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A NEW APPROACH TO THE REGULATION OF TRADING ACROSS SECURITIES MARKETS

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In this Article, Professors Amihud and Mendelson propose that a securities issuer should have the exclusive right to determine in which markets its securities will be traded, in contrast to the current regulatory scheme under which markets may unilaterally enable trading in securities without issuer consent. Professors Amihud and Mendelson demonstrate that the trading regime of a security affects its liquidity, and consequently its value, and that multimarket trading by some securities holders may produce negative externalities that harm securities holders collectively. Under the current scheme, some markets compete for order flow from individuals by lowering standards, thereby creating the need for regulatory oversight. A rule requiring issuer consent would protect the liquidity interests of issuers and of securities holders as a group. Professors Amihud and Mendelson address the treatment of derivative securities under their scheme, proposing a fair use test that would balance the issuer's liquidity interest against the public's right to use price information freely. The authors suggest that under their proposed rule, markets will compete to attract securities issuers by implementing and enforcing value-maximizing trading rules, thereby providing a market-based solution to market regulation.

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INTRODUCTION

Trading the same security in more than one market, commonly known as multimarket trading, is an increasingly widespread phenomenon both across and within countries. For example, following the 1986 deregulation of the London Stock Exchange, known as the "Big Bang," London's computer-based SEAQ International system started trading the stocks of French, German, Italian, and Japanese Companies and had reached a point where the volume of Swedish stocks traded in London was greater than that traded in Sweden.¹ European markets, such as the Deutsche Börse in Frankfurt, have developed computer-based trading capabilities to enable investors throughout the European Union to trade their national securities on local exchanges.² Under the European Union's Investment Services Directive, a regulated market in any European Union country that does not require a physical trading floor should allow remote electronic access to qualified investment firms or banks in any other Union country.³ Thus, for example, a London-based stockbroker should be able to trade the same French-listed stock both on the London Stock Exchange and on the Paris Bourse—but a Paris-based stockbroker should have the same capability. The London Stock Exchange is developing new electronic trading services that will enable it to better cope with the competition, and is implementing a fully automated order-matching system for the Financial Times 100 stocks.⁴ Increased use of such systems will expand the already prevalent practice of si-

¹ See Laura Covill, *Survival of the Fittest*, *Euromoney*, Aug. 1996, at 60, 60-62 (discussing competition among European stock exchanges); Henry Harrington, *Behind the Remote Reality*, *Survey of European Stock Exchanges*, *Fin. Times*, Feb. 16, 1996, at 4 (discussing Investment Services Directive and its impact in context of electronic trading: "Today, there is nothing to stop a British broker trading shares on the Amsterdam stock exchange from under a sun umbrella on a Greek beach."); *Hollowing Out Japan's Financial Markets*, *The Economist*, Aug. 13, 1994, at 67, 67 (discussing migration of trading from Tokyo Stock Exchange to SEAQ International).

² See Andrew Fisher, *The Market That Comes to You*, *Fin. Times*, Feb. 16, 1996, at II (survey) (discussing computer-based trading networks at Deutsche Börse). Of stocks listed on the Netherlands Exchange, 56% are nondomestic; in Germany, 49% of listed stocks are nondomestic; in Switzerland, 42% of listed stocks are nondomestic; and in France, 32% of listed stocks are nondomestic. See Office of Technology Assessment, U.S. Congress, *Trading Around the Clock: Global Securities Markets and Information Technology—Background Paper 30 (OTA-BP-CIT-66, July 1990)* [hereinafter *Trading Around the Clock*] (tabulating nondomestic stock percentages on various exchanges).

³ See Harrington, *supra* note 1, at 4.

⁴ See John Eisenhammer, *Stock Exchange Gives Go-Ahead to Trading Reforms*, *The Independent*, Mar. 22, 1996, available in 1996 WL 4064575 (outlining approval of reform proposals by London Stock Exchange); *London Exchange Buckles Down to Fight Competition*, *Reuters World Service*, July 1, 1996, available in LEXIS, News Library, Non-US File (summarizing London Stock Exchange's responses to increased competition).

multaneously trading stocks in multiple markets. This trend is apparent worldwide and is expected to accelerate with the further facilitation of international communication and the advent of computer-based trading systems.⁵

Likewise, multimarket trading of stocks is prevalent within national markets. For example, in the United States, stocks listed on either the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) can be traded on one or more of the regional exchanges⁶ as well as on private trading systems.⁷ In addition, securities can be traded simultaneously on both the NASDAQ National Market System⁸ and a stock exchange.⁹

In fact, the U.S. regulatory regime facilitates and even encourages multimarket trading.¹⁰ After a company issues its stock in the initial public offering, it has only limited influence in determining the markets in which the stock will be traded. Regional exchanges can apply to the Securities and Exchange Commission (SEC) for unlisted trading privileges (UTP) and subsequently trade in a stock listed on another exchange.¹¹ Trading is then subject to the rules and procedures of the Intermarket Trading System (ITS).¹² A company that lists its stock for trading on an exchange cannot prevent market-makers from trading its stock over the counter, nor can it effectively

⁵ A comprehensive analysis of these trends appears in *Trading Around the Clock*, supra note 2, and in Office of Technology Assessment, U.S. Congress, *Electronic Bulls & Bears: U.S. Securities Markets and Information Technology 62-65* (OTA-CIT-469, Sept. 1990) [hereinafter *Electronic Bulls & Bears*].

⁶ The regional exchanges are the Pacific, Boston, Chicago (formerly Midwest), Philadelphia, and Cincinnati Stock Exchanges.

⁷ See James E. Shapiro, *Recent Competitive Developments in U.S. Equity Markets 8-10* (New York Stock Exchange Working Paper No. 93-02, 1993) (discussing rise and use of private trading systems). The private trading systems include Posit, Instinet, and a system operated by Bernard Madoff Investment Securities. A proprietary trading system in Arizona now operates as the Arizona Stock Exchange.

⁸ NASDAQ is an acronym for the National Association of Securities Dealers Automated Quotation system. National Market System securities include NASDAQ securities whose transactions are reported as they occur as well as some listed securities whose transactions are reported by NASDAQ. See 17 C.F.R. §§ 240.11(A)(a)(2-1)-(3-1) (1996).

⁹ See *id.*

¹⁰ See *infra* Part I.

¹¹ See *infra* Part I.

¹² The Intermarket Trading System is a computer-based communication system that connects the six stock exchanges and NASDAQ and displays the best prices quoted on any stock market for stocks which are traded in more than one market. It also enables broker-dealers to route orders from one market to another. For additional discussion, see *infra* Part III.C.5; see also *Electronic Bulls & Bears*, supra note 5, at 52-53 (discussing praise and criticism of Intermarket Trading System); U.S. Equity Market Structure Study, Exchange Act Release No. 30,920, 51 SEC Docket 1524, 1530 (July 14, 1992) [hereinafter *Equity Market Structure Study*] (noting that Intermarket Trading System links participant markets and provides for routing of orders).

consolidate the trading in its stock on the exchange of its choice. In addition, U.S. stocks can be traded over the counter in a number of international markets,¹³ and foreign stocks may be traded over the counter in the United States.¹⁴ Similar trading structures exist in other countries with multiple markets.¹⁵

Multimarket trading has both benefits and costs.¹⁶ It enhances competition between markets, thereby stimulating improvements in trading systems and reducing the costs of trading. Accordingly, U.S. lawmakers and regulators have encouraged multimarket trading and facilitated the granting of UTP in exchange-listed stocks to regional markets.¹⁷ Conversely, however, multimarket trading can adversely affect the cost of trading a security or, more broadly, its liquidity.¹⁸ Thus, some argue that regulators should consolidate trading into a sin-

¹³ See James E. Shapiro, *U.S. Equity Markets: A View of Recent Competitive Developments 7-8* (New York Stock Exchange Working Paper, 1993) (discussing reported trading in NYSE-listed stocks in London, Tokyo, Paris, and Frankfurt).

