/Market_Making_in_Options_Markets_FMA.pdf).

42. DAN PASSARELLI, *TRADING OPTION GREEKS: HOW TIME, VOLATILITY, AND OTHER PRICING FACTORS DRIVE PROFIT* 317 (2008).

43. WILLIAMS & HOFFMAN, *supra* note 14, at 58.

44. BAIRD, *supra* note 11, at 5.

45. Silber, *supra* note 14, at 490. *See also id.* at 496 (arguing that “the principle of synthetic puts and calls allows the marketmaker to quote bid and offer prices for options that have little or no order flow”).

46. *See* McGee, *supra* note 40. Furthermore, “[t]he heterogeneity of options compounds [market makers’] costs because it forces [them] to monitor the prices and inventories of several related yet different options on a stock.” Anand M. Vijh, *Liquidity of the CBOE Equity Options*, 45 J. FIN. 1157, 1171 (1990).

47. The existence of the so-called “volatility smile”—also known as the “volatility



industry professional remarked, “[t]here is no doubt that from a market maker’s point of view, an option’s fair value depends on his current position.”<sup>48</sup>

Unlike their counterparts in equity markets, options market makers in many instances do not simultaneously buy and sell the same security and profit from the bid-ask spread alone. Instead, they “write” options, in exchange for a premium, and bear the risk of their future exercise,<sup>49</sup> as secondary trading of options is often thin.<sup>50</sup> As a CBOE options

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skew”—the puzzling phenomenon of *different* implied volatilities for options on the same underlying asset with *different* strike prices but the *same* expiration date, is at least partially explained by options market makers’ inventory management, which is influenced by supply and demand trends for options with different strike prices. See CHARLES M. COTTLE, *OPTIONS: PERCEPTION AND DECEPTION: POSITION DISSECTION, RISK ANALYSIS, AND DEFENSIVE TRADING STRATEGIES* 298 (1996); M.S. JOSHI, *THE CONCEPTS AND PRACTICE OF MATHEMATICAL FINANCE* 73 (2003); NATENBERG, *supra* note 14, at 414; DENNIS YANG, *QUANTITATIVE STRATEGIES FOR DERIVATIVES TRADING* 3-4 (2006); Nicolas P.B. Bollen & Robert E. Whaley, *Does Net Buying Pressure Affect the Shape of Implied Volatility Functions*, 59 J. FIN. 711 (2004); Len Yates, *Exploiting Volatility for Maximum Gains*, in DAVID L. KAPLAN, *THE NEW OPTION SECRET: VOLATILITY* 251, 261 (1996). But there are other possible—and, sometimes, interacting—forces contributing to the volatility smile’s existence. See FRANS DE WEERT, *AN INTRODUCTION TO OPTIONS TRADING* 103 (2006) (the combination of the fact that volatility is price direction-dependent and the necessity of more frequent re-hedging of an option position with a lower strike price when the price of the underlying asset moves away from a higher strike price); Bruno Dupire, *A Unified Theory of Volatility*, in *DERIVATIVES PRICING: THE CLASSIC COLLECTION* 185, 187 (Peter Carr ed., 2004) (jumps in the underlying asset’s price); Steve Hotopp, *Practical Issues Concerning Volatility and Its Measurement, Past and Predicted*, in *VOLATILITY IN THE CAPITAL MARKETS: STATE-OF-THE-ART TECHNIQUES FOR MODELING, MANAGING, AND TRADING VOLATILITY* 1, 2-3 (Israel Nelken ed., 1997) (the non-normality of the underlying asset’s returns); Hersh Shefrin, *Irrational Exuberance and Option Smiles*, FIN. ANALYSTS J., Nov.-Dec. 1999, at 91 (heterogeneous beliefs of market participants); Klaus Bjerre Toft & Brian Prucyk, *Options on Leveraged Equity: Theory and Empirical Tests*, 52 J. FIN. 1151 (1997) (the relevant company’s financial leverage); Interview with a former CBOE options market maker “A” in Chicago, Ill. (June 30 & July 10, 2009) [hereinafter “A” Interview] (price limits and minimum price increments).

48. YANG, *supra* note 47, at 4. See also WILLIAMS & HOFFMAN, *supra* note 14, at 237 (“[W]hen a market maker determines whether he or she will pay (or sell) one price over another, he or she determines not only the theoretical value of the option but also whether or not the option is a specific fit for risk-management purposes.”).

49. See Dan Colarusso, *Tales from the Pits: Trapped by Insider Trading*, THESTREET.COM, June 4, 1998, <http://www.thestreet.com/stocks/optionsbuzz/15765.html>.

50. BAIRD, *supra* note 11, at 5.

market maker noted, “we are usually not selling from ‘inventory’. Rather, we are creating the options to sell to the buyer.”<sup>51</sup> Focusing on bid-ask spreads as the source of profits from *buying* and *selling* the *same* asset obscures the reality that options market makers often *create different* leveraged securities and profit from options premiums—not just bid-ask spreads arising from nearly simultaneous roundtrip transactions.<sup>52</sup>

More generally, because of the heterogeneity of their portfolios, the characteristics of derivatives positions, and the complexity of their trading strategies, options market makers resort to sophisticated techniques to manage their risks. These techniques typically involve the use of underlying securities and related derivatives, such as options and futures.<sup>53</sup> In the process, monitoring various risk metrics, such as the “Greeks,”<sup>54</sup> becomes critical for providing liquidity in options markets.<sup>55</sup>

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51. Colarusso, *supra* note 49. Drawing on the same concept, one empirical study maintained that options’ bid and ask prices are asymmetrically distributed around such options’ true values and provided the following explanation: “Since the loss is limited for buying an option but unlimited for selling . . . the adverse-selection cost [of an options market maker] is larger for buy orders than sell orders . . .” Kalok Chan & Y. Peter Chung, *Asymmetric Price Distribution and Bid-Ask Quotes in the Stock Options Market 3* (Feb. 1999) (unpublished manuscript, on file with author), *available at* <http://home.ust.hk/~kachan/research/spread.pdf>.

52. Even the leading primer on derivatives describes options market makers as entities that “make their profits from the bid-ask spread.” JOHN C. HULL, *OPTIONS, FUTURES, AND OTHER DERIVATIVES* 189 (7th ed. 2008). A federal district court similarly argued that a CBOE market maker “derives his profit from the ‘spread’—that is, the difference between the bid and asked price.” *Chill v. Green Tree Fin. Corp.*, 181 F.R.D. 398, 411 (D. Minn. 1998).

53. See BAIRD, *supra* note 11, chs. 5-8.

54. The Greeks are popular risk metrics that essentially capture the price sensitivity of an option to the parameters of the Black-Scholes-Merton option pricing model and their derivatives, such as “delta” as the “[s]ensitivity of the option price to the change in the underlying asset price,” “gamma” as the “[s]ensitivity of the option delta to the change in the underlying asset price,” “vega,” also known as “kappa,” as the “[s]ensitivity of the option price to the change in implied volatility,” “theta” as the “[e]xpected change in the option price with the passage of time assuming risk-neutral growth in the asset,” and “rho” as the “[s]ensitivity of the option price to interest rates or dividend payout.” TALEB, *supra* note 14, at 10. For short definitions of these Greeks and less frequently used risk metrics, their shortcomings, and useful modifications, see *id.* at 112-13. For a more detailed analysis of these risk metrics, see *id.* chs. 7-11.

55. See BAIRD, *supra* note 11, chs. 5-8 (an options market maker stressing the importance of managing risk exposure to various Greeks); Mel Jameson & William

Accordingly, “the derived nature of options means the dimension of risk management is broadened to the control of the sensitivity of the option portfolio value to various Greek variables rather than a single target inventory level.”<sup>56</sup> As pointed out by an options market maker, option positions that are neutral with respect to several Greek variables “are actually employed, or at least attempted, by traders such as market makers who try to make their profits from the difference between the bid and offer of an options quote, and not from assuming market risk.”<sup>57</sup> Another options market maker remarked that “the real skill of market making comes in maintaining the appropriate delta-neutral limited-risk option carryover positions. Without a risk-defined strategy the market maker will risk losing not only the liquidity function profit but also his or her entire capital.”<sup>58</sup> Indeed, managing Greeks is pivotal for profitability: “Derivatives market making in both standard and nonstandard products is an attractive occupation because although every option is relatively illiquid, the market as a whole for the Greeks is very liquid. . . . The compensation for traders comes from offsetting the Greek risks

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Wilhelm, *Market Making in the Options Markets and the Costs of Discrete Hedge Rebalancing*, 47 J. FIN. 765 (1992) (an empirical study arguing that bid-ask spreads in options markets are partly determined by gamma and vega); David Michayluk et al., *Decomposing the Bid-Ask Spread of Stock Options: A Trade and Risk Indicator Model* (Sept. 4, 2006) (unpublished manuscript, on file with author), *available at* <http://www.docs.fce.unsw.edu.au/banking/seminar/2006/Yip.pdf> (an empirical study arguing that bid-ask spreads in options markets are partly determined by delta, gamma, and vega).

56. Michayluk et al., *supra* note 55, at 12.

57. LAWRENCE G. McMILLAN, *OPTIONS AS A STRATEGIC INVESTMENT* 881 (4th ed. 2002). *See also In re Motel 6 Sec. Litig.*, 161 F. Supp. 2d 227, 243-44 (S.D.N.Y. 2001) (discussing the delta-neutral hedging strategy of the plaintiff options market makers); JOHN C. COX & MARK RUBINSTEIN, *OPTIONS MARKETS* 308 (1985) (arguing that “many Market Makers attempt to adhere quite strictly to a delta-neutral strategy”). For an early observation suggesting that options market makers prefer to avoid position-taking, see LEONARD R. HIGGINS, *THE PUT-AND-CALL* 38-39, 55 (1902). On the other hand, an industry professional noted that the increasing competition and tightening bid-ask spreads are forcing options market makers to engage in proprietary trading, i.e., position-taking, in addition to providing liquidity. “A” Interview, *supra* note 47. However, as noted by another industry professional, “speculative or directional strategies require the expenditure of time and effort in developing a technical or fundamental forecasting model of some sort, whereas market making is already a full-time trading activity.” BAIRD, *supra* note 11, at 119.

58. BAIRD, *supra* note 11, at 152-53.

(delta, vega, gamma) more rapidly than predicted.”<sup>59</sup>

To immunize themselves from price fluctuations and to guarantee a profit by creating an opposite synthetic position at a lower cost—or to remove at least some degree of risk—options market makers could engage in “static replication”/“static hedging.” This approach refers to replicating the payoffs of an option position with other financial instruments to create “a match . . . that does not require continuous rebalancing.”<sup>60</sup> For instance, options market makers use available options on the same underlying security to create a near-perfect static hedge based on the put-call parity relationship<sup>61</sup> or to enter into insurance-like positions to protect themselves from extreme price movements.<sup>62</sup> But static replication is often problematic because the components of the required hedge either do not exist or are traded in illiquid markets with high transaction costs, because the asset to be replicated, such as an option, can be highly nonlinear, which makes it problematic to construct a hedge consisting of more liquid assets with linear payoffs, or because parameters influencing the value of the asset to be replicated may change.<sup>63</sup>

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59. TALEB, *supra* note 14, at 53.

60. *Id.* at 256. *See also id.* at 257 (“The best static hedge is the one that matches the Greeks on every state across all the nodes.”).

61. *See* MCDONALD, *supra* note 14, at 433; *see also* BAIRD, *supra* note 11, ch. 5. As an industry professional remarked, “[h]edging options with . . . a synthetically identical option by using the put-call-parity removes all the risk all the time—it not only hedges your delta, but also your gamma, vega and theta, etc. . . . It is a robust hedge against jumps in the asset price and what is known as stochastic volatility.” ESPEN GAARDER HAUG, *Option Pricing and Hedging from Theory to Practice: Know Your Weapon III*, in DERIVATIVES: MODELS ON MODELS 33, 56 (2007).

62. *See* MCDONALD, *supra* note 14, at 433.