¹⁴ Foreign companies whose securities are traded on a U.S. securities exchange or on NASDAQ are subject to U.S. reporting requirements, unless the stocks traded on NASDAQ prior to 1983 and therefore qualify for an exemption. See James L. Cochrane, *Assessing and Evaluating the Current Directions of Transactional Listings 6-7* (New York Stock Exchange Working Paper No. 93-03, 1993) (noting that foreign companies cannot be listed on U.S. Exchange or NASDAQ unless securities were registered on NASDAQ prior to 1983); Franklin R. Edwards, *SEC Requirements for Trading of Foreign Securities on U.S. Exchanges*, in *Modernizing U.S. Securities Regulation: Economic and Legal Perspectives 57, 57-61* (Kenneth Lehn & Robert W. Kamphuis, Jr. eds., 1992) (discussing SEC requirements for trading foreign security on U.S. Exchanges).

¹⁵ For example, in Germany, the stocks of the top 40 companies are traded on eight national exchanges as well as on IBIS, an electronic trading system. The eight exchanges in Germany are Berlin, Bremen, Düsseldorf, Frankfurt, Hamburg, Hanover, Munich, and Stuttgart. For an analysis of multimarket trading in these markets, see generally Hartmut Schmidt et al., *Competition Among German Trading Mechanisms: Electronic Trading on IBIS vs. Trading on the Floor Based BOSS-CUBE System* (Jan. 12, 1996) (unpublished manuscript, on file with authors).

¹⁶ See Yakov Amihud & Haim Mendelson, *How (Not) to Integrate the European Capital Markets, in European Financial Integration 73, 75-89* (Albert Giovanni & Colin Mayer eds., 1991) [hereinafter Amihud & Mendelson, *European Capital Markets*], for an analysis of the effects of the ITS and similar systems. An analysis of the liquidity consequences of multimarket trading appears in Yakov Amihud & Haim Mendelson, *Option Markets Integration: An Evaluation 11-16* (Jan. 1990) [hereinafter Amihud & Mendelson, *Option Markets*] (unpublished manuscript, on file with authors). See also Kalman J. Cohen et al., *The Microstructure of Securities Markets 152-67* (1986); Robert A. Schwartz, *Reshaping the Equities Markets: A Guide for the 1990s*, at 169-80 (1991); *Equity Market Structure Study*, supra note 12, at 1531-33.

¹⁷ See *infra* Part I.

¹⁸ Liquidity is the ease with which a security can be transacted and converted to cash or with which cash can be converted to a security. The lower the liquidity of a security is, the higher the costs of transactions in that security will be. See *infra* Part II for a detailed analysis.

gle market.¹⁹ However, with the advent of worldwide, multimarket trading and the proliferation of proprietary, computer-based trading systems, securities market regulation is becoming increasingly ineffective.²⁰ It is nearly impossible to have a global authority that will regulate securities trading and enforce specific trading rules in each and every market around the world.

Thus, securities trading is now at the threshold of a new era: National regulation will become less important as the ability to trade a security anywhere around the world with great ease and at low cost increases. A country's regulators cannot enforce their preferred trading procedures and rules worldwide because, if traders find the country's regulations undesirable, they can carry out their trades in a securities market located elsewhere. Under this scenario, the authority of national regulatory agencies is diminished and traders are free to choose the regulatory environment in which they trade. The question then becomes who will select and enforce the best trading regime for a security?

In this Article, we propose a new regulatory framework for multimarket trading. Specifically, we argue that the issuer of a security should be given the exclusive right to decide how and where its securities are traded, because the issuer has the clearest incentive to choose the most efficient trading regime for its securities. For example, in the case of corporate stock, under our proposal, the company's board of directors will have the authority to decide which markets will be allowed to trade its stock. We demonstrate that both the market in which a security is traded and the trading rules that apply affect the liquidity of a security,²¹ which in turn affects the security's value.²²

¹⁹ See, e.g., Kalman J. Cohen et al., *An Analysis of the Economic Justification for Consolidation in a Secondary Security Market*, 6 *J. Banking & Fin.* 117, 119 (1982) (stating that consolidation of all orders would maximize liquidity and immediacy of execution and help ensure that trades are executed at reasonable prices); Morris Mendelson & Junius W. Peake, *Intermediaries' or Investors': Whose Market Is It Anyway?*, 19 *J. Corp. L.* 443, 444 (1994) (stating that economic functions are performed most efficiently when all orders for particular financial instrument interact within single trading arena); see also *infra* note 119.

²⁰ For an analysis of the globalization of securities markets and its impact on market regulation, see Joseph A. Grundfest, *Internationalization of the World's Securities Markets: Economic Causes and Regulatory Consequences*, 4 *J. Fin. Services Res.* 349 (1990); see also Diana B. Henriques, *In World Markets, Loose Regulation*, *N.Y. Times*, July 23, 1991, at D1 (discussing regulatory lag in growing global markets).

²¹ See Yakov Amihud & Haim Mendelson, *Liquidity, Volatility and Exchange Automation*, 3 *J. Acct. Auditing & Fin.* 369, 371-83 (1988) (showing how trading mechanisms applied in markets affect securities' liquidity); Jonathan Macey & Hideki Kanda, *The Stock Exchange as a Firm: The Emergence of Close Substitutes for the New York and Tokyo Stock Exchanges*, 75 *Cornell L. Rev.* 1007, 1012-20 (1990) (same).

²² This has been shown both theoretically and empirically. See Yakov Amihud & Haim Mendelson, *Asset Pricing and the Bid-Ask Spread*, 17 *J. Fin. Econ.* 223, 223-49 (1986)

The issuer, therefore, has the incentive to select the trading regime that will maximize the value of its securities. Whereas the current regime may provide incentives to markets to adopt rules that hurt the liquidity of traded securities, our proposed rule will induce markets to adopt trading procedures that maximize liquidity. Finally, we show that the results of our proposed rule will be consistent with both overall investor welfare and the policy objectives of securities market regulation.

Part I presents the development of the current U.S. regulatory approach, which does not allow companies to control where and how their financial claims are traded. Part II examines theory and evidence regarding the effects of multimarket trading on securities values and concludes that multimarket trading has disparate effects on the liquidity of different securities—hurting liquidity for some securities and improving it for others. Accordingly, Part III proposes a new regulatory framework and illustrates its application to the choice of trading rules and market mechanisms. In addition, Part III addresses the problems of implementing this new proposal for derivative securities.

I

THE U.S. REGULATORY POLICY: ISSUER CONSENT

The issuer's role in determining how and where its securities are traded is severely limited under current U.S. regulatory policy. For example, once a company's shares of stock are registered and listed on a national securities exchange or on NASDAQ, they may be traded on another market upon that market's initiative and without the issuer's consent.²³ Proprietary trading systems such as electronic "bulletin boards" and trading systems like Posit and Instinet can trade the shares with minimal controls pursuant to SEC no-action letters effectively exempting them from registration as national securities exchanges, associations, or clearing agencies.²⁴ Foreign markets can also

[hereinafter Amihud & Mendelson, Bid-Ask Spread] (discussing empirical study of liquidity effect on value); Yakov Amihud & Haim Mendelson, Liquidity and Asset Prices: Financial Management Implications, *Fin. Mgmt.*, Spring 1988, at 5, 12-13 [hereinafter Amihud & Mendelson, Liquidity and Asset Prices] (demonstrating theoretical effect of liquidity on valuation); Yakov Amihud & Haim Mendelson, Liquidity, Asset Prices and Financial Policy, 47 *Fin. Analysts J.*, Nov.-Dec. 1991, at 56, 58-60 [hereinafter Amihud & Mendelson, Financial Policy] (demonstrating liquidity's theoretical effect on value).

²³ See *infra* Part I.A., .C.

²⁴ See Division of Mkt. Regulation, U.S. Sec. & Exch. Comm'n, *Market 2000: An Examination of Current Equity Market Developments* app. IV (1994) [hereinafter *Market 2000*] (outlining description of proprietary trading systems).

trade U.S.-listed securities, and, because of the limits on U.S. regulatory authority abroad, these practices are difficult to regulate.²⁵

Today, trading in UTP securities constitutes the lion's share of the volume traded on U.S. regional exchanges. In 1994, 72% of the trades in issues listed on the NYSE were executed on the NYSE itself, 5% were traded on the Pacific Stock Exchange, 6% on the Chicago Stock Exchange, 2% on the Philadelphia Stock Exchange, 2% on the Boston Stock Exchange (BSE), 3% on the Cincinnati Stock Exchange, and 9% on the NASDAQ Stock Market.²⁶ Over 97% of the trading volume on regional exchanges in 1992 was in stocks of NYSE- and AMEX-listed companies traded pursuant to UTP.²⁷ As discussed in Part II, because the issuer does not have a voice in determining where its securities are traded, this high volume of unlisted trading may conflict with the issuer's interests.

A. The Issuer's Role in Determining Grants of Unlisted Trading Privileges

Historically, all securities trading started as "unlisted" trading, and it remained so until the exchanges became powerful enough to require issuers to list their securities in return for obtaining the exchange's "stamp of approval." At the same time, however, most exchanges did not give up unlisted trading on their own floors. By 1934, there were twenty-three exchanges, sixteen of which permitted UTP. The original 1934 bills considering UTP proposed the complete abolishment of unlisted trading,²⁸ and the original language of section 12(f) of the Exchange Act of 1934 directed the SEC to study the problem and report its recommendations to Congress.²⁹ The resulting SEC Report considered the problem in some detail and recommended that exchanges should no longer be able to unilaterally appropriate

²⁵ On the need for international coordination of regulatory actions and on some SEC initiatives in this area, see Grundfest, *supra* note 20, at 367-71.

²⁶ See New York Stock Exch., *Fact Book for the Year 1994*, at 29 (1995) [hereinafter *Fact Book*] (discussing breakdown of NYSE trades). The distribution of volume gives a larger NYSE market share (83%), see *id.* at 28 (figures rounded), because the regional exchanges execute smaller trades on average, whereas larger blocks tend to be traded on the NYSE.

²⁷ See *Market 2000*, *supra* note 24, at II-8 (discussing regional stock exchanges).

²⁸ See S. 2693, 73d Cong., 2d Sess. § 11 (1934), reprinted in 11 J.S. Ellenberger & Ellen P. Mahar, *Legislative History of the Securities Act of 1933 and Securities Exchange Act of 1934* (1973); H.R. 7855, 73d Cong., 2d Sess. § 11 (1934), reprinted in 10 Ellenberger & Mahar, *supra*.

²⁹ See Securities Exchange Act of 1934, Pub. L. No. 73-291, § 12(f), 48 Stat. 881, 894 (1934).

UTP.³⁰ Instead, the report maintained that the SEC should determine on a case-by-case basis whether the grant of UTP was in the public interest.³¹

Regarding the necessity of issuer consent, the report stated:

The contention has frequently been made that the determination of the market place for securities of an issuer is properly the responsibility of the management of the issuer. It is alleged that the course of trading in the securities of an issuer affects the general problems of management, and that management, in the exercise of its fiduciary duty to all security holders, should decide where trading in the securities should be centered.³²

The SEC Report, however, concluded that *neither the issuer nor the exchanges* should make the final determination, because only an unbiased party such as the SEC could reach the best decision:

The Commission believes that it would be unwise, as well as inconsistent with the general theory of the Exchange Act, to vest the final authority to make such a determination in either management or an exchange. But some authority other than management or the exchange must exercise a check upon the right . . . to grant trading privileges to a security upon an exchange. That authority must be disinterested. Thus, as between the contention that the issuer through its management should have the sole right to choose the market place and the contention that the exchange, irrespective of the wishes of management, should have the right to create an exchange market in a security, the solution appears to lie in vesting the Commission with power to determine whether under particular circumstances the public interest is to be served by permitting a security to be admitted to trading privileges upon an exchange.³³

Thus, section 12(f) of the Exchange Act was amended to require the exchange requesting UTP to establish to the satisfaction of the SEC "that there exists in the vicinity of such exchange sufficiently widespread public distribution of such security and sufficient public trading therein to render the extension of unlisted trading privileges on such exchange thereto necessary or appropriate in the public interest or for the protection of investors."³⁴

In a number of early decisions, the SEC granted the application of securities dealers to terminate UTP based on these statutory re-

³⁰ See Securities & Exch. Comm'n, Report on Trading in Unlisted Securities upon Exchanges 7 (1936) [hereinafter Report on Trading in Unlisted Securities].

³¹ See *id.* at 24 (recommending that Commission be empowered to prescribe terms and conditions under which certain securities should be permitted to enjoy exchange market).

³² *Id.* at 9.

³³ *Id.* at 10.

³⁴ 5 U.S.C. § 781(f) (1936).

quirements.³⁵ The SEC then shifted to a more permissive policy that effectively eliminated these standards by placing the emphasis on intermarket competition and on the assurance of the economic survival of the regional exchanges.³⁶ With respect to issuer consent, the SEC has quickly shifted its stance to the view that the issuer's interests and preferences should not determine whether to grant or terminate UTP. Although the 1936 Report envisioned the SEC as the "disinterested authority" positioned between the stock exchanges and the issuer, beginning with its early administrative rulings the SEC has consistently diminished the role of the issuer to the point of insignificance.³⁷

In *In re Edison Electric Illuminating Co.*,³⁸ for example, the company opposed the extension of UTP in its bonds on the New York Curb Exchange (NYCE) pursuant to section 12(f)(2) of the Exchange Act. Edison Electric originally listed its bonds, which traded by and large over the counter, on the Boston Stock Exchange merely to avoid certain blue sky requirements, and indeed, "not a single trade ha[d] occurred on the Boston Stock Exchange."³⁹ The company argued that due to the combined effect of the bid-ask spread and brokerage commissions, the cost of trading on the NYCE must be 3/8 of 1% or higher, whereas the cost of trading over the counter was closer to 1/8 of 1%.⁴⁰ Furthermore, the company expressed concern with the effects of thin trading⁴¹ in an auction market.⁴² The SEC dismissed the company's claims, citing its voluntary listing on the BSE and the congressional "hope . . . of encouraging competition between the over-the-counter and the exchange markets rather than discouraging it," noting, "[t]he phrase of the statute—'appropriate in the public interest or for the protection of investors'—is to be read in this light."⁴³

³⁵ See, e.g., *In re Piedmont & N. Ry. Co.*, 1 Fed. Reg. 2171, 2171 (S.E.C. 1936) ("[B]y reason of inadequate public trading activity . . . the termination of . . . unlisted trading privileges is necessary and appropriate in the public interest and for the protection of investors . . .").