63. SALIH N. NEFTCI, PRINCIPLES OF FINANCIAL ENGINEERING 177 (2d ed. 2008); TALEB, *supra* note 14, at 256-57. In the case of equity options, the market for the underlying security is typically liquid, but covering written calls or puts by simply buying or shorting an equivalent number of shares, i.e., linear instruments, serves as a good static hedge only if such options are subsequently exercised. An options market maker would still be exposed to potentially large risks *ex ante*, and buying or shorting a large number of shares by itself could be problematic for a number of reasons. However, static replication can be practical in such cases as hedging complex “exotic” options by using “plain vanilla” options, as replicating portfolios would consist of nonlinear instruments. *See* Peter Carr et al., *Static Hedging of Exotic Options*, 53 J. FIN. 1165 (1998); Emmanuel Derman et al., *Static Options Replication*, J. DERIVATIVES, Summer 1995, at 78; Morten Nalholm & Rolf Poulsen, *Static Hedging and Model Risk*

Another approach employed by options market makers is “dynamic replication”/“dynamic hedging,” a strategy of “sticking to a minimum Greek exposure and rebalancing continuously to achieve a certain neutrality” for a given position.<sup>64</sup> In the context of dynamic hedging, an option position is “neutral” with respect to a Greek for a *small* change in the variable in question, but a large change, as well as changes in other variables, including the passage of time, could make this position non-neutral.<sup>65</sup> Another factor is that there are some economies of scale in dynamic hedging, which helps manage transaction costs.<sup>66</sup>

A simple dynamic hedging strategy, however, such as delta hedging with the underlying security, cannot completely immunize options market makers. As summarized by an industry professional, “[e]very knowledgeable market maker or option trader knows very well that [he] cannot remove all risk or even most of the risk by dynamic delta replication.”<sup>67</sup> One solution is to neutralize a given position by engaging in dynamic hedging with respect to several Greeks: despite potential changes caused by market conditions, “the profitability of an option position or portfolio will be much more stable when it is neutral with respect to several of these measures of exposure.”<sup>68</sup>

Dynamic hedging with respect to gamma and vega is common,<sup>69</sup> as this approach protects options market makers from large price jumps and

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for *Barrier Options*, 26 J. FUTURES MKTS. 449 (2006).

64. TALEB, *supra* note 14, at 258. The concept of dynamic hedging of an option by combining positions in the underlying asset and the risk-free asset is at the heart of the Black-Scholes-Merton option pricing model. See Black & Scholes, *supra* note 38; Merton, *supra* note 38. Dynamic hedging has been known for a long time; for instance, the following observation about options trading in the United Kingdom was made a century ago: “It is usual for the person who is to receive the option money [i.e., the premium] to minimize his risk by selling or buying half the stock which he has eventually to accept or deliver, and later on he will judge by the market position whether it will suit him to sell or buy the rest of the stock before the option is declared.” WYNDHAM A. BEWES, STOCK EXCHANGE LAW AND PRACTICE 48 (1910).

65. See LAWRENCE G. McMILLAN, *McMILLAN ON OPTIONS* 448, 491, 495 (2d ed. 2004).

66. HULL, *supra* note 52, at 376.

67. HAUG, *supra* note 61, at 56.

68. McMILLAN, *supra* note 65, at 455.

69. HULL, *supra* note 52, at 377. According to one industry professional, hedging gamma and vega is critical for profitable options market making. Interview with a former CBOE options market maker “B” in Chicago, Ill. (July 14 & 21, 2009) [hereinafter “B” Interview].

changing volatility<sup>70</sup> and creates more stable hedges that need to be rebalanced less frequently compared to delta-neutral hedges.<sup>71</sup> On the other hand, dynamic hedging of gamma and theta necessitates the use of nonlinear instruments, such as options on the same underlying security,<sup>72</sup> and hedging both of these Greeks usually requires at least two traded options.<sup>73</sup> The nature of dynamic hedging also highlights difficulties with making markets in options as nonlinear derivatives compared to futures as linear derivatives because typically the latter have more stable hedge positions and require only delta hedging.<sup>74</sup>

Because rebalancing cannot be instantaneous and costless, dynamic hedging still leaves the risk of the market moving against options market makers.<sup>75</sup> In practice, options market makers “do not hedge every option dynamically; instead they hedge only their extremely small *net* position.”<sup>76</sup> Furthermore, the viability of both static and dynamic

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70. HULL, *supra* note 52, at 375.

71. *Id.* at 377; “A” Interview, *supra* note 47; “B” Interview, *supra* note 69. In practice, “[g]amma and vega are monitored, but are not usually managed on a daily basis.” HULL, *supra* note 52, at 377.

72. HULL, *supra* note 52, at 376. *See also* BAIRD, *supra* note 11, at 154 (“The basis of all successful risk hedging is both delta and kappa/vega hedging. Since the only way to hedge an option’s kappa/vega is with another option, all effective risk hedging must involve option spread trading.”); TALEB, *supra* note 14, at 260 (“Trading options against options proves to be a safe way to hedge against the host of second, third derivatives, and so on [such as gamma and vega] that plague the trader.”). Another industry professional also emphasized the importance of hedging options with options in addition to delta hedging: “[M]arket makers often hedge residual risk with delta hedging, but they tend to try truncating their tail risk [with options] . . . . Going long or truncating your wing risk does not necessarily mean you get an edge with expected profit, it is just a way to . . . insure you from blowing up.” HAUG, *supra* note 61, at 62.

73. HULL, *supra* note 52, at 373.

74. *See* TALEB, *supra* note 14, at 126; *see also* HULL, *supra* note 52, at 379.

75. *See* Emanuel Derman & Nassim Nicholas Taleb, *The Illusions of Dynamic Replication*, 5 QUANTITATIVE FIN. 323, 323-25 (2005) (pointing out that dynamic replication is constrained by discontinuous price movements of the underlying asset, transaction costs, and liquidity constraints); Jameson & Wilhelm, *supra* note 55, at 778 (arguing, on the basis of empirical evidence, that “the inability to costlessly and continuously rebalance an option portfolio imposes undiversifiable risks on market participants [such as options market makers]”).

76. Derman & Taleb, *supra* note 75, at 323. *See also* MCMILLAN, *supra* note 57, at 167 (“Delta-neutral hedging is . . . even difficult for market-makers, who pay no commissions.”); TALEB, *supra* note 14, at 53 (“The inherent instability of derivative position and their dependence on time and market levels makes it clearly impossible to

hedging with related options on the same underlying security is problematic because “it is difficult to find options or other nonlinear derivatives that can be traded in the volume required at competitive prices.”<sup>77</sup> In the end, options market makers still have to assume substantial order flow-related risks: “Most [options] market makers like to trade flat—that is, profit from the bid-ask spread and strive to lower exposure to direction, time, volatility, and interest as much as possible. But market makers are at the mercy of customer orders, or paper, as it’s known in the industry.”<sup>78</sup>

Risk exposures of options market makers are unique because they trade multiple options with different expiration dates and strike prices, which are less liquid and more leveraged than underlying securities, face limitations of dynamic and static hedging of options as nonlinear derivatives, and assume additional risk by *creating* options instead of *trading* from their inventories. Overall, “much of the skill of option market making comes from being able to manage [position-related] risks well in a large carryover position until expiration,”<sup>79</sup> and inventory management is more complex than it is for equity market makers.<sup>80</sup> Consequently, the adverse impact of a trade with a better-informed

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define oneself as completely ‘flat,’ except when the book is empty of trades, a rare occurrence.”); Colarusso, *supra* note 49 (“To the extent that positions may go unhedged, [options market makers are] going to have dynamic risk.”); Antoine Giannetti et al., *Inventory Hedging and Option Market Making*, 7 INT’L J. THEORETICAL & APPLIED FIN. 853, 874 (2004) (“[In the context of the presented model of dynamic hedging,] option market making risk is essentially a hedging risk.”).

77. HULL, *supra* note 52, at 376. In practice, options market makers also use options on highly correlated assets, which may mitigate this problem to some degree. “A” Interview, *supra* note 47.

78. PASSARELLI, *supra* note 42, at 317. See also David Bukey, *Yahuda Belsky: A Market Maker’s Perspective*, FUTURES & OPTIONS TRADER, June 2007, at 34, 35 (“Market makers sold calls they thought were overpriced, but they couldn’t create a spread (*i.e.*, buy higher-strike calls) or buy stock as a hedge at a decent price. Acting as a market maker in a one-sided environment isn’t always fun and games.”).

79. BAIRD, *supra* note 11, at 6-7.

80. As one empirical study concluded, options market makers “face risks in managing inventory that are *unique* to the options markets.” Jameson & Wilhelm, *supra* note 55, at 765 (emphasis added). The fact that market making in options is more problematic than in equity instruments was pointed out as early as 1910 in the context of securities markets in the United Kingdom: “The business of [an equity market maker] consists almost entirely in covering his business as he goes along . . . . With Options, however, it is practically impossible to ‘undo’ the business thoroughly . . . .” LAWRENCE R. DICKSEE, BUSINESS ORGANIZATION 128-29 (1910).

insider on an options market maker's inventory is potentially large because of difficulties with rebalancing positions rapidly. The fact that options market makers create leveraged securities also stacks the odds against them: "Option writers who trade with insiders are perhaps the most clearly and seriously harmed of all, because of the leverage that works for the insiders and against the writers."<sup>81</sup> Overall, this analysis suggests that options market makers are vulnerable to insider trading.

## II. EVIDENCE OF LOSSES OF OPTIONS MARKET MAKERS FROM INSIDER TRADING

This Section contends that losses of options market makers are evident from the frequent occurrence of insider trading in options markets, as suggested by numerous empirical studies, the position taken by the options industry, numerous relevant lawsuits, and other evidence. Part A examines empirical studies and other evidence on the occurrence of informed trading in options and provides an explanation for this phenomenon. Part B reviews empirical bid-ask spread decomposition studies that analyze options markets and concludes that such studies are inconclusive and contradictory. Part C argues that the position adopted by the options industry and the existence of case law in this area demonstrate the cost of insider trading to options market makers and possible implications for the liquidity of options markets.

### A. Empirical Evidence on the Occurrence of Informed Trading in Options Markets and the Reasons for Its Existence

Numerous empirical studies have suggested that informed trading in options, with illegal insider trading probably constituting a significant portion of such transactions, is quite common and that, under certain conditions, informed traders may prefer to trade in options instead of stocks to capitalize on their information,<sup>82</sup> although this conclusion is

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81. 3 BROMBERG & LOWENFELS, *supra* note 1, § 6:116.

82. See Kaushik I. Amin & Charles M.C. Lee, *Option Trading, Price Discovery, and Earnings News Dissemination*, 14 CONTEMP. ACCT. RES. 153 (1997); Tom Arnold et al., *Do Option Markets Substitute for Stock Markets? Evidence from Trading on Anticipated Tender Offer Announcements*, 15 INT'L REV. FIN. ANALYSIS 247 (2006); Timothy Cairney & Judith Swisher, *The Role of the Options Market in the Dissemination of Private Information*, 37 J. BUS. FIN. & ACCT. 1015 (2004); Charles



contested by several empirical studies.<sup>83</sup> A related group of studies has suggested the existence of informed trading in credit default swaps, i.e., complex over-the-counter derivatives with optionality features,<sup>84</sup>

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Cao et al., *Informational Content of Option Volume Prior to Takeovers*, 78 J. BUS. 1073 (2005); Sugato Chakravarty et al., *Informed Trading in Stock and Option Markets*, 59 J. FIN. 1235 (2004); Kam C. Chan et al., *Informed Trading Under Different Market Conditions and Moneyness: Evidence from TXO Options*, 17 PAC.-BASIN FIN. J. 189 (2009); Carl R. Chen et al., *Information Flows Between the Stock and Option Markets: Where Do Informed Traders Trade?*, 14 REV. FIN. ECON. 1 (2005); David Easley et al., *Option Volume and Stock Prices: Evidence on Where Informed Traders Trade*, 53 J. FIN. 431 (1998); Narayanan Jayaraman et al., *Informed Trading Around Merger Announcements: An Empirical Test Using Transaction Volume and Open Interest in Options Markets*, 37 FIN. REV. 45 (2001); Jason Lee & Cheong H. Yi, *Trade Size and Information-Motivated Trading in the Options and Stock Markets*, 36 J. FIN. & QUANTITATIVE ANALYSIS 485 (2001); Haim Levy & James A. Yoder, *The Behavior of Option Implied Standard Deviations Around Merger and Acquisition Announcements*, 28 FIN. REV. 261 (1993); Dan C. McGuire & Ronald J. Kudla, *Option Prices as an Indicator of Stock Return Expectations*, 18 J. BUS. FIN. & ACCT. 421 (1991); Jun Pan & Allen M. Potesman, *The Information in Option Volume for Future Stock Prices*, 19 REV. FIN. STUD. 871 (2006); Aamir M. Sheikh & Ehud I. Ronn, *A Characterization of Daily and Intraday Behavior of Returns on Options*, 49 J. FIN. 557 (1994); Joshua Turkington & David Walsh, *Informed Traders and Their Market Preference: Empirical Evidence from Prices and Volumes of Options and Stock*, 8 PAC.-BASIN FIN. J. 559 (2000); Natividad Blasco et al., *Does Informed Trading Occur in the Options Market? Some Revealing Clues* (Aug. 2006) (unpublished manuscript, on file with author), available at [http://ssrn.com/abstract\\_id=905204](http://ssrn.com/abstract_id=905204); Xuewu Wesley Wang, *Informed Option Trading Around Merger Announcements* (July 12, 2008) (unpublished manuscript, on file with author), available at [http://ssrn.com/abstract\\_id=1159206](http://ssrn.com/abstract_id=1159206).