³⁶ For an analysis of this shift in SEC policy, see generally Walter Werner, *Adventure in Social Control of Finance: The National Market System for Securities*, 75 *Colum. L. Rev.* 1233, 1246-56 (1975).

³⁷ See Report on Trading in Unlisted Securities, *supra* note 30, at 10.

³⁸ Exchange Act Release No. 986 (Dec. 17, 1937).

³⁹ *Id.* at 5.

⁴⁰ See *id.* at 4.

⁴¹ Thin trading is defined as a situation where trading is of low and infrequent volume and without a great availability of buyers and sellers. In such circumstances, a buy or sell order of large size may have a strong impact on price: A large buy order will cause the price to rise, and a large sell order will cause the price to fall. The thinner the trading is, the greater the price impact any one order will have.

⁴² See *In re Edison*, Exchange Act Release No. 986 at 4.

⁴³ *Id.* at 5.

In *In re Providence Gas Co.*,⁴⁴ the issuer applied for termination of UTP in its common stock on the NYCE. The New York Curb Exchange trading in the securities of Providence Gas Co.—an independent, locally owned public utility serving the City of Providence and its vicinity—was inactive.⁴⁵ Providence's management considered it good policy for the stock to be owned by its customers, and the company believed that this policy could best be carried out by trading the stock in the local over-the-counter market, where virtually all trades took place.⁴⁶ Trading on the NYCE interfered with this policy. The SEC pointed out that in order to prevail, "[a]n applicant must . . . establish that the public interest or the protection of investors is jeopardized thereby."⁴⁷ In the case at hand, the SEC determined that Providence had not shown that the inactive NYCE market resulted in any harm to investors and subsequently denied its application.⁴⁸

Likewise, in *In re Chicago Rivet & Machine Co.*,⁴⁹ the issuer sought termination of UTP in its stock on the NYCE. The trial examiner recommended that Chicago Rivet's application be granted: Trading volume on the NYCE was low, and, as evidenced by its bid-ask spread, the stock was highly illiquid.⁵⁰ The SEC found that, "the character of the trading in the security had been unsatisfactory, and that if the unit of trading^o100 shares^owas not reduced, termination of unlisted trading privileges would be appropriate in the public interest and for the protection of investors."⁵¹ The SEC ordered, however, that if the NYCE agreed to test a reduced lot size, the proceedings would be continued pending the results.⁵² Following the change, the average spread declined and the experiment was pronounced a success.⁵³ The company pointed out that over the same period, the security's price also declined, but the SEC countered that:

[W]hile the decline in average spread from 68 cents to 40 cents was not proportionately greater than the concurrent decline in the price of the security, it may well be that in the absence of a change in the trading unit an average spread of more than 40 cents would have occurred in the test period.⁵⁴

⁴⁴ Exchange Act Release No. 1992 (Jan. 19, 1939).

⁴⁵ See *id.* at 2.

⁴⁶ See *id.*

⁴⁷ *Id.* at 4.

⁴⁸ See *id.*

⁴⁹ Exchange Act Release No. 3395, Fed. Sec. L. Rep. (CCH) ¶ 75,369 (Mar. 17, 1943).

⁵⁰ See *id.* at 76,015-16.

⁵¹ *Id.* at 76,015.

⁵² See *id.* at 76,016.

⁵³ See *id.* at 76,017.

⁵⁴ *Id.*

Also citing a moderate increase in volume and shorter execution delays for odd-lot trades, the SEC denied Chicago Rivet's application to terminate the UTP.⁵⁵ In addition, the SEC reconfirmed that the wishes of the issuer, as well as its stockholders, are not controlling.⁵⁶ These decisions have effectively settled the issue, and no UTP requests have been denied since 1934.⁵⁷

The Securities Act Amendments of 1975⁵⁸ strengthened this posture by explicitly introducing competition among securities markets as an element of the National Market System (NMS)⁵⁹ and by giving the SEC broad discretion to shape the emerging system.⁶⁰ With respect to issuer rights, the U.S. Senate's Securities Industry Study that preceded the 1975 Amendments concluded:

The proposition that the issuer of a security has a right to limit the markets in which investors can trade its securities finds no support either in past practice in the securities markets or in Congressional or SEC policy. In fact, the consistent approach has been that trading in a security should be permitted in any market unless such trading would contravene some important policy. . . . The Subcommittee believes that restriction of trading in securities to a single market is a drastic measure, to be legislated only when the public interest clearly requires it. It is not a prerogative of corporate management, which has no legitimate interest in restricting the trading opportunities of investors who have acquired a company's shares.⁶¹

In *Ludlow Corp. v. SEC*,⁶² the court affirmed the SEC's grant of UTP in the stock of the Ludlow Corporation (listed on the NYSE) to the Boston Stock Exchange. Ludlow first argued that, because no specialist would be assigned to the stock, the Boston Stock Exchange had not established that a fair and orderly market for its stock would develop if UTP were granted.⁶³ Moreover, the company claimed that the diversion of order flow from the NYSE would harm investors be-

⁵⁵ See *id.* at 76,018.

⁵⁶ See *id.* at 76,017-18.

⁵⁷ See 140 Cong. Rec. H6508 (daily ed. Aug. 1, 1994) (statement of Rep. Markey).

⁵⁸ Pub. L. No. 94-29, 89 Stat. 97 (1975) (codified at 15 U.S.C. § 78k-1 (1994)).

⁵⁹ See 15 U.S.C. § 78k-1 (1994). The NMS was established by the Securities Act Amendments of 1975, which amended the Securities Exchange Act of 1934. See Securities Act Amendments of 1975, § 7, 89 Stat. at 111 (codified at 15 U.S.C. § 78k-1(a)(2) (1994)). It directed the SEC to "facilitate the establishment of a national market system for securities" and to eliminate hurdles to competition. 15 U.S.C. § 78k-1(a)(2) (1981). For a detailed discussion, see *Electronic Bulls & Bears*, *supra* note 5, at 47-49.

⁶⁰ See Securities Act Amendments of 1975, § 11(a)(2), 89 Stat. at 112 (codified as amended at 15 U.S.C. § 78k-1(a)(2) (1994)).

⁶¹ Subcomm. on Securities of the Senate Comm. on Banking, Housing and Urban Affairs, *Securities Industry Study*, S. Doc. No. 93-13, 93d Cong., 1st Sess. 120-21 (1973).

⁶² 604 F.2d 704 (D.C. Cir. 1979).

⁶³ See *id.* at 710.

cause, for example, prearranged block trades on the Boston Stock Exchange would displace the execution of public limit orders on the NYSE book.⁶⁴ The court rejected both arguments. With respect to the first argument, the court found that:

Under the 1975 Amendments, an applicant for unlisted trading privileges need not show that there will be fair and orderly markets. The applicant must show only that the unlisted trading privileges are "consistent with" fair and orderly markets. . . . BSE must [only] show that if trading should develop, it will be fair and orderly.⁶⁵

Thus, the court determined that the Boston Stock Exchange met this lower burden. With respect to Ludlow's second contention, the court found that because the company had few institutional holders, block trades were unlikely, and that "[m]oreover, certain features of the national market system, such as a composite quote reporter and a central limit order file, are due to come into use. These features will ensure that any block trades that do occur will not displace limit orders on other exchanges."⁶⁶ Needless to say, the central limit order file has not been implemented to date, but the *Ludlow* case confirms that, under current law, the issuer has very little say in decisions that have a paramount impact on its market value: "The legislative history of section 12(f)(2) does indicate that Congress did not want an issuer to have exclusive power to control which markets may trade the issuer's stock."⁶⁷ Following this ruling, the SEC granted the Midwest Stock Exchange UTP in 910 NYSE-listed stocks with no substantive review, citing the D.C. Circuit's confirmation of the SEC's liberal standards.⁶⁸

Another development related to the 1975 Amendments was the introduction of NMS securities, which are subject to improved dissemination of transaction and quotation information in the NASDAQ market. The question that arose was whether the issuer should determine the choice of its securities for NMS designation.⁶⁹

While the National Association of Securities Dealers (NASD) and others argued in favor of issuer consent for the NMS designation, the SEC opposed such a requirement. The NASD stated that "the

⁶⁴ See *id.* at 711.

⁶⁵ *Id.* at 710 (emphasis omitted).

⁶⁶ *Id.* at 711.

⁶⁷ *Id.* at 708.

⁶⁸ See Applications of Midwest Stock Exchange, Inc. for Unlisted Trading Privileges in Certain Securities, Exchange Act Release No. 16,422, [1979-1980 Transfer Binder] Fed. Sec. L. Rep. (CCH) ¶ 82,385, at 82,657 (Dec. 12, 1979) (finding grant of UTP consistent with broad goals of orderly markets and investor protection).

⁶⁹ See Designation of National Market System Securities, Exchange Act Release No. 34-17,549, [1981 Transfer Binder] Fed. Sec. L. Rep. (CCH) ¶ 82,826 (Feb. 17, 1981).

companies who have a fiduciary responsibility to their shareholders to insure that the market for their shares has depth and liquidity should have a choice as to whether or not their shares are traded in the NMS.”⁷⁰ Citing the history of the Exchange Act and its 1975 Amendments and the Senate Committee’s comments that the facilities of the NMS “should be afforded to investors in all securities with suitable characteristics and should not be dependent upon the decision of corporate management to ‘list,’”⁷¹ the SEC disagreed. The SEC explicitly stated, “[t]he Commission believes that issuers should not be allowed to veto designation of their securities as NMS securities.”⁷² As a compromise, the SEC ruled that participation in Tier I of the NMS, which included the most active over-the-counter securities, would be mandatory, whereas Tier II NMS designations (for less active securities) would require the issuer’s application.⁷³ However, the two-tiered approach was abandoned in 1987 at the NASD’s initiative, leading to an effective requirement of issuer consent for NMS designation.⁷⁴ This requirement appears to be the sole exception to the prevailing U.S. rules which deem issuer consent unnecessary for changes in the markets or mechanisms by which their securities are traded.

B. Issuer Consent Regarding Options Listing

The question of issuer consent arose again in the context of options listing: Should the issuer have the right to determine whether and on what market options are traded on its securities?⁷⁵ In the context of options on exchange-listed stocks, the answer, as with UTP, was negative. The question resurfaced when the SEC solicited comments on its proposals to trade listed options on over-the-counter stocks.⁷⁶ The NASD and others proposed that an issuer’s consent be required before trading options on its stock, given that such a requirement is “consistent with the basic tenet of freedom of choice and al-

⁷⁰ Id. at 35 (quoting letter from Gordon S. Macklin, President, NASD, to George A. Fitzsimmons, Secretary, SEC (Aug. 13, 1979)).

⁷¹ Id. at 36.

⁷² Id.

⁷³ See id. at 25.

⁷⁴ See Designation of National Market System Securities, Exchange Act Release No. 34-24,635, 52 Fed. Reg. 24,149 (1987) (codified at 17 C.F.R. § 240 (1996)).

⁷⁵ For our analysis of this issue, see *infra* Part III.D.

⁷⁶ See Release Discussing Exchanges’ and NASD’s Proposed Rule Changes, Exchange Act Release No. 34-22,026, 50 Fed. Reg. 20,310, 23,313-14 (1985) (discussing NASD suggestion that exchanges require issuer consent before trading options). For an analysis of market structure issues involved in options trading, see generally Amihud & Mendelson, *Option Markets*, *supra* note 16.

lows issuers the right to determine which market is better to trade options on their stocks," whereas the alternative "is a misappropriation and unauthorized use of the issuer's assets."⁷⁷ The SEC reiterated its position that Congress had stressed that "an issuer does not have the right to veto exchange trading of its securities,"⁷⁸ and that requiring issuer consent for options listing would be similarly inconsistent with legislative intent.⁷⁹ Therefore, it denied the NASD's proposal, although it allowed the NASD to impose an issuer consent constraint upon itself.

In *Golden Nugget, Inc. v. AMEX*,⁸⁰ the company, which was listed on the NYSE, claimed that the issuance and trading of options on its stock by the AMEX and the Options Clearing Corporation⁸¹ without its consent constituted misappropriation of Golden Nugget property, infringement of its trade name, and unfair competition with its own issues, all in violation of Nevada law. The Ninth Circuit found these claims to be without merit. With respect to the misappropriation claim, the court stated that AMEX dealt only with the property of Golden Nugget's shareholders, not with property owned by the corporation.⁸² Accordingly, the Ninth Circuit held that "appellant's misappropriation claim fails because it had no property interest that could be misappropriated."⁸³ The court also rejected Golden Nugget's second claim, noting that "[s]urely a dealer in a product can describe it accurately by its tradename—shares of Golden Nugget common stock are not unlike second-hand BMW's or Chevrolets,"⁸⁴ and that such action does not constitute a trademark violation. The court further rejected Golden Nugget's argument that the options were a new product, distinct from the underlying stock, that had appropriated the Golden Nugget name.⁸⁵ Finally, the court rejected the unfair competition claim because it found nothing dishonest or unfair in the AMEX's actions.⁸⁶

⁷⁷ Release Discussing Exchanges' and NASD's Proposed Rule Changes, 50 Fed. Reg. at 20,313. In addition, some commentators cited the possible negative impact of options on the market for the issuer's securities and on the company itself. See *id.*

⁷⁸ *Id.*

⁷⁹ See *id.*

⁸⁰ 828 F.2d 586 (9th Cir. 1987).

⁸¹ For a description of the Options Clearing Corporation, see *Electronic Bulls & Bears*, *supra* note 5, at 190-93.

⁸² See *Golden Nugget*, 828 F.2d at 590.

⁸³ *Id.* at 591.