83. See Kalok Chan et al., *The Informational Role of Stock and Option Volume*, 15 REV. FIN. STUD. 1049, 1051-52 (2002) (suggesting that “informed investors initiate trades [via market orders] in the stock market only”); Siu Kai Choy & Jason Wei, *Option Trading: Information or Differences of Opinion?* 29 (Apr. 23, 2009) (unpublished manuscript, on file with author), available at [http://ssrn.com/abstract\\_id=1395205](http://ssrn.com/abstract_id=1395205) (arguing that “informed trading is not detected in options”).

84. See Viral V. Acharya & Timothy C. Johnson, *Insider Trading in Credit Derivatives*, 84 J. FIN. ECON. 110 (2007); Antje Berndt & Anastasiya Ostrovnaya, *Do Equity Markets Favor Credit Market News Over Options Market News?* (Aug. 2008) (unpublished manuscript, on file with author), available at <http://www.andrew.cmu.edu/user/aberndt/BeOs08.pdf>; Charles Cao et al., *The Information Content of Option-Implied Volatility for Credit Default Swap Valuation* (Sept. 9, 2009) (unpublished manuscript, on file with author), available at [http://ssrn.com/abstract\\_id=889867](http://ssrn.com/abstract_id=889867). One of these studies specifically addressed the issue of liquidity and found no evidence that “the degree of asymmetric information adversely affects prices or liquidity in either the equity or credit markets.” Acharya & Johnson, *supra*, at

although there is no clear lead-lag relation relative to exchange-traded standardized equity options.<sup>85</sup> Several studies also have attempted to identify types of options preferred by informed traders.<sup>86</sup> Furthermore, there is evidence that, in some instances, insider trading dominates options markets.<sup>87</sup> The explanation for these observations is that options

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85. See Berndt & Ostrovnaya, *supra* note 84; Cao et al., *supra* note 84.

86. Conventional wisdom suggests that informed trades are more likely to be made in near-maturity/out-of-the-money—i.e., low time premium/high-leverage—options and empirical studies generally support this view. See Amber Anand & Sugato Chakravarty, *Stealth Trading in Options Markets*, 42 J. FIN. & QUANTITATIVE ANALYSIS 167, 186 (2007) (preference for at-the-money options); Cao et al., *supra* note 82, at 1097 (preference for near-maturity/out-of-the-money options); Chakravarty et al., *supra* note 82, at 1238 (preference for out-of-the-money options); Chan et al., *supra* note 82, at 207 (preference for out-of-the-money options); Chen et al., *supra* note 82, at 16 (preference for out-of-the-money options); Jayaraman et al., *supra* note 82, at 64, 68 (preference for near-maturity/out-of-the-money options); Blasco, *supra* note 82, at 11, 13, 15 (preference for out-of-the-money options); Gautam Kaul et al., *Informed Trading and Options Spreads* 16 (Apr. 2004) (unpublished manuscript, on file with author), available at [http://ssrn.com/abstract\\_id=547462](http://ssrn.com/abstract_id=547462) (preference for at-the-money and slightly out-of-the-money options); Michayluk et al., *supra* note 55, at 21 (preference for out-of-the-money options); Wang, *supra* note 82, at 4 (preference for near-maturity and at-the-money options). This lack of unanimity may be rationalized on the grounds that informed traders are likely to trade strategically, balancing between such factors as leverage, transaction costs, and liquidity as a proxy for the ability to disguise informed trading. See Amin & Lee, *supra* note 82, at 182; Kaul et al., *supra*, at 16. Characteristics of certain option transactions that are more likely to be informed often suggest the presence of insider trading. For instance, an empirical study pointed out that, “[p]rior to [takeover/merger] announcements, buying activity is highest in the short-term out-of-the-money call options (with the highest leverage). It suggests that those making the trades are relatively certain that an announcement will occur and occur soon.” Cao et al., *supra* note 82, at 1075.

87. See, e.g., SEC v. One or More Purchasers of Call Options for the Common Stock of CNS, Inc., Civil Action No. 06-4540 (E.D. Pa. Oct. 12, 2006), Litigation Release No. 19, 867, 2006 SEC LEXIS 2328, at \*2 (Oct. 13, 2006) (pointing out that alleged insider trading “represented approximately 67% to 100% of the daily volume of the various CNS options series on the days purchased”); Jeffrey Taylor, *SEC Seeks Buyers of Duracell Options with Inside Knowledge of Gillette Deal*, WALL ST. J., Sept. 17, 1996, at A2 (stating that alleged insider trading “represented 100% of the daily trading activity in one speculative options contract and 35% of the volume in another”); Jeffrey Taylor & Stephen E. Frank, *Inside Track: Takeovers Spur Rash of Trading Investigations*, WALL ST. J., Sept. 17, 1994, at C1 (discussing suspicious trading before an acquisition announcement and stating that “[w]hile trading in Gerber’s [the acquired

markets provide more financial leverage, lower implicit interest rates, and more opportunities to circumvent short-selling restrictions common in equity markets.<sup>88</sup> Trading in options also allows one to profit on information about future volatility, which is nearly impossible to do in equity markets without knowing “how the stock price will respond” in terms of its direction.<sup>89</sup> Indeed, “[b]y their very operation, the options markets provide a forum ideally suited to insider trading.”<sup>90</sup> Furthermore, given limitations of equity markets for realizing the value of a piece of information, “many potential information traders will trade on the options markets when they wouldn’t bother to trade at all if the options market did not exist.”<sup>91</sup> As a result, market makers “will face a more dangerous trading environment on an options exchange [as

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company] stock rose more than 40% over its average in that period, trading volume in some Gerber call options soared more than 3,000%”).

88. See Raman Kumar et al., *The Impact of Options Trading on the Market Quality of the Underlying Security: An Empirical Analysis*, 53 J. FIN. 717, 718-19 (1998).

89. COX & RUBINSTEIN, *supra* note 57, at 55. For another discussion of the importance of volatility information trading, see Sophie X. Ni et al., *Volatility Information Trading in the Option Market*, 63 J. FIN. 1059 (2008). Volatility is a key—although not directly observable—determinant of options prices, and the relationship between the underlying security’s volatility—including *changes* in volatility based on the market’s perception of uncertainties facing the company in question—and the price of an option seems to have been understood at the dawn of equity options trading. See Murphy, *supra* note 16, at 22-24. Volatility is an extremely important factor for options market makers. As one unnamed CBOE market maker remarked, “[w]e don’t trade stocks; we trade *volatility*.” O’CONNELL, *supra* note 39, at 81. Furthermore, an options market maker’s bid and ask prices are often quoted in terms of their implied volatilities. KAPLAN, *supra* note 47, at 101. See also PASSARELLI, *supra* note 42, at 58 (“When immediate directional risk is eliminated from a position, IV [implied volatility] becomes the traded commodity.”).

90. Harvey L. Pitt & Karl A. Groskaufmanis, *Insider Trading in Non-Equity Securities*, 49 BUS. LAW. 187, 196 (1993). See also SEC v. Tome, 638 F. Supp. 596, 619-20 (S.D.N.Y. 1986) (“[The] opportunities [to profit from inside information about a tender offer] can be greatly maximized on the options market because the value of an option contract tends to increase by a much greater percentage than the value of the underlying stock.”); HOUSE COMM. ON INTERSTATE AND FOREIGN COMMERCE, 96TH CONG., REPORT OF THE SPECIAL STUDY OF THE OPTIONS MARKETS TO THE SECURITIES AND EXCHANGE COMMISSION 183 (Comm. Print 1979) (“The leverage offered by options, which permits substantial percentage gains on a small capital investment, and the existence of a liquid market for options have created new opportunities for profitable options trading based in non-public market information.”).

91. Fischer Black, *Fact and Fantasy in the Use of Options*, FIN. ANALYSTS J., July-Aug. 1975, at 36, 61.

compared] to a stock exchange.”<sup>92</sup> On the other hand, given their own constraints, options markets do not always displace equity markets as the preferred venue for informed trading: “It may be easier to detect illegal insider trading in the options market, as many contracts are thinly traded. Options are also generally associated with higher proportional transaction costs and less liquidity.”<sup>93</sup>

*B. Empirical Bid-Ask Spread Decomposition Studies in the  
Context of Options Markets*

Several empirical bid-ask spread decomposition studies analyzed the impact of informed trading on options markets. In one of the earliest studies, Anand M. Vijh estimated the adverse selection component of bid-ask spreads for a sample of CBOE options at less than 1%<sup>94</sup> and concluded that “information effects in option trades are very small and do not have a substantial influence on option liquidity.”<sup>95</sup> A study by Jason Lee and Cheong H. Yi calculated the adverse selection component

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92. *Id.* Compared to equity markets, options markets tend to have higher percentage spreads, i.e., bid-ask spreads expressed as percentages of applicable assets’ prices. See PASSARELLI, *supra* note 42, at 63. However, greater losses of options market makers attributed to informed trading are not the only force behind this phenomenon, as various hedging and inventory-management considerations specific to options also play a role. One explanation is the financial leverage inherent in options. *Id.* Similarly, less liquid options markets should have higher percentage spreads than more liquid markets for underlying securities. See LONDON STOCK EXCHANGE COMMISSION, MINUTES OF EVIDENCE TAKEN BEFORE THE COMMISSIONERS, 1878, C. 2157-I, para. 2699, at 98 (testimony of Robert Burt Marzetti, LSE market maker) (“In a stock where there is very little dealing the quotation is always wider, a man must have a wider margin to cover his risk . . . .”); Harold Demsetz, *The Cost of Transacting*, 82 Q.J. ECON. 33, 41 (1968) (“The fundamental force working to reduce the spread is the time rate of transactions.”). Furthermore, in the context of dynamic hedging, “the percentage spreads in the production costs of derivative securities can be many times larger than the spreads in their underlying securities.” ROBERT C. MERTON, CONTINUOUS-TIME FINANCE 440 (rev. ed. 1992).

93. Cao et al., *supra* note 82, at 1077. Not surprisingly, empirical studies analyzing the lead-lag relation between equity and options markets with respect to price discovery have produced mixed results. For surveys of such studies, see Anand & Chakravarty, *supra* note 86, at 169-70; Cao et al., *supra* note 82, at 1074; Easley et al., *supra* note 82, at 432.

94. Vijh, *supra* note 46, at 1177.

95. *Id.* at 1159.

for a similar sample of CBOE options to be 38%<sup>96</sup> and criticized Vijh's results because he focused on larger options trades that are more visible and hence less likely to be informed.<sup>97</sup> However, Vijh used large options trades just to measure their price impact,<sup>98</sup> and trades of all sizes were employed to calculate the adverse selection component.<sup>99</sup>

Another CBOE-centered study by David J. Hait estimated the adverse selection component at less than 2%,<sup>100</sup> although it concluded that "our simple model of asymmetric information is too simple, and does not adequately capture the pricing of asymmetric information within the spread."<sup>101</sup> This study also observed that "models of asymmetric information for the options markets are necessarily more complex"<sup>102</sup> because there are different types of information, including volatility information, that could be exploited in options markets, because noise traders can trade in both stock and options markets, and because informed trading can occur in a variety of options on the same equity instrument.<sup>103</sup> In fact, another study of the CBOE by Joseph A. Cherian and Anne Fremault Vila distinguished among "volatility traders . . . with information about future volatility" and "directional traders . . . with information about future price movements in the underlying security" and came to a surprising conclusion that "the presence of volatility traders tends to widen the bid-ask spread in options but the presence of directional traders has the opposite effect."<sup>104</sup> Another study analyzing the CBOE by Gautam Kaul, M. Nimalendran, and Donghang Zhang concluded that "option market makers do face significant adverse selection costs because informed agents trade on the options market

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96. Lee & Yi, *supra* note 82, at 496 tbl.4.

97. *Id.* at 487.

98. Vijh, *supra* note 46, at 1160.

99. *Id.* at 1171-72.

100. David J. Hait, *Essays on Options Markets* 66 (May 1999) (unpublished Ph.D. dissertation, New York University) (on file with author).

101. *Id.* at 65-66.

102. *Id.* at 51.

103. *Id.* at 51-52.

104. JOSEPH A. CHERIAN & ANNE FREMAULT VILA, *INFORMATION TRADING, VOLATILITY, AND LIQUIDITY IN OPTION MARKETS* 1 (1997). On the other hand, a subsequent extension of this methodology involving "volatility" and "directional" traders, which was also based on the CBOE data, did not unambiguously confirm the prior results. See Joseph A. Cherian & William Y. Weng, *An Empirical Analysis of Directional and Volatility Trading in Options Markets*, J. DERIVATIVES, Winter 1999, at 53.