⁸⁴ *Id.*

⁸⁵ See *id.*

⁸⁶ See *id.*

C. *The Unlisted Trading Privileges Act of 1994*

Multimarket trading is further facilitated by the Unlisted Trading Privileges Act of 1994.⁸⁷ Amending section 12(f) of the Securities Exchange Act of 1934,⁸⁸ the 1994 act makes the grant of UTP immediate and automatic, eliminating even the requirement of SEC approval in order to obtain UTP.⁸⁹ Congressman Wyden's introduction of the bill on the House floor recognized that the past role of the SEC in "approving" UTP was strictly perfunctory.⁹⁰ Congressman Markey's comments also illustrated the prevailing view that multimarket trading should be encouraged because of its competitive effect:

Mr. Speaker, today the House is taking up legislation to streamline and make our Nation's stock markets more competitive by extending unlisted trading privileges to the regional stock exchanges for most registered securities as soon as they become listed and registered on another exchange.

....

This bill eliminates an anachronistic provision of the Securities Exchange Act of 1934 which requires regional stock exchanges, such as the Boston Stock Exchange, to receive Securities Exchange Commission approval before they can trade stocks listed on the New York or the American Stock Exchange.

The Securities and Exchange Commission routinely approves all requests by the regional exchanges for unlisted trading privileges. Last year, for example, the Commission reported that it approved over 1,600 exchange requests for UTP. No UTP requests have actually been denied since 1934, and during the last 10 years, virtually no comments have been submitted to the SEC on a UTP application.⁹¹

Thus, in summary, under the prevailing U.S. regulatory regime, the issuer has no right to determine the location and manner of trading in its own securities. In order to evaluate the current system effectively, one must understand and consider the effect of a security's trading regime—the locations, rules, and mechanisms of trading—on its value. Part II undertakes this analysis.

⁸⁷ Pub. L. No. 103-389, 108 Stat. 4081 (1994) (codified as amended at 15 U.S.C. § 78I(f) (1994)).

⁸⁸ 15 U.S.C. § 78I(f) (1994).

⁸⁹ See *id.*

⁹⁰ See 139 Cong. Rec. E1633 (daily ed. June 24, 1993) (statement of Rep. Wyden) (introducing legislation and noting that SEC routinely grants UTP applications).

⁹¹ 140 Cong. Rec. H6508 (daily ed. Aug. 1, 1994) (statement of Rep. Markey).

II EFFECTS OF SECURITIES LIQUIDITY AND MULTIMARKET TRADING

A. *The Effect of Liquidity on Securities Values*

The method and rules that govern the trading of a security determine its liquidity, which, in turn, affects its value. In earlier works, we have shown both theoretically and empirically that securities with lower liquidity have lower values (holding all other things equal) or, equivalently, higher average returns for a given level of risk.⁹²

Illiquidity of a security reflects the costs associated with exchanging that security for cash, the most liquid asset.⁹³ In order to effect an immediate transaction, investors must rely on traders or market-makers on the other side of the market who are willing to trade with them. For example, on the NASDAQ Stock Market, market-makers quote ask and bid prices and stand ready to sell and buy (respectively) stated quantities at these prices.⁹⁴ On the NYSE, the specialist assigned to a stock quotes the ask and bid prices at which he stands ready to execute transactions immediately.⁹⁵ In addition, liquidity is provided by investors' limit orders.⁹⁶ These limit orders are integrated into the specialist's "book" and provide liquidity to the market, enabling prompt execution of incoming market orders.

Examples of typical limit orders or quotes are: "Buy 500 shares of a stock at a price of \$75 or better (lower)"; or "Sell 400 shares at a price of \$76 or better (higher)." If these are the best available quotes, an investor who places a market buy order will pay \$76 per share, and one who places a sell order will receive \$75 per share upon execution.

⁹² See Amihud & Mendelson, *Financial Policy*, supra note 22, at 56-57 (discussing relationship between returns and liquidity). See generally Amihud & Mendelson, *Bid-Ask Spread*, supra note 22 (deriving theoretical relationship between returns and liquidity and confirming this relationship empirically); Amihud & Mendelson, *Liquidity and Asset Prices*, supra note 22 (discussing corporate financial implications of relationship between returns and liquidity).

⁹³ For a detailed discussion of the costs of illiquidity, see Amihud & Mendelson, *Bid-Ask Spread*, supra note 22, at 243-47; Amihud & Mendelson, *Liquidity and Asset Prices*, supra note 22, at 6-8; Amihud & Mendelson, *Financial Policy*, supra note 22, at 56-57.

⁹⁴ See *Electronic Bulls & Bears*, supra note 5, at 45-47 (discussing evolution of NASDAQ bid-and-ask process).

⁹⁵ See *id.* at 44 (discussing mechanics of NYSE transactions).

⁹⁶ A limit buy order specifies a quantity and a price, meaning that the indicated quantity is to be bought at the designated price or at a lower price. A limit sell order specifies a quantity and a price, meaning that the indicated quantity should be sold at the designated price or at a higher price. An incoming market buy order (an order to buy immediately at any price) is executed against the offer to sell with the lowest available price, and an incoming market sell order is executed against the offer to buy with the highest available price.

The difference (\$1 in this example) between the best offer price available to market buyers (\$76) and the best bid price available to sellers (\$75) is the bid-ask spread. The bid-ask spread compensates for the costs of providing immediacy and, in particular, for the risks of maintaining an inventory of the security and the possibility of trading against traders with superior information.⁹⁷

A party who has quoted a buying (bid) price or who has placed a limit buy order and faces an incoming sell order expects that the sale by another party may signify that the security is overvalued. If, in the above example, the seller is informed that the stock is worth less than \$75, he will sell the stock at the quoted price of \$75, and the buyer will lose on his investment when the information is later revealed and the stock price drops below \$75. In contrast, if the selling party sells the stock because it needs the cash and does not have superior information, the buyer will buy at \$75, expecting to sell it later at \$76 and gain the bid-ask spread of \$1. The lower the risk of trading against parties with superior information, the narrower the difference between the buying and selling price will be. In other words, the bid-ask spread will be smaller.

In general, buy and sell orders generate a price impact. A buyer will react to a flow of sell orders by lowering her buying price, and a seller will react analogously to a flow of orders by raising the price at which he will sell. Thus, sell orders have a negative price impact, while buy orders have a positive price impact. In a similar way, constraints on the size of the inventory that a dealer is willing to carry cause him to lower his quoted prices when his inventory increases as a result of public sell orders. The dealer lowers prices in order to induce the public to buy securities from him and to discourage further sales to him. Similarly, a dealer increases the quoted prices when the public buys from his inventory. This "price impact" cost usually increases with the transaction size: The larger the transaction is, the greater the

⁹⁷ For models of the effect of asymmetry of information between buyers and sellers in the market on the buying and selling prices and on the bid-ask spread, see generally Yakov Amihud & Haim Mendelson, *Asset Price Behavior in a Dealership Market*, *Fin. Analysts J.*, May-June 1982, at 50, 55-58; Walter Bagehot, *The Only Game in Town*, 27 *Fin. Analysts J.*, Mar.-Apr. 1971, at 12, 12-14; Thomas E. Copeland & Dan Galai, *Information Effects on the Bid-Ask Spread*, 38 *J. Fin.* 1457, 1464-67 (1983); Lawrence R. Glosten & Paul R. Milgrom, *Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders*, 14 *J. Fin. Econ.* 71, 76-91 (1985) (discussing model of asymmetric information in pure dealership market); Albert S. Kyle, *Continuous Auctions and Insider Trading*, 53 *Econometrica* 1315, 1317-30 (1985) (positing discrete models of sequential trading based on asymmetry of market information). For analyses of inventory effects, see Yakov Amihud & Haim Mendelson, *Dealership Market: Market Making with Inventory*, 8 *J. Fin. Econ.* 31, 44-51 (1980); Thomas Ho & Hans R. Stoll, *The Dynamics of Dealer Markets Under Competition*, 38 *J. Fin.* 1053, 1060-69 (1983).

impact will be. The bid-ask spread can thus be viewed as the price impact of a standard-size transaction executed against the best available quotes.

Illiquidity costs are the costs of buying or selling a security in the market.⁹⁸ The premium paid by investors when buying a security, or the value they forego when selling (i.e., the bid-ask spread and price-impact costs), are significant illiquidity costs. Additional illiquidity costs include the costs of search and delay that investors incur when they try to mitigate the price-impact costs. For example, investors can place limit orders and wait for the orders to be executed at a price better than the prices at which they could immediately execute a market order, or investors can delay the execution of an order for fear that it will impact the price and instead actively search for counterparties. This second scenario is especially common in block transactions. Furthermore, brokerage commissions and exchange fees are illiquidity costs.

Illiquidity costs affect securities values because investors require compensation for bearing these costs.⁹⁹ As a result, securities with higher illiquidity costs will have lower values (holding all other things equal). Stated differently, in order to compensate investors, securities with higher illiquidity costs must generate higher yields or higher expected returns for any given level of risk.

Empirical evidence supports this theory. In our study of NYSE stocks over the 1961-1980 period, average stock returns were found to increase with the stocks' bid-ask spreads (after controlling for risk).¹⁰⁰ Later studies, using different measures of stock liquidity, found that greater liquidity of a given security correlated with a lower average return on the stock.¹⁰¹ Similar results were obtained in studies analyz-

⁹⁸ See Amihud & Mendelson, *supra* note 21, at 371-72 (noting that illiquidity is given by trading costs paid over lifetime of stock).

⁹⁹ For a mathematical model, see Amihud & Mendelson, *Bid-Ask Spread*, *supra* note 22, at 225-31.

¹⁰⁰ See *id.* at 232-35. The return for a period is calculated as the dividend yield plus the percentage price appreciation over the period. A recent study corroborates these results for NASDAQ stocks. See generally Venkat R. Eleswarapu, *Cost of Transacting and Expected Returns in the NASDAQ Market* (July 1996) (unpublished manuscript, on file with authors).

¹⁰¹ Strong corroborating evidence, using recent NASDAQ data, is presented in Eleswarapu, *supra* note 100, at 6-13. Others used another measure of illiquidity—the price-impact cost—and found that average stock returns were increasing in illiquidity. See Michael J. Brennan & Avanidar Subrahmanyam, *Market Microstructure and Asset Pricing: On the Compensation for Adverse Selection in Stock Returns 2-4, 19-21* (Nov. 22, 1994) (unpublished manuscript, on file with authors). Recent studies measured liquidity by the stock turnover (ratio of trading volume to number of shares outstanding) and found a very strong and statistically significant relationship: Higher liquidity (thus measured) correlated with a lower average return earned on stocks after controlling for risk. See Vinay Datar et

ing the bond market. We found that government debt securities with identical cash flows had different yields to maturity, depending on their liquidity: The less-liquid debt securities had higher yields.¹⁰² Finally, evidence shows that corporate securities with restricted trading rights have considerably lower values than similar unrestricted securities.¹⁰³

Thus, as the above studies demonstrate, liquidity has a sizable impact on securities values. Although the illiquidity costs per transaction are usually small relative to the security's price, their effect on the security's *value* is considerable because the costs are incurred *repeatedly* whenever the security is traded. The value loss due to illiquidity is given by the discounted present value of the illiquidity costs incurred throughout the lifetime of the security at a frequency determined by investors' holding periods.¹⁰⁴ In order to understand the

al., Role of Trading Activity in the Cross-Section of Stock Returns 12-18 (London Business Sch. Working Paper No. 175-93, 1995) (discussing results of study where more actively traded stocks provided lower average returns); Robert A. Haugen & Nardin L. Baker, Commonality in the Determinants of Expected Stock Returns, 41 J. Fin. Econ. 401 (1996) (discussing results of study finding that lower average return correlated with higher volume); Venkat R. Eleswarapu & Chandrasekhar Krishnamurthi, Liquidity, Stock Returns and Ownership Structure: An Empirical Study of the Bombay Stock Exchange 15-22 (Apr. 1995) (unpublished manuscript, on file with authors) (analyzing results of study where returns were inversely related to trading frequency). A theoretical analysis of the tradeoff between asset return and trading costs appears in Alex Kane, Trading Cost Premiums in Capital Asset Returns—A Closed Form Solution, 18 J. Banking & Fin. 1177, 1179-82 (1994) (considering model of quoted and nonquoted assets). For a general equilibrium analysis of the impact of changes in securities' liquidity on their values, see Dimitri Vayanos & Jean-Luc Vila, Equilibrium Interest Rate and Liquidity Premium Under Proportional Transaction Costs 14-21 (Jan. 1995) (unpublished manuscript, on file with authors).

¹⁰² See generally Yakov Amihud & Haim Mendelson, Liquidity, Maturity and the Yields on U.S. Treasury Securities, 46 J. Fin. 1411 (1991) (examining effects of asset liquidity on yields of U.S. Treasury bills and notes with maturities of less than six months). Confirming evidence is presented in Avraham Kamara, Liquidity, Taxes, and Short-Term Treasury Yields, 29 J. Fin. & Quantitative Analysis 403, 405-09 (1994) (demonstrating that less-liquid notes have higher yields than otherwise identical bills). The relationship of yield differential between Treasury notes and bills and liquidity differential was first noted by Kenneth D. Garbade, Bankers Trust Co., Analyzing the Structure of Treasury Yields: Duration, Coupon, and Liquidity Effects, in Topics in Money and Securities Markets 3-4 (1984).

¹⁰³ See William L. Silber, Discounts on Restricted Stock: The Impact of Illiquidity on Stock Prices, Fin. Analysts J., July-Aug. 1991, at 60, 60-64 (comparing price of restricted stock with price of publicly traded stock from same company to demonstrate relationship between liquidity and value of stock).

¹⁰⁴ For a formal model, see Amihud & Mendelson, Bid-Ask Spread, *supra* note 22, at 225-31, showing that higher illiquidity costs result in investors requiring a higher return. For all securities, higher illiquidity costs result in investors requiring a higher return. Moreover, the sensitivity of return to illiquidity costs is greater for securities that are traded more frequently. The trading frequency of a security is affected, in part, by its liquidity. In equilibrium, investors who expect to hold the security for a short period of time will prefer a more-liquid security; an investor with a longer holding period will be less

magnitude of this effect, consider a stock priced by the simple dividend discount model, which states that the current stock value, P_0 , equals the present value of its expected future dividend payout stream.¹⁰⁵ Absent transaction costs, the stock's value is given by

$$P_0 = \frac{D_1}{r-g},$$

where D_1 is its end-of-period dividend payout, r is the required return on the stock, and g is the growth rate per period. If the stock's annual growth rate is 6%, its expected end-of-period dividend is \$1, and the required return absent transaction costs is 10%, then the stock's theoretical market value (ignoring transaction costs) is $P_0 = \$1/(0.10-0.06) = \25 .