[and] . . . are not able to completely hedge the risk arising from trading with informed agents.”<sup>105</sup> More specifically, the study estimated the adverse selection component for at-the-money/slightly out-of-the-money and out-of-the-money options at 34% and 10%, respectively.<sup>106</sup> Another study by Min-Hsien Chiang and Yun Lin compared the NYSE and CBOE and concluded that the adverse selection components for these two trading venues are 83% and 67% or 75%, depending on the daily measure used, respectively.<sup>107</sup>

Several studies turned their attention to trading venues other than the CBOE. David Michayluk, Laurie Prather, Li-Anne E. Woo, and Henry Y.K. Yip analyzed bid-ask spreads of options traded on the Australian Stock Exchange and estimated the adverse selection component at 5%.<sup>108</sup> Another study by Söhnke M. Bartram, Frank Fehle, and David G. Shrider compared options traded on Eurex, a leading European derivatives exchange, and similar bank-issued warrants traded on the Stuttgart Stock Exchange.<sup>109</sup> Because the latter venue is non-anonymous and has greater hedging costs compared to the former, the authors concluded that “more than half of the bid-ask spreads on the traditional EuRex exchange represent the adverse selection component of the spread.”<sup>110</sup>

Several studies even assumed away the adverse selection component of bid-ask spreads in their respective modeling approaches. For instance, in his study of options traded on the Austrian Stock Exchange, Felix Landsiedl maintained that “[m]arket makers are assumed to hedge all risk exposures arising from option transactions, [and] option bid-ask spreads depend on order processing and delta

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105. Kaul et al., *supra* note 86, at 3.

106. *Id.* This model incorporated the initial hedging cost and the rebalancing cost to reflect the specifics of providing liquidity in options, *id.* at 5-6, but it did not include the inventory holding cost, making an argument, which is not entirely convincing, that “option market makers rarely take directional risks; even if they carry inventory, it is likely to be hedged,” *id.* at 7 n.5.

107. Min-Hsien Chiang & Yun Lin, *Investigating Bid-Ask Spread Components Between the NYSE and the CBOE*, 1 ADVANCES QUANTITATIVE ANALYSIS FIN. & ACCT. (n.s.) 85, 99 (2004).

108. Michayluk et al., *supra* note 55, at 29.

109. Söhnke M. Bartram et al., *Does Adverse Selection Affect Bid-Ask Spreads for Options?*, 28 J. FUTURES MKTS. 417 (2008).

110. *Id.* at 436.

hedging costs, inventory holding costs and competition.”<sup>111</sup> Giovanni Petrella also made a similar assumption in his study of covered warrants, which are option-like instruments, traded on the Italian Stock Exchange: “[A] representative market maker does not fear to trade with informed traders, because his position is hedged against variations in the underlying asset price by holding delta neutral portfolios, but he does fear to trade with scalpers [i.e., short-term traders exploiting temporary price patterns and inflexible quotes].”<sup>112</sup> Giovanni Petrella and Reuben Segara used the same approach in a study analyzing covered warrants traded on the Australian Stock Exchange.<sup>113</sup> The assumption of near-perfect hedging with respect to the underlying asset’s price, however, might not be a useful approximation of the reality of options market making.

Given the inconclusive and contradictory results of these empirical bid-ask spread decomposition studies, it appears that there is no consensus with respect to quantifying the impact of informed trading on transaction costs in options markets as a proxy for options market makers’ losses.<sup>114</sup> This state of the research probably is explained by

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111. Felix Landsiedl, *The Market Microstructure of Illiquid Option Markets and Interrelations with the Underlying Market* 24 (Apr. 2005) (unpublished manuscript, on file with author), available at <http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=4B7A518AB6BAA721EDA7301680742CE5?doi=10.1.1.89.2321&rep=rep1&type=pdf>. This approach, called the “derivative hedge theory,” was first developed in Young-Hye Cho & Robert F. Engle, *Modeling the Impacts of Market Activity on Bid-Ask Spreads in the Option Market* (Nat’l Bureau of Econ. Research, Working Paper No. 7331, 1999), available at <http://www.nber.org/papers/w7331.pdf>. The original contribution stated that “[i]n a perfect hedge world, spreads arise from the illiquidity of the underlying market, rather than from inventory risk or informed trading in the option market itself” but also recognized that “the illiquidity in the underlying asset leads to an imperfect hedge in the option markets and as a result, the option market activity itself still may have an effect on the spreads of options.” *Id.* at 29.

112. Giovanni Petrella, *Option Bid-Ask Spread and Scalping Risk: Evidence from a Covered Warrants Market*, 26 J. FUTURES MKTS. 843, 865 (2006).

113. Giovanni Petrella & Reuben Segara, *Determinants of Liquidity for Bank-Issued Options: Evidence from the Australian Covered Warrants Market* (Aug. 25, 2008) (unpublished manuscript, on file with author), available at <http://ssrn.com/abstract=1253168>.

114. Several related studies of bid-ask spreads in options markets employed regressions based on readily observable variables with the bid-ask spread as the endogenous variable and treated such variables as volatility, trading volume, and delta as imperfect proxies for informed trading, but it is problematic to estimate the liquidity cost of informed trading based on these studies. See Sean Pinder, *An Empirical*

methodological problems, and numerous empirical bid-ask spread decomposition studies in the context of equity markets also raise similar concerns.<sup>115</sup>

C. Position Adopted by the Options Industry and the Relevant Case Law

Perhaps the most important piece of evidence is that options market makers and exchanges have repeatedly expressed their concerns about insider trading.<sup>116</sup> As one commentator vividly put it, “the brutality of trading on insider information has severe ramifications in several places, and one place in particular: the options pits. Options market makers feel they can quickly become chalk outlines on the trading pit steps.”<sup>117</sup> As one prominent options trader remarked,

I have nothing to gain by making a tight market because if I price the option right, [the insider will] pass—that is, he won’t do anything—and if I price it wrong, he’ll trade, and I’ll lose . . . . If you’re a market maker . . . you live in fear that you’re going to be the one selling the option to an informed source.<sup>118</sup>

The risk of trading with an insider was also described by another options market maker as the one “of losing my business, my home, and everything I’ve worked for.”<sup>119</sup>

While options market makers occasionally benefit from insider trading when they are able to detect it in advance and eventually trade in

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*Examination of the Impact of Market Microstructure Changes on the Determinants of Option Bid-Ask Spreads*, 12 INT’L REV. FIN. ANALYSIS 563 (2003) (evidence from the Australian Options Market); Jean-Michel Sahut, *Option Market Microstructure*, in RISK MANAGEMENT AND VALUE: VALUATION AND ASSET PRICING 581 (Mondher Bellalah et al. eds., 2008) (evidence from the Paris Options Market).

115. See Dolgoplov, *supra* note 4, at 149-62, 172-74.

116. Some anecdotal stories suggesting harm imposed on specialized intermediaries in options markets by insider trading are over a century old. See HIGGINS, *supra* note 57, at 55-57.

117. Colarusso, *supra* note 49. See also Bevis Longstreth, Op-Ed., *Halting Insider Trading*, N.Y. TIMES, Apr. 12, 1984, at A27 (pointing out that “specialists who write stock options have been bankrupted by honoring commitments to insiders”).

118. Jeff Yass, *The Mathematics of Strategy*, in THE NEW MARKET WIZARDS: CONVERSATIONS WITH AMERICA’S TOP TRADERS 396, 405 (Jack D. Schwager ed., 1992) [hereinafter NEW MARKET WIZARDS].

119. Colarusso, *supra* note 49.



the same direction before the relevant information is absorbed by the market, they are much more likely to be harmed by this practice.<sup>120</sup> Options market makers are also subject to certain obligations that limit their discretion to refuse dealing with other traders.<sup>121</sup> Another factor is that insiders are likely to split their trades into multiple orders and across different options exchanges,<sup>122</sup> thereby making it more difficult for options market makers to identify such trades. Furthermore, because options market makers often engage in dynamic hedging, they risk trailing behind the market when insiders try to profit on sudden price jumps: "In a takeover situation . . . you might think that you are hedged, but the price move occurs so quickly that you really aren't."<sup>123</sup>

One industry professional even described the problem of insider trading as a pivotal factor in the market-making business: "Taking advantage of unforeseen, news-related stock moves, dividend changes or some other form of insider information, these orders almost always represent the most pre-hedge risk from the perspective of a [market maker]. Insider orders are the primary reason why the public quote does not always represent the best market."<sup>124</sup> In fact, the aggregate cost of insider trading to options market makers seems to be substantial: "Market makers PEAK6 LLC and AGS Specialists LLC say insider trading is costing them at least 10% of annual earnings."<sup>125</sup> Not surprisingly, options market makers try to respond to perceived insider trading: "[W]hen the true insider activity is present, the market-makers

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120. "B" Interview, *supra* note 69.

121. See, e.g., *SEC v. Pinez*, 389 F. Supp. 325, 330 n.7 (D. Mass. 1997) ("Under CBOE rules, the market makers were required to satisfy certain customer demands for options, even if doing so meant trading options for their own accounts. The CBOE market makers are, thus, the primary victims of alleged insider trading.").

122. Shearer, *supra* note 3, at 69.

123. Blair Hull, *Getting the Edge*, in *NEW MARKET WIZARDS*, *supra* note 118, at 363, 378. See also Cao et al., *supra* note 82, at 1074 (presenting empirical evidence that "[p]reannouncement call option volume imbalance (e.g., buyer-seller initiated call volume scaled by total volume) is highly predictive of the pending takeover"); Yass, *supra* note 118, at 406 (describing an instance involving insider trading in connection with a takeover in which "the stock stopped trading before we had a chance to buy it as a hedge against our position").

124. Letter from Mark Liu, Head Options Specialist, AGS Specialist Partners, to Jonathan G. Katz, Sec'y, Sec. and Exch. Comm'n (Apr. 15, 2004), <http://www.sec.gov/rules/concept/s70704/mliu8271.htm>.

125. Edgar Ortega & David Scheer, *Goldman, Interactive Undermined by Insider Trading on Options*, BLOOMBERG.COM, July 2, 2007, <http://www.bloomberg.com/apps/news?pid=20601087&refer=home&sid=aB3t.CViRA3I>.

react to the aggressive nature of call buying [by hedging with the underlying security or other options].”<sup>126</sup> One academic study also pointed out that certain institutional features of the CBOE aim to “reduce the degree of anonymity on the CBOE and allow option market makers to screen informed traders effectively.”<sup>127</sup>

The CBOE’s official position—expressed in a letter supporting the SEC’s proposal to ban selective disclosure by companies to investors and financial analysts—also stressed the significance of losses of options market makers: “[M]arket makers on the trading floor are obliged to honor their markets and trade with . . . ‘knowledgeable’ orders, which can cause these market makers substantial losses, and as a result, also cause potentially, wider and less liquid options markets.”<sup>128</sup> In general, options market makers believe that “[t]he costs [of insider trading] aren’t limited to their own losses, but include a possible decline in the liquidity and thus the efficiency of options markets as a whole as they respond to the losses by scaling back their activities.”<sup>129</sup>

Industry professionals confirm the academic argument on the link between insider trading and bid-ask spreads. As one options market maker observed, “[e]very trade we do involves some risk premium for the possibility that the other side of the transaction represents informed activity. . . . In essence, it’s really the average investor who ends up paying for insider trading through the wider bid/ask spreads.”<sup>130</sup> In

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126. McMILLAN, *supra* note 57, at 745. Furthermore, insider trading typically “occurs in the near-term option series, particularly the at-the-money strike and perhaps the next strike out-of-money [and impacts] other option series as market-makers (who by the nature of their job function are short the near-term options that those with insider trading are buying) snap up everything on the books that they can find.” *Id.*

127. Lee & Yi, *supra* note 82, at 488. See also COX & RUBINSTEIN, *supra* note 57, at 80-81 (“By [a CBOE] rule, Floor Brokers are obliged to ‘give up’ to the other party to a transaction the name of the member firm initiating the order. From perhaps bitter past experience, Market Makers learn to identify likely information traders and protect themselves by giving more conservative quotes in response.”).

128. Letter from Charles J. Henry, President and Chief Operating Officer, Chicago Bd. Options Exch., to Jonathan G. Katz, Sec’y, Sec. and Exch. Comm’n 2 (May 9, 2000) (on file with author).

129. McGee, *supra* note 40.

130. Yass, *supra* note 118, at 406. Other commentators similarly noted that “[m]arket makers also adjust buy and sell prices to compensate for potential losses after realizing they have entered a suspicious trade.” Ortega & Scheer, *supra* note 125. Interestingly enough, an empirical study that looked at options trading around merger/takeover announcements found that options bid-ask spreads tend to *decline*

other words, insider trading translates into a systemic cost borne by the options industry, with corresponding implications for the efficiency of options markets and a possible spillover to equity markets.<sup>131</sup>

The magnitude of the cost imposed by insider trading also explains why industry professionals demand more enforcement and cite the connection between regulation and market liquidity: "It is definitely harmful to the quality of markets that we see in options, if insider trading becomes more frequent. Our customers want to see that liquidity, so we would want the regulators to be aggressive to protect market makers from getting taken advantage of in any situation that gets leaked out."<sup>132</sup> In the eyes of options market makers, it logically follows that, "[t]he more successful the SEC is in catching people trading on inside information . . . the tighter the bid/ask spreads will be."<sup>133</sup>

The existence of substantial losses of options market makers from insider trading is also suggested by cases, such as direct lawsuits or distributions of disgorged profits by the SEC, that involve major price-moving transactions, such as mergers, acquisitions, and takeover bids, in which such losses are alleged.<sup>134</sup> These cases underscore the special role

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during the preannouncement period, despite the evidence of informed trading, although this counterintuitive result may be explained by an increased trading volume, which should lower the fixed cost component of spreads, or the minimum tick size. Cao et al., *supra* note 82, at 1082.

131. For a discussion of the interaction of options and equity markets, see *supra* note 19.

132. Ortega & Scheer, *supra* note 125 (quoting Peter Bottini, Executive Vice President OptionsXPress Holdings, Inc.).

133. Yass, *supra* note 118, at 406.

134. See SEC v. Wang, 944 F.2d 80 (2d Cir. 1991) (trading on the Philadelphia Stock Exchange in connection with upcoming announcements of tender offers, mergers, and other important transactions); Lechman v. Ashkenazy Enters., Inc., 712 F.2d 327 (7th Cir. 1983) (trading on the CBOE in connection with an upcoming acquisition announcement); SEC v. Euro Sec. Fund, 98 CIV. 7347 (DLC), 2006 U.S. Dist. LEXIS 34133 (S.D.N.Y. May 30, 2006) (trading on the Pacific Stock Exchange in connection with an upcoming acquisition announcement); Prime Mkts. Group v. Masters Capital Mgmt., No. 01 C 6840, 2003 U.S. Dist. LEXIS 7928 (N.D. Ill. May 7, 2003) (trading on the CBOE in connection with an upcoming merger announcement); *In re Motel 6 Sec. Litig.*, 161 F. Supp. 2d 227 (S.D.N.Y. 2001) (same); Abrams v. Prudential Sec., Inc., No. 99 C 3884, 2000 U.S. Dist. LEXIS 18541 (N.D. Ill. Mar. 20, 2000) (same); Goldsmith v. Pinez, 84 F. Supp. 2d 228 (D. Mass. 2000) (same); TFM Inv. Group v. Bauer, No. 99-840, 1999 U.S. Dist. LEXIS 15821 (E.D. Pa. Sept. 24, 1999) (trading on the Philadelphia Stock Exchange in connection with an upcoming merger announcement); Rosenbaum & Co. v. H.J. Myers & Co., No. 97-824, 1997 U.S. Dist.

of insider trading in options markets and the corresponding concerns of options market makers because there is virtually no case law demonstrating losses from insider trading to equity market makers.<sup>135</sup>

The position of the options industry and the existence of relevant lawsuits strongly suggest that losses of options market makers from insider trading are a common phenomenon, while no similar evidence exists for market makers in other types of financial instruments. This evidence also demonstrates the relevance of the characteristics of options as complex securities, the structural features of options markets, and the process of providing liquidity in options. Not every practice of options market makers, however, which is attributed to their informational disadvantages in academic literature, such as payment for order flow, serves as reliable evidence of this harm.<sup>136</sup>

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LEXIS 15720 (E.D. Pa. Oct. 9, 1997) (trading on the Philadelphia Stock Exchange in connection with an upcoming acquisition announcement); *SEC v. Certain Unknown Purchasers*, No. 81 Civ. 6553, 1983 U.S. Dist. LEXIS 15226 (S.D.N.Y. July 25, 1983) (trading on the Pacific Stock Exchange in connection with an upcoming acquisition announcement); *see also* *United States v. Ruggiero*, 56 F.3d 647, 650 (5th Cir. 1995) (mentioning that trading in options in connection with an upcoming acquisition announcement harmed an options market maker in an unnamed market).

135. Dolgoplov, *supra* note 4, at 108-09. The only case involving an equity market maker known to the author that fits the hypothetical, although imprecisely, is *Amswiss International Corp. v. Heublein, Inc.*, 69 F.R.D. 663 (N.D. Ga. 1975), in which a "third market" market maker/broker-dealer sold shares to persons with the knowledge of the impending merger. *Id.* at 665. On the other hand, the market maker claimed to have relied on face-to-face affirmative misrepresentations, *id.*, and the negotiated character of these transactions and the lack of automatic double-sided executions of incoming orders blurred the line between a market maker and a mere active trader occasionally dealing with an undisclosed insider. In another case that bears some similarity, *DuPont Glore Forgan, Inc. v. Arnold Bernhard & Co.*, No. 73 Civ. 3071 (HFW), 1978 U.S. Dist. LEXIS 20385 (S.D.N.Y. Mar. 6, 1978), an over-the-counter equity market maker/broker-dealer alleged harm from insider trading in connection with a negotiated purchase of a large block of stock before an earnings announcement was reported by the Dow Jones News Service and certain newspapers, *id.* at \*\*6-8. However, the court ruled that the information about decreased earnings was public because this announcement had appeared in the Reuters Financial Report before the transaction in question. *Id.* at \*\*13-21.

136. "Payment for order flow" refers to the practice of both equity and options market makers of paying brokers for diverted orders that typically come from retail investors, and this practice has been sometimes rationalized on the grounds that non-retail, as opposed to retail, traders tend to be more informed than market makers. For a presentation of this explanation and its critique, see Dolgoplov, *supra* note 4, at 134-

III. ANALYSIS OF JUDICIAL DECISIONS ON LOSSES OF  
OPTIONS TRADERS FROM INSIDER TRADING AND  
IMPLICATIONS FOR OPTIONS MARKET MAKERS

This Section reviews and critiques the existing judicial decisions with respect to calculations of losses of options traders from insider trading and develops several elements of a methodology for calculating losses of options market makers. Part A asserts that such calculations should depend on whether an options market maker has transacted with insiders by using options from his inventory written by third parties or by writing options himself. Part B argues for a scrutiny of losses stemming from trading on inside information in the underlying security based on the impact of such trading on the underlying security's price and the overall position of an options market maker. Part C contends that such calculations should account for the options market makers' hedging of their risks with underlying securities or related derivatives.

*A. Losses and the Distinction Between Inventory and Written Options*

Several courts have distinguished transactions involving options written by third parties and options written by an options trader

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38. However, non-retail traders are not necessarily more informed than market makers, and, similarly, retail traders do not necessarily lack information unknown to market makers, and industry professionals interviewed by the author also denied the validity of this explanation. "A" Interview, *supra* note 47; "B" Interview, *supra* note 69; Interview with a former CBOE options market maker "C" in Chicago, Ill. (May 27, 2009) [hereinafter "C" Interview]. One of the major reasons behind the existence of payment for order flow is that a typical retail trader is at an informational *disadvantage* vis-à-vis a market maker. As noted by an options market maker, "retail customers are looking at delayed quotes, which are a snapshot of where the market was 20 minutes ago. Even with live quotes, it's still a slow-motion scenario . . . . Trading against someone who has a different timeframe from you can be profitable and is how payment for order flow came into being." JON NAJARIAN, HOW I TRADE OPTIONS 185-86 (2001). As another industry similarly remarked, for options market makers, retail orders often represent "dumb money." Interview with a former CBOE options market maker "D" in Chicago, Ill. (Aug. 25, 2009) [hereinafter "D" Interview]. Of course, the practice of payment for order flow is also attributed to other factors, such as relatively high bid-ask spreads or profit margins present in the market in question, and this practice may also involve conflicts of interest. "C" Interview, *supra*. Furthermore, retail order flow is attractive to options market makers because it tends to consist of relatively small—and diverse—orders that, to some degree, offset each other, and these characteristics of retail trades make inventory management easier. "C" Interview, *supra*; "D" Interview, *supra*.

himself.<sup>137</sup> The Second Circuit articulated this distinction when it ruled that “recovery [should not be] afforded to an options trader who sells [an insider] options already in his inventory.”<sup>138</sup> Even here, the court was not entirely correct because it is possible for an options market maker to suffer *some* loss by transacting in inventory options with a better-informed insider, if there is no time to rebalance his inventory before the relevant information is absorbed by the market.<sup>139</sup> This situation can occur if that options market maker sells an option from his inventory to an insider and then replenishes his inventory by purchasing the same option at a higher price, or, in a less likely scenario, if he buys an option from an insider and sells it later at a lower price or is unable to sell it before the expiration date.<sup>140</sup> One district court possibly used this reasoning when it attributed options market makers’ losses to “the significant re-purchase of the options a day later at a significantly higher price,”<sup>141</sup> although it is unclear whether the court was referring to inventory or written options. Yet, overall, the Second Circuit was correct in suggesting a pivotal difference between inventory options and written options from the perspective of risk exposure.

B. Losses Stemming from Insider Trading in the Underlying Security

Another factor in calculating losses of an options trader is the scrutiny of the impact of insider trading in the underlying security,

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137. This distinction was recognized by commentators a long time ago: “Option dealers . . . may ‘write’ and sell their own options or simply deal in the options of others.” S.A. NELSON, *THE A B C OF OPTIONS AND ARBITRAGE* 23 (1904).

138. *SEC v. Wang*, 944 F.2d 80, 86 (2d Cir. 1991).

139. See Dolgoplov, *supra* note 4, at 110-11. Of course, this loss could be difficult to measure, or, maybe, it could be mitigated because of inventory management before the absorption of such information by the market. On the other hand, the illiquidity of options markets is likely to interfere with inventory management.

140. See WANG & STEINBERG, *supra* note 5, § 3:3.3 (arguing that “[a market maker’s] damage is determined by comparing his or her actual inventory at the time of disclosure with what that inventory would have been in the absence of the insider trade”); Thomas E. Copeland & Dan Galai, *Information Effects on the Bid-Ask Spread*, 38 J. FIN. 1457, 1459 (1983) (presenting a theoretical model that demonstrates a loss to a market maker when he trades with an insider from his inventory *immediately* before inside information becomes public).

141. *Rosenbaum & Co. v. H.J. Myers & Co.*, No. 97-824, 1997 U.S. Dist. LEXIS 15720, at \*4 (E.D. Pa. Oct. 9, 1997).

although the existing case law still exhibits substantial disparities among jurisdictions with respect to the standing and loss causation issues. Several early cases gave standing to options traders.<sup>142</sup> Another early case addressed the issue of causation: "[A] purchaser of stock is injured by insider trading in that stock. An options trader is likewise injured by insider trading in the underlying shares since the price of the option is directly related to the price of the stock."<sup>143</sup> The Third Circuit crafted a more refined approach to causation in its dictum, stating that "[i]nsiders trading on undisclosed material information can injure option holders . . . by [creating] market activity which causes the price of the underlying stock to move."<sup>144</sup> This reasoning implies that insider trading in equity markets might be a causal factor of price fluctuations and, correspondingly, a determinant of options' payoffs and exercise decisions. But the Eighth Circuit declined to recognize the existence of an injury to options traders from insider trading in the underlying security by asserting that "[t]he *sine qua non* in every private action under section 10(b) is unauthorized trading of securities in the same market."<sup>145</sup> Furthermore, the court attacked the causal link: "There is only a speculative relationship between the insider's trading and the alleged loss caused to the options holder. . . . [T]he insider's trading of stock on the stock market has no transactional nexus with the option holder's loss on the options exchange."<sup>146</sup>

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142. *Backman v. Polaroid Corp.*, 540 F. Supp. 667 (D. Mass. 1982); *In re McDonnell Douglas Corp. Sec. Litig.*, MDL No. 488, 1982 U.S. Dist. LEXIS 15481 (E.D. Mo. Oct. 15, 1982). At the same time, one of the decisions pointed out that the options trader in question "may have difficulty in establishing that he was damaged [by such insider trading in shares]." *Backman*, 540 F. Supp. at 671.

143. *Moskowitz v. Lopp*, 128 F.R.D. 624, 635 (E.D. Pa. 1989). A somewhat similar decision, which argued for the existence of an injury in the context of two interrelated markets, concluded that "[i]nsider trading of stock can distort not only the market for stock but also the market for convertible debentures." *In re Worlds of Wonder Sec. Litig.*, No. C 87 5491 SC, 1990 U.S. Dist. LEXIS 18396, at \*\*11-12 (N.D. Cal. Oct. 19, 1990). However, the opinion also emphasized the convertibility feature of such debentures and the existence of a fiduciary duty owed to holders of these securities by insiders. *Id.* at \*\*8-15. The later judicial decisions pertaining to this controversy, without reconsidering the standing and causation issues, concluded that there had been no insider trading. *In re Worlds of Wonder Sec. Litig.*, 814 F. Supp. 850, 859 (N.D. Cal. 1993), *modified*, 35 F.3d 1407 (9th Cir. 1994).

144. *Deutschman v. Beneficial Corp.*, 841 F.2d 502, 504 (3d Cir. 1988). The plaintiffs in *Deutschman* did not raise an insider trading claim. *Id.* at 503.

145. *Laventhal v. Gen. Dynamics Corp.*, 704 F.2d 407, 412 (8th Cir. 1983).

146. *Id.* For an extensive critique of *Laventhal*, see Deborah I. Mitchell, Note,

Considering the merits of these two positions, the Third Circuit's dictum, which points to a possible loss from the price effect of insider trading in the underlying security, does have some force, despite the problem of measuring this loss,<sup>147</sup> although the concept of causation is complex.<sup>148</sup> While its magnitude is uncertain, the price effect of insider trading certainly does exist. In fact, several empirical studies present evidence that informed trading, which includes insider trading, pushes the market price of the security in question closer to its future post-disclosure price,<sup>149</sup> supporting much earlier theoretical claims.<sup>150</sup> On the

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*Laventhal v. General Dynamics Corporation: No Recovery for the Plaintiff-Option Holder in a Case of Insider Trading Under Rule 10b-5*, 79 NW. U. L. REV. 780 (1984).

147. There is one important analogy in the context of the Insider Trading and Securities Fraud Enforcement Act of 1988, Pub. L. No. 100-704, 102 Stat. 4677, which expressly gave the private right of action to persons who trade "contemporaneously"—and in the opposite direction than insiders—in "securities of the same class." *Id.* § 5, at 4680-81. The legislative history of this statute also suggested the existence of the private right of action available to non-contemporaneous traders if insider trading has a damaging price effect—for instance, by making a publicly traded company's acquisition more expensive. See H.R. REP. NO. 100-910, at 27-28 (1988). For a further discussion of this congressional report and the relevant case law, see RALPH C. FERRARA ET AL., *FERRARA ON INSIDER TRADING AND THE WALL* § 3.01 & nn.10-12 (2d ed. 2001 & Supp. 2008).

148. One potential complication with causation is the analytical distinction between (a) the impact of insider trading on the market price and "induced" marginal transactions, i.e., comparing a universe where the insider has traded without disclosing his information to a universe where the insider has neither traded nor disclosed, and (b) the impact of nondisclosure as such, i.e., comparing a universe where the insider has traded without disclosing his information to a universe where the insider has disclosed his information and then traded. See generally WANG & STEINBERG, *supra* note 5, § 3:2 to :4.

149. See Ji-Chai Lin & Michael S. Rozeff, *The Speed of Adjustment of Prices to Private Information: Empirical Tests*, 18 J. FIN. RES. 143, 144 (1995) (arguing that over 80% of the impact of private information is impounded in the market price on the same trading day); Lisa K. Meulbroek, *An Empirical Analysis of Illegal Insider Trading*, 47 J. FIN. 1661, 1663 (1992) (stating that "insider trading is associated with immediate price movements and quick price discovery"); but see Sugato Chakravarty & John J. McConnell, *Does Insider Trading Really Move Stock Prices?*, 34 J. FIN. & QUANTITATIVE ANALYSIS 191, 208 (1999) (arguing that insider trading does not lead "to more rapid price discovery than do trades by any other investor").

150. See MANNE, *supra* note 10, at 60-61 ("As those with valuable information purchase shares, *ipso facto*, they tend to make the price or value of all shares rise [creating the possibility that subsequent] disclosure will add nothing to the market price . . . ."); FRANK P. SMITH, *MANAGEMENT TRADING: STOCK-MARKET PRICE AND PROFITS*



other hand, depending on the overall composition of an options market maker's portfolio, a more accurate price of the underlying security could either harm or benefit this market participant by impacting options' payoffs and exercise decisions.<sup>151</sup> Another factor is the impact of insider trading on *subsequently* traded or written options. If insider trading improves price accuracy before the relevant information is disclosed to the market, it will cause such options to be traded or written at more accurate prices, which could either decrease or increase the unfavorable effect of the relevant information's disclosure on an options market maker's overall position. More generally, the overall impact of price fluctuations as such is ambiguous: "Normally, [when] a market maker's entire portfolio of options on a given asset is aggregated . . . considerable netting out of market exposure may occur."<sup>152</sup>

The link between insider trading in the underlying security and losses of options market makers is possible despite the fact that such transactions do not, by themselves, create order imbalances in the relevant options market that adversely impact these market participants. Yet, in practice, such calculations are likely to be very complex, such losses might be hedged, and the overall impact of such price fluctuations may even produce a marginal benefit. These losses will materialize only in limited circumstances in which the price impact is clearly traced to specific transactions in the underlying security by insiders and produces an adverse impact on an options market maker's entire portfolio.

### C. Hedging Losses with the Underlying Security and Other Derivatives

Another important issue for calculating options traders' losses from insider trading is the significance of hedging techniques. While no options market maker can be completely insulated from the impact of insider trading at all times because of limitations of both static and

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5 (1941) ("[With insider trading,] at the time the information is made public the market price of the securities concerned will already be near the price which will prevail after the announcement.").

151. As a simple illustration, the facts of *Laventhal* indicate that the plaintiff, who purchased call options, could have benefited from the subsequent purchases of stock by the defendant corporation in the open market, as such purchases exerted a marginal upward pressure on the stock price, and, in any instance, once the information had been released to the market, the stock price was still below the strike price of the plaintiff's options. See *Laventhal v. Gen. Dynamics Corp.*, 704 F.2d 407, 408-10 (8th Cir. 1983).

152. Stephen Figlewski, *Options Arbitrage in Imperfect Markets*, 44 J. FIN. 1289, 1307 (1989).

dynamic hedging, the mitigating effect of these trading strategies should be taken into account. For instance, combining a short call with a long position in the equivalent number of shares essentially determines the payoff when the option is exercised after the relevant information has been revealed to the market, mitigating the loss from trading with an insider possessing superior information.<sup>153</sup> Likewise, this risk can be hedged with other options or futures on the underlying security.

Several federal courts were sympathetic to the idea of offsetting damages on the basis of options traders' positions in the underlying security or related options. For instance, one court approved a disgorgement distribution plan based on "offsetting the contemporaneous seller's gross loss from the sale of option contracts against his profits from buying common stock or other series of call option contracts based on that common stock."<sup>154</sup> Similarly, another court approved a disgorgement distribution plan recognizing that "losses from sales of a particular option series [may be mitigated] by contemporaneously establishing related positions in other options of the same issuer."<sup>155</sup> This decision also pointed out the difference between writing options "covered" by the underlying security in one's portfolio and "uncovered"—or "naked"—options and concluded that "options traders that wrote uncovered call options, that is, options on stock not in inventory, assumed great risk of loss if the underlying stock price rose, particularly those obliged to do so by virtue of requirements applicable to market makers."<sup>156</sup> Furthermore, the court emphasized that "there simply were no comparable losses (or risks of loss) suffered by market makers in stocks."<sup>157</sup> In a similar case, the same court observed that one of the claimants of disgorged profits who had traded options "successfully employed hedging strategies to limit his exposure to loss [from insider trading]."<sup>158</sup>

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153. The fact that options writers are hedged from insider trading losses, if they hold a sufficient number of shares, was pointed out in the context of *SEC v. Texas Gulf Sulphur Co.*, 258 F. Supp. 262 (S.D.N.Y. 1966), *modified*, 401 F.2d 833 (2d Cir. 1968) (en banc), by Henry G. Manne. MANNE, *supra* note 10, at 90-91.

154. *SEC v. Finacor Anstald*, No. 90 Civ. 7667 (JMC), 1991 U.S. Dist. LEXIS 12034, at \*4 (S.D.N.Y. Aug. 27, 1991).

155. *SEC v. Wang*, 944 F.2d 80, 82 (2d Cir. 1991).

156. *Id.* at 86.

157. *Id.*

158. *SEC v. Certain Unknown Purchasers*, 817 F.2d 1018, 1021 (2d Cir. 1987).

The courts have recognized that focusing on isolated transactions and ignoring hedging techniques would overcompensate options traders. Yet, for an options market maker, calculations pertaining to this mitigating factor are likely to be complex, depending on the ultimate price impact of the piece of inside information in question, his overall position, and limitations of static or dynamic hedging. For instance, in one insider trading case, the plaintiff options market makers contested the defendant's assertion that they "intended to maintain a true 'delta neutral' position."<sup>159</sup>

#### IV. UNIQUENESS OF OPTIONS MARKET MAKERS' RISKS AND HEDGES IN THE CONTEXT OF FRAUD-ON-THE-MARKET

This Section explores the boundaries of the fraud-on-the-market doctrine and asserts that this context, also stemming from informational asymmetry, further illustrates the uniqueness of risks and hedges of options market makers. Part A briefly reviews the current boundaries of the fraud-on-the-market doctrine and argues that it has special implications for frequent traders and applies to options markets. Part B considers the nature and evidence of losses of options market makers from fraud-on-the-market and maintains that risks and hedges of these market participants are unique.

##### A. Current Boundaries of the Fraud-on-the-Market Doctrine and Its Application to Frequent Traders and Options Markets

The essence of the fraud-on-the-market doctrine<sup>160</sup> can be summarized by the following excerpt from the seminal decision of the U.S. Supreme Court: "[I]n an open and developed securities market, the price of a company's stock is determined by the available material information . . . . The causal connection between the defendants' fraud

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159. *In re Motel 6 Sec. Litig.*, 161 F. Supp. 2d 227, 243 (S.D.N.Y. 2001).

160. For a sample of the voluminous academic commentary on the fraud-on-the-market doctrine, see Barbara Black, *Fraud on the Market: A Criticism of Dispensing with Reliance Requirements in Certain Open Market Transactions*, 62 N.C. L. REV. 435 (1984); Frederick C. Dunbar & Dana Heller, *Fraud on the Market Meets Behavioral Finance*, 31 DEL. J. CORP. L. 455 (2006); Nicholas L. Georgakopoulos, *Frauds, Markets, and Fraud-on-the-Market: The Tortured Transition of Justifiable Reliance from Deceit to Securities Fraud*, 49 U. MIAMI L. REV. 671 (1995); Jonathan R. Macey & Geoffrey P. Miller, *Good Finance, Bad Economics: An Analysis of the Fraud-on-the-Market Theory*, 42 STAN. L. REV. 1059 (1990).

and the plaintiffs' [losses] in such a case is no less significant than in a case of direct reliance on misrepresentation[.]”<sup>161</sup> The federal judiciary crafted the fraud-on-the-market doctrine as a means for plaintiffs to prove their losses from affirmative misrepresentations and, in some instances, omissions<sup>162</sup>—mostly in the context of lawsuits against corporations and their officers—without demonstrating specific reliance but instead presuming “the integrity of the market price.”<sup>163</sup> This doctrine does not make any strong assumptions about the ultimate price accuracy: “[T]he fraud-on-the-market presumption of reliance does not depend on the accuracy of the market price [but rather] on whether the market price of the stock reflects all available information.”<sup>164</sup>

The fraud-on-the-market doctrine has been heavily influenced by the efficient capital markets hypothesis maintaining that all “available” information about a security is reflected in its market price.<sup>165</sup> The Supreme Court itself limited the application of the doctrine to “well-

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161. *Basic, Inc. v. Levinson*, 485 U.S. 224, 241-42 (1988) (quoting *Peil v. Speiser*, 806 F.2d 1154, 1160-61 (3d Cir. 1986)). The intuition behind this statement was considered much earlier by courts and commentators: “[It is not] necessary that the purchaser knows of the specific false statement . . . . [W]here the effect of the statement was to create a false valuation or appraisal by the entire market, and the buyer relied on the state of the market, he had, at second hand as it were, relied on the statement itself.” A.A. Berle, Jr., *Liability for Stock Market Manipulation*, 31 COLUM. L. REV. 264, 269 (1931) (discussing *Bedford v. Bagshaw*, (1859) 4 H. & N. 537, 157 Eng. Rep. 951 (Exch.)).

162. See *Roeder v. Alpha Indus., Inc.*, 814 F.2d 22, 27 (1st Cir. 1987) (“[T]he ‘fraud on the market’ theory . . . has been employed by a number of courts in nondisclosure cases . . . [but] there must be a duty to disclose before there can be liability.”); *In re Worlds of Wonder Sec. Litig.*, 814 F. Supp. 850, 859 (N.D. Cal. 1993) (“In a fraud on the market case, ‘silence, absent a duty to disclose, is not misleading.’”) (quoting *Basic*, 485 U.S. at 239 n.17); see also 4 BROMBERG & LOWENFELS, *supra* note 1, § 7:469 (analyzing the extension of the fraud-on-the-market doctrine to certain types of nondisclosure); WANG & STEINBERG, *supra* note 5, § 4:7.3, at 4-210 to 4-211 & nn.633-34 (same).

163. *Basic*, 485 U.S. at 247.

164. *In re Xcelera.com Sec. Litig.*, 430 F.3d 503, 510 (1st Cir. 2005).

165. For a classic introduction to the efficient capital markets hypothesis, see Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383 (1970). This analytical concept is defined as follows: “A market in which prices always ‘fully reflect’ available information is called ‘efficient.’” *Id.* at 383. Indeed, the Supreme Court noted that “[r]ecent empirical studies have tended to confirm . . . that the market price of shares traded on well-developed markets reflects all publicly available information.” *Basic*, 485 U.S. at 246.

developed, efficient, and information-hungry market[s].”<sup>166</sup> The most-widely used list of factors that indicate the existence of an “efficient” market is as follows: a substantial trading volume in the security, the coverage of the company by securities analysts, the existence of market makers and arbitrageurs in the security, the company’s eligibility to file certain forms with the SEC, and a documented history of immediate price movements in response to unexpected corporate news.<sup>167</sup> Several courts have also pointed to other factors, such as the market capitalization, the bid-ask spread, the percentage of securities held by non-insiders, the easiness of short-selling, violations of the put-call parity, and serial correlation.<sup>168</sup> Overall, the efficiency determination is more complex than a mechanical count of various factors.<sup>169</sup>

Another important limitation of the fraud-on-the-market doctrine imposed by the U.S. Supreme Court in *Dura Pharmaceuticals, Inc. v. Broudo* is the necessity of demonstrating clear realized losses rather than analyzing losses as of the time of the initial transaction.<sup>170</sup> The Ninth

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166. *Basic*, 485 U.S. at 249 n.29.

167. *Cammer v. Bloom*, 711 F. Supp. 1264, 1285-87 (D.N.J. 1989).

168. *In re PolyMedica Corp. Sec. Litig.*, 453 F. Supp. 2d 260, 273-78 (D. Mass. 2006); *Krogman v. Sterritt*, 202 F.R.D. 467, 478 (N.D. Tex. 2001). *See also* Brad M. Barber et al., *The Fraud-on-the-Market Theory and the Indicators of Common Stocks’ Efficiency*, 19 J. CORP. L. 285 (1994) (offering an empirical analysis that compares the predictive power of various proxies—including proxies used by the courts—for market efficiency); Geoffrey Christopher Rapp, *Proving Markets Inefficient: The Variability of Federal Court Decisions on Market Efficiency in Cammer v. Bloom and Its Progeny*, 10 U. MIAMI BUS. L. REV. 303 (2002) (examining the federal judiciary’s decisions on market efficiency proxies).

169. *See Unger v. Amedisys, Inc.*, 401 F.3d 316, 323 (5th Cir. 2005) (listing the factors used in *Cammer* and *Krogman* and arguing that such factors “must be weighed analytically, not merely counted, as each of them represents a distinct facet of market efficiency”). The *Cammer* court, however, placed a special emphasis on one of the factors, stating that “a cause and effect relationship between unexpected corporate events or financial releases and an immediate response in the stock price . . . is the essence of an efficient market and the foundation for the fraud on the market theory.” *Cammer*, 711 F. Supp. at 1287. Another court similarly stated that the responsiveness of the stock price to the release of company-specific information is “in many ways, the most important . . . factor.” *In re Xcelera.com Sec. Litig.*, 430 F.3d at 512.

170. *In re Dura Pharms., Inc. Sec. Litig.*, Civ. No. 99CV0151-L (NLLS), 2000 U.S. Dist. LEXIS 15258 (S.D. Cal. July 11, 2000), *rev’d sub nom.* *Dura Pharms., Inc. v. Broudo*, 339 F.3d 933 (9th Cir. 2003), *rev’d*, 544 U.S. 336 (2005). For a further analysis of *Dura*, see Allen Ferrell & Atanu Saha, *The Loss Causation Requirement for Rule 10b-5 Causes of Action: The Implications of Dura Pharmaceuticals, Inc. v. Broudo*, 63 BUS. LAW. 163 (2007); Michael J. Kaufman, *At a Loss: Congress, the*

Circuit held that “plaintiffs establish loss causation if they have shown that the price *on the date of purchase* was inflated because of the misrepresentation.”<sup>171</sup> The Supreme Court rejected this position and offered a powerful rebuttal:

[A]t the moment the transaction takes place, the plaintiff has suffered no loss; the inflated purchase payment is offset by ownership of a share that *at that instant* possesses equivalent value. . . . [If] the purchaser sells the shares quickly before the relevant truth begins to leak out, the misrepresentation will not have led to any loss.<sup>172</sup>

Thus, the *Dura* decision has great significance for analyzing losses of frequent traders, such as market makers. While such traders are more likely to make a trade at a distorted price, the frequency of transactions may mitigate their losses.<sup>173</sup>

Another salient feature of the fraud-on-the-market doctrine is its application to options markets. The weight of the existing case law indicates that options traders do have standing to be compensated for damages from affirmative misrepresentations and certain omissions.<sup>174</sup>

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*Supreme Court, and Causation Under the Federal Securities Laws*, 2 N.Y.U. J.L. & BUS. 1 (2005); Ann Morales Olazábal, *Loss Causation in Fraud-on-the-Market Cases Post-Dura Pharmaceuticals*, 3 BERKELEY BUS. L.J. 337 (2006); James C. Spindler, *Why Shareholders Want Their CEOs to Lie More After Dura Pharmaceuticals*, 95 GEO. L.J. 653 (2007).

171. *Dura*, 544 U.S. at 340 (quoting *Dura*, 339 F.3d at 938). Also compare Merritt B. Fox, *Demystifying Causation in Fraud-on-the-Market Actions*, 60 BUS. LAW. 507 (2005) (agreeing with this conclusion of the Ninth Circuit), with John C. Coffee, Jr., *Causation by Presumption? Why the Supreme Court Should Reject Phantom Losses and Reverse Broudo*, 60 BUS. LAW. 533 (2005) (criticizing this conclusion of the Ninth Circuit).

172. *Dura*, 544 U.S. at 342.

173. See Dolgoplov, *supra* note 4, at 178 (arguing that “[t]he fact that they trade frequently is more likely to aid providers of liquidity than to harm them” in the context of insider trading).

174. See *Fry v. UAL Corp.*, 84 F.3d 936 (7th Cir. 1996), *aff’g* 895 F. Supp. 1018 (N.D. Ill. 1995) (a dividend announcement allegedly made in bad faith); *Deutschman v. Beneficial Corp.*, 841 F.2d 502 (3d Cir. 1988), *rev’g* 668 F. Supp. 358 (D. Del. 1987) (alleged affirmative misrepresentations about the financial condition of the company’s insurance subsidiary); *In re New Century*, 588 F. Supp. 2d 1206 (C.D. Cal. 2008) (alleged affirmative misrepresentations and omissions relating to earning repurchase reserves, residual interest valuations, internal controls, loan quality, and underwriting standards); *In re OCA, Inc. Sec. & Derivative Litig.*, Civil Action No: 05-2165 Section

As one district court summarized the state of the law, “[i]n the context of Section 10(b) allegations premised on fraudulent misrepresentations . . . courts uniformly agree that option traders have standing.”<sup>175</sup> The chief arguments are that options, as “securities,” are covered by the federal securities laws<sup>176</sup> and that “[t]he duty not to make misrepresentations

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R(3), 2008 U.S. Dist. LEXIS 84869 (E.D. La. Oct. 17, 2008) (alleged affirmative misrepresentations and omissions relating to the company’s financial results and future prospects); *In re* Fed. Nat’l Mortgage Ass’n Sec., Derivative & ERISA Litig., 247 F.R.D. 32 (D.D.C. 2008) (alleged affirmative misrepresentations and omissions relating to earnings manipulation and disclosure of financial statements not prepared in accordance with GAAP); *Levie v. Sears Roebuck & Co.*, 496 F. Supp. 2d 944 (N.D. Ill. 2007) (alleged duty to disclose merger negotiations); *In re* Scientific-Atlanta, Inc. Sec. Litig., 571 F. Supp. 2d 1315 (N.D. Ga. 2007) (alleged use of improper accounting methods and affirmative misrepresentations and omissions relating to demand for the company’s products); *In re* Priceline.com Inc. Sec. Litig., 236 F.R.D. 89 (D. Conn. 2006) (alleged affirmative misrepresentations and omissions relating to one of the company’s joint ventures and the nature of discounts offered through the company’s Web site); *In re* Green Tree Fin. Corp. Options Litig., Civ. No. 97-2679 (JRT/RLE), 2002 U.S. Dist. LEXIS 13986 (D. Minn. July 29, 2002) (alleged affirmative misrepresentations and omissions relating to the company’s financial condition); *In re* Oxford Health Plans, Inc. Sec. Litig., 199 F.R.D. 119 (S.D.N.Y. 2001) (alleged affirmative misrepresentations and omissions relating to the company’s financial condition and the problems with its computer system); *Liebhard v. Square D Co.*, 811 F. Supp. 354 (N.D. Ill. 1992) (alleged affirmative misrepresentations about the status of takeover negotiations); *Margolis v. Caterpillar, Inc.*, 815 F. Supp. 1150 (C.D. Ill. 1991) (alleged affirmative misrepresentations and omissions relating to the company’s finances and operations); *In re* Gulf Oil/Cities Serv. Tender Offer Litig., 725 F. Supp. 712 (S.D.N.Y. 1989) (alleged affirmative misrepresentations and omissions relating to the proposed merger); *Moskowitz v. Lopp*, 128 F.R.D. 624 (E.D. Pa. 1989) (alleged affirmative misrepresentations and omissions relating to the company’s financial condition); *Tolan v. Computervision Corp.*, 696 F. Supp. 771 (D. Mass. 1988) (alleged affirmative misrepresentations and omissions relating to the company’s current and projected operations and earnings and its ability to maintain growth levels); *Kirby v. Cullinet Software, Inc.*, 116 F.R.D. 303 (D. Mass. 1987) (alleged affirmative misrepresentations about the company’s growth and revenues); *In re* Digital Equip. Corp. Sec. Litig., 601 F. Supp. 311 (D. Mass. 1984) (alleged affirmative misrepresentations about the company’s projected sales and earnings).

175. *Green Tree*, 2002 U.S. Dist. LEXIS 13986, at \*16. *Levie v. Sears Roebuck & Co.*, 496 F. Supp. 2d 944, is an outlier case based solely on nondisclosure claims rather than a combination of affirmative misrepresentation and nondisclosure claims.

176. *Deutschman*, 841 F.2d at 505; *In re* Arakis Energy Corp. Sec. Litig., No. 99-CV-3431 (ARR), 1999 U.S. Dist. LEXIS 22246, at \*\*11-12 (E.D.N.Y. Apr. 23, 1999); *Digital*, 601 F. Supp. at 314.

does not depend on the existence of a fiduciary relationship.”<sup>177</sup> Turning to policy-based justifications, the courts have pointed out that the protection of options traders is consistent with the federal securities laws’ goals of the honesty and integrity of securities markets;<sup>178</sup> that the existence of options makes the market for the underlying security more efficient in terms of better risk-sharing, greater liquidity, and lower volatility;<sup>179</sup> and that recognizing options traders as proper plaintiffs would not “open corporations up to limitless liability.”<sup>180</sup> The courts also expressly endorsed the idea that options traders rely on the integrity of the market price, opening the door to the application of the fraud-on-the-market doctrine. As one district court explained, “[j]ust as the trader in the underlying stock relies on market integrity, so too does the options trader. His market strategy may be different, but his reliance on market integrity is the same.”<sup>181</sup> Another court pointed out that “the premium, or price of the option contract is directly responsive to the market price of the underlying security and to information affecting that price.”<sup>182</sup>

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177. *Fry*, 84 F.3d at 938.

178. *Fry*, 895 F. Supp. at 1035; *In re Adobe Sys. Inc. Sec. Litig.*, 139 F.R.D. 150, 154 (N.D. Cal. 1991).

179. *Fry*, 84 F.3d at 938; *Deutschman*, 841 F.2d at 507; *Arakis*, 1999 U.S. Dist. LEXIS 22246, at \*11; *Moskowitz*, 128 F.R.D. at 633; *Tolan*, 696 F. Supp. at 776.

180. *Green Tree*, 2002 U.S. Dist. LEXIS 13986, at \*20. *See also Deutschman*, 841 F.2d at 507 (“[P]rotection against unlimited liability [from claims of options traders] is also afforded to the defendant by the proximate cause requirement . . . .”); *Fry*, 895 F. Supp. at 1034 (“[T]here is no reason why the ability to control the magnitude of liability should be a prerequisite for amenability to suit under Rule 10b-5 [which] addresses not mere negligence but knowing fraud . . . . The defendant can control the extent of liability simply by refraining from engaging in the fraud.” (quoting *Sacksteder*, *supra* note 19, at 634 n.67)).

181. *Tolan*, 696 F. Supp. at 776. *See also In re Fed. Nat’l Mortgage Ass’n Sec., Derivative & ERISA Litig.*, 247 F.R.D. 32, 41-42 (D.D.C. 2008) (sustaining the presumption that an options trader relied on the integrity of the market price); *Levie v. Sears Roebuck & Co.*, 496 F. Supp. 2d 944, 948 (N.D. Ill. 2007) (same); *In re Oxford Health Plans, Inc. Sec. Litig.*, 199 F.R.D. 119, 124 (S.D.N.Y. 2001) (same); *Margolis v. Caterpillar, Inc.*, 815 F. Supp. 1150, 1156-57 (C.D. Ill. 1991) (same); *Deutschman v. Beneficial Corp.*, 132 F.R.D. 359, 370 (D. Del. 1990) (same); *Kirby v. Cullinet Software, Inc.*, 116 F.R.D. 303, 308 (D. Mass. 1987) (same). Another district court provided the following explanation: “There is a fundamental difference between an investor’s [i.e., options holder’s] presumption that the market price will move and the fact that the price was tainted by fraud.” *Moskowitz v. Lopp*, 128 F.R.D. 624, 631 (E.D. Pa. 1989).

182. *Deutschman*, 132 F.R.D. at 371.



Even though the market for a given option might not be an efficient one based on the efficiency of the underlying security alone,<sup>183</sup> it is likely that organized markets in standardized options would be considered efficient to satisfy this requirement of the fraud-on-the-market doctrine.<sup>184</sup>

*B. Nature and Evidence of Losses of Options Market Makers from Fraud-on-the-Market and the Uniqueness of Such Losses*

Equity and options market makers are likely to be able to use the fraud-on-the-market doctrine, although several courts have questioned whether these market participants rely on the integrity of the market price.<sup>185</sup> Affirmative misrepresentations or omissions by themselves do

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183. In *O'Neil v. Appel*, 165 F.R.D. 479 (W.D. Mich. 1995), the court criticized the idea that "any fraud-on-the-market for the common stock [is] somehow transferred to the market for the warrants [i.e., option-like instruments]" and rejected the "theory of 'derivative' fraud-on-the-market," *id.* at 506, pointing out that such warrants were sold by the company to a limited number of investors at a fixed price, *id.* at 505-06. *But see In re Scientific-Atlanta, Inc. Sec. Litig.*, 571 F. Supp. 2d 1315, 1330 (N.D. Ga. 2007) ("[If an] options seller demonstrates market efficiency in the underlying security, he is generally entitled to rely on the fraud on the market theory."); *Weikel v. Tower Semiconductor Ltd.*, 183 F.R.D. 377, 391 (D.N.J. 1998) ("[T]o the extent the market for [common stock] was efficient, the market for . . . options may be viewed as efficiently priced.").

184. *Cf. In re PolyMedica Corp. Sec. Litig.*, 453 F. Supp. 2d 260, 266 (D. Mass. 2006) ("[While] a stock's listing on a national exchange does not, by itself, establish that the stock trades in an efficient market . . . [it] undisputably improves the market structure for trading . . . [and] one would be hard-pressed to deny the relevance of this fact in an efficiency analysis."); 4 BROMBERG & LOWENFELS, *supra* note 1, § 7:484 ("[T]here should be a presumption . . . that certain markets [including the CBOE] are developed and efficient for *virtually all* the securities traded there [which] would be rebuttable on a showing that the specific security in question is inactively traded on the market or unresponsive to new information.") (emphasis added).

185. For instance, in *Susquehanna Investment Group v. Amgen Boulder, Inc.*, 918 F. Supp. 326 (D. Colo. 1996), the court dismissed the theory that options market makers "did not rely on the integrity of the market but rather engaged in conduct which was essential to setting the prices in the market on which others would rely," *id.* at 328. The court convincingly argued that "[t]he plain language of the Securities Acts does not exclude market makers from their protection" and that the U.S. Supreme Court in its *Basic* decision specifically mentioned market makers in its discussion of "causal connection." *Id.* at 329. *Also compare* *Tsirekidze v. Syntax-Brilliant Corp.*, No. CV-07-02204-PHX-FJM, 2009 U.S. Dist. LEXIS 61145, at \*\*19-20 (D. Ariz. July 17, 2009) (stating that equity market makers in the putative class relied on the integrity of the market price), and *In re Sunbeam Sec. Litig.*, No. 98-8258-CIV-MIDDLEBROOKS,

not create marginal transactions, although some impact is possible, but an options market maker would still trade and create options at “incorrect” prices. A price distortion and its eventual correction may damage an options market maker’s position by impacting options’ payoffs and exercise decisions. Reported cases also point to the existence of some losses of options market makers from fraud-on-the-market.<sup>186</sup> Still, casual empiricism suggests that fraud-on-the-market is a lesser concern for these market participants than insider trading, which might be explained by the fact that the former does not, by itself, create

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2001 U.S. Dist. LEXIS 25703, at \*\*9-12 (S.D. Fla. July 3, 2001) (declining to exclude equity market makers from the certified class as traders not relying on the integrity of the market price), and *In re Oxford Health Plans*, 199 F.R.D. at 124 (sustaining the presumption that options market makers relied on the integrity of the market price), and *Chill v. Green Tree Fin. Corp.*, 181 F.R.D. 398, 411-12 (D. Minn. 1998) (sustaining the presumption that an options market maker relied on the integrity of the market price), and *Katz v. Comdisco, Inc.*, 117 F.R.D. 403, 409 (N.D. Ill. 1987) (sustaining the presumption that an equity market maker relied on the integrity of the market price), and *In re Olympia Brewing Co. Sec. Litig.*, No. 77 C 1206, 1987 U.S. Dist. LEXIS 3673, at \*12 (N.D. Ill. Apr. 30, 1987) (declining to rule out that an equity market maker relied on the integrity of the market price), with *Tice v. NovaStar Fin., Inc.*, Case No. 04-0330-CV-W-ODS, 2004 U.S. Dist. LEXIS 16800, at \*24 (W.D. Mo. Aug. 23, 2004) (concluding that an equity market maker, as a class representative, might be subject to unique defenses, including the lack of reliance on the integrity of the market price), and *Queen Uno Ltd. P’ship v. Couer D’Alene Mines Corp.*, 183 F.R.D. 687, 691-92 (D. Colo. 1998) (concluding that a market maker in both equity and options markets, as a class representative, might be subject to unique defenses, including the lack of reliance on the integrity of the market price), and *McNichols v. Loeb Rhoades & Co.*, 97 F.R.D. 331, 347 (N.D. Ill. 1982) (concluding that an equity market maker, as a class representative, might be subject to unique defenses, including the lack of reliance on the integrity of the market price).

186. See *In re Oxford Health Plans*, 199 F.R.D. 119 (two market makers in an unnamed market claiming harm from alleged affirmative misrepresentations and omissions relating to the financial condition of the company and the problems with its computer system); *Chill*, 181 F.R.D. 398 (a CBOE options market maker claiming harm from alleged affirmative misrepresentations and omissions relating to subsequently restated reports employing unreasonably aggressive accounting methods); *Queen Uno*, 183 F.R.D. 687 (a CBOE options market maker, which also served as an equity market maker in the over-the-counter market, claiming harm from alleged affirmative misrepresentations and omissions relating to the company’s operational losses and profitability and condition and prospects of one of its mines); *Susquehanna*, 918 F. Supp. 326 (a Philadelphia Stock Exchange options market maker claiming harm from alleged affirmative misrepresentations and omissions relating to the efficacy of a new pharmaceutical product).

order imbalances that adversely impact options market makers.

Similarly, the impact of affirmative representations or certain omissions, which obviously have a more direct and immediate effect on the underlying security's price compared to the effect produced by insider trading, on this market participant may be ambiguous, depending on the magnitude and direction of this price impact and the composition of his portfolio. Under a number of scenarios, such affirmative misrepresentations and omissions may even benefit an options market maker, potentially making him a "big winner,"<sup>187</sup> which requires a scrutiny of his overall position to determine the existence of a loss. Furthermore, the price impact of fraud-on-the-market and its subsequent correction on the underlying security's volatility could either benefit or harm an options market maker, depending on his volatility position, and the impact on options' trading volume should be considered as well.<sup>188</sup> Likewise, hedging techniques of options market makers create another offset in calculating such losses.

As suggested by *Dura*, frequent traders' losses might be mitigated because of the turnover of their portfolios.<sup>189</sup> Market makers are, of course, frequent traders *par excellence* that might avoid substantial losses,<sup>190</sup> although options market makers—compared to their counterparts in equity markets—could be at a greater disadvantage because options markets are less liquid and hence present greater

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187. "C" Interview, *supra* note 136.

188. "A" Interview, *supra* note 47; "B" Interview, *supra* note 69; "C" Interview, *supra* note 136.

189. See *supra* notes 170-173 and accompanying text.

190. See Edward A. Dyl, *Estimating Economic Damages in Class Action Securities Fraud Litigation*, 12 J. FORENSIC ECON. 1, 8 (1999) (presenting a methodology for calculating losses based on an actual lawsuit and arguing that, "[s]ince market makers [on NASDAQ] generally are assumed to have resold their shares of stock on the same day they purchased them—with both transactions occurring at the artificially high prices prevailing during the Class Period—they [should not be] considered members of the Class"); see also *In re OCA, Inc. Sec. & Derivatives Litig.*, Civil Action No: 05-2165, 2009 U.S. Dist. LEXIS 19210, at \*23 (E.D. La. Mar. 2, 2009) (approving a settlement in a fraud-on-the-market case involving affirmative misrepresentations and omissions relating to the company's financial results and future prospects that denied any compensation "for put options sold during the Class Period to offset a long position in the same option that was purchased at any time prior to the sale"); *Etshokin v. Texasgulf, Inc.*, 612 F. Supp. 1220, 1233 (N.D. Ill. 1985) (observing that, in the context of allegations of direct reliance on affirmative misrepresentations and omissions, an options market maker was "in the unique position of being both a purchaser and seller of . . . call options during the relevant trading period").

difficulties for inventory management. On the other hand, a potential upside from fraud-on-the-market might be greater for options market makers—for instance, because of the volatility factor, and some industry professionals are of the opinion that, overall, the impact of fraud-on-the-market is more likely to benefit options market makers.<sup>191</sup> More generally, options market makers' realized losses stem from unfavorable changes in their inventories when an option is exercised or when the true information is absorbed by the market.

The application of the fraud-on-the-market doctrine to options market makers also illustrates their unique risks and hedges. Analytically, losses of these market participants from fraud-on-the-market can be approached in the same fashion as losses from insider trading. One would also expect the former to have a lesser adverse impact on options market makers, which seems to be the case in practice.

#### CONCLUSION

This Article has shown that the brunt of insider trading often falls on options market makers in contrast to their counterparts in equity markets. This phenomenon can be explained by the leveraged nature and hence greater risks of options, the fact that options are frequently "created" rather than merely "traded," potential problems with dynamic and static hedging, and the relative illiquidity of options markets—partly due to the existence of a spectrum of options on the same underlying security—and corresponding difficulties of options market makers with managing risk exposures. Insider trading is not an imaginary concern for the options industry, and, in this instance, losses from insider trading are concentrated rather than diffused among numerous market participants. Existing evidence in fact demonstrates the gravity of losses of options market makers, and the potential adverse impact in the form of more costly transactions in options constitutes a proven economic cost of insider trading. Of course, whether insider trading in options markets affects the fragility of the financial marketplace and the liquidity of equity markets to a degree that impedes capital formation, resulting in a true social cost, is an empirical question—and a difficult one.

Furthermore, the federal courts need to make a more general

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191. "B" Interview, *supra* note 69.

“distinction between the market maker and the ordinary investor”<sup>192</sup>—something they have often neglected to do. The judiciary should recognize these market participants’ specific trading strategies, obligations to deal with other traders, and hedging techniques in calculations of options market makers’ losses from insider trading and fraud-on-the-market under the existing regime of civil liability, navigating between the Scylla of under-compensation and the Charybdis of over-compensation. Making this distinction would be in line with continuing advances in the economics of liquidity provision in options markets.<sup>193</sup> In fact, despite the lack of a comprehensive methodology of estimating losses from insider trading or fraud-on-the-market of options market makers or even options traders more generally, several courts have demonstrated an understanding of the underlying economics and provided a framework for analyzing this issue.

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192. *Etshokin*, 612 F. Supp. at 1232.

193. Even a prominent academic recently summarized the current state of derivatives research by the statement that “we need more realistic models of market structure—in particular, of the market makers.” *David Bates on Crash and Jumps*, in HAUG, *supra* note 61, at 335, 341.