Now assume that each transaction entails illiquidity costs of 1% of the stock's value, and that the stock is traded every two years.¹⁰⁶ Because the buyer must take into account both her own illiquidity costs and the effect of such future costs on the stock's resale price, the stock price must reflect both the present value of the dividend stream and the present value of all future illiquidity costs. The present value of the stream of illiquidity costs over the lifetime of the stock is given by

$$\sum_{t=0}^{\infty} \frac{0.01 \cdot P \cdot 1.06^{2t}}{1.1^{2t}},$$

where P is the present value of the stock's dividend stream *net of transaction costs*. Solving for P , it is now \$21.93, or 12.3% below the

sensitive to the illiquidity costs and thus will select a less-liquid security if the additional return earned on the security is sufficient to compensate her for the higher illiquidity costs. See *id.* at 224. Because the illiquidity costs are incurred more frequently for securities whose holding periods are shorter, more-liquid securities which have low transaction costs and shorter holding periods will be more sensitive to illiquidity costs. In addition, in equilibrium the net-of-transaction-cost returns will be higher for less-liquid securities. See *id.* at 228. This is true because all investors, short-term and long-term alike, prefer securities with low costs, and thus higher-cost securities must offer higher net returns to induce long-term investors to hold them.

¹⁰⁵ See, e.g., Richard A. Brealey & Stewart C. Myers, *Principles of Corporate Finance* 59 (5th ed. 1996) (noting that present value of stock is equivalent to present value of expected future dividends). In what follows, we use for simplicity the cost of capital, r , which, by our model, needs to be adjusted for investors' equilibrium holding periods. See Amihud & Mendelson, *Bid-Ask Spread*, *supra* note 22, at 228-29 (noting that present value of stock is equivalent to present value of expected future dividends net of transaction costs).

¹⁰⁶ This corresponds to a 50% turnover rate. The average turnover of stocks traded on the NYSE was 54% in 1994, 54% in 1993, and 48% in 1992. See *Fact Book*, *supra* note 26, at 94.

former value of \$25. Thus, an apparently small 1% illiquidity cost translates into a sizable effect on the stock price.

The effect of liquidity on securities values induces issuers, such as corporations, to pursue policies directed at increasing the liquidity of their publicly traded claims.¹⁰⁷ A major decision that must be reached by a public corporation is where to list its stock, and, indeed, evidence shows that corporate listing decisions are consistent with the objective of increasing liquidity.¹⁰⁸ Studies by both Christie and Huang and Kadlec and McConnell found that companies that listed their securities on exchanges (after having been traded over the counter) or that switched their listings between exchanges enjoyed an improvement in their stocks' values.¹⁰⁹ Further, this change was associated with an improvement in the stocks' liquidity, reflected by a decline in bid-ask spreads, which are a measure of illiquidity. Christie and Huang found that the effective bid-ask spread declined substantially and significantly on the first day that companies listed on one of the exchanges (or switched between exchanges) and remained low thereafter.¹¹⁰ Kadlec and McConnell found that across companies that listed on exchanges, stock price increases were positively and significantly related to the improvement in stock liquidity.¹¹¹ This evidence demonstrates the importance of the issuer's decision on the trading location of its securities. Companies choose the listing location in a way that is consistent with value maximization, and they pursue policies that improve the liquidity of their stocks.

Given that the trading regime affects liquidity, some securities markets have attempted to attract corporate listing by developing liquidity-enhancing trading systems.¹¹² One objective is to encourage the placement of quotes and limit orders because they provide liquid-

¹⁰⁷ See Amihud & Mendelson, *Liquidity and Asset Prices*, supra note 22, for a comprehensive survey of corporate policies which affect the liquidity of the corporate claims (stocks and bonds).

¹⁰⁸ See *id.* at 13 (noting that "[t]he liquidity-increasing motive may explain the desire of many firms to list on the large and organized securities exchanges despite the costs and restrictions associated with such listings rather than to trade over the counter"); see also Macey & Kanda, supra note 21, at 1010-11 (noting that "[t]he most widely understood function of an organized exchange is to provide liquidity for listing firms").

¹⁰⁹ See William G. Christie & Roger D. Huang, *Market Structures and Liquidity: A Transactions Data Study of Exchange Listings*, 3 *J. Fin. Intermediation* 300, 307-15 (1994); Gregory B. Kadlec & John J. McConnell, *The Effect of Market Segmentation and Illiquidity on Asset Prices: Evidence from Exchange Listings*, 49 *J. Fin.* 611, 619-21 (1994); see also references therein for earlier studies that established similar results.

¹¹⁰ See Christie & Huang, supra note 109, at 307-12.

¹¹¹ See Kadlec & McConnell, supra note 109, at 612.

¹¹² For example, markets developed electronic systems that facilitate placement of limit orders and accelerate the execution of market orders. The NYSE's SuperDOT automated system for order placement is one example of such a system. For a discussion of the man-

ity to the market. Limit orders provide liquidity to the market because those who place the orders effectively stand ready to trade (buy or sell) at their orders' limit prices. Thus, they enable any investor who wishes to effect an immediate execution of his order at any time to have a party on the other side willing to trade with him. Some markets provide such an incentive by establishing *time priority* in execution, whereby orders with the same quoted price will be executed in the same sequence in which they arrived.¹¹³ This reward is intended to encourage investors to place limit orders early and make them available to investors who wish to trade promptly through market orders. Early placement of limit orders also helps the value discovery process,¹¹⁴ because those who quote prices disclose their valuation of the security and thus provide free information to the entire market. This effect is referred to as a positive (information) externality.¹¹⁵ Another secondary priority is *size priority*: Given two limit orders with the same price, the order for a larger quantity has priority in execution against any incoming market orders.¹¹⁶

The next section examines the manner in which multimarket trading can interfere with both the issuer's intention to increase the stock's liquidity through listing and with the incentives to provide liquidity to the market. In addition, the section studies the associated liquidity effects of multimarket trading.

ner by which the NYSE's system operates, see *Electronic Bulls & Bears*, supra note 5, at 44.

¹¹³ See, e.g., N.Y. Stock Exch. Rule 72(I)(a), 2 N.Y.S.E. Guide (CCH) ¶ 2651 ("If it is possible to determine clearly the order of time in which bids were made such bids shall be filled in that order."); Am. Stock Exch. Rule 126(e)(1), 2 Am. Stock Ex. Guide (CCH) ¶ 2459 ("[W]hen a bid is clearly established as the first made at a particular price, the maker shall be entitled to priority and shall have precedence on the next sale at that price . . ."); Pac. Stock Exch. Rule 5.8(c), Pac. Stock Ex. Guide (CCH), ¶ 3999 ("When a bid or offer is clearly established as the first made at a particular price regardless of the floor, the maker shall be entitled to priority and shall have precedence on the next sale at that price . . ."). On the role of secondary priority rules in securities markets, see Cohen et al., supra note 16, at 156-60 (discussing prominence of time priority rule); Merton H. Miller, *Financial Innovations and Market Volatility 152-57* (1991) (discussing effect of exchange rules on market transparency); Schwartz, supra note 16, at 39 (noting that secondary trading priority rule "specifies the sequence to be followed for orders that have been submitted at the same price"); Amihud & Mendelson, *European Capital Markets*, supra note 16, at 85-87 (explaining time priority, size priority, and public order priority rules); Amihud & Mendelson, *Option Markets*, supra note 16, at 21-24 (same).

¹¹⁴ Value discovery is the process by which investors in the market gather information about securities and use it to establish their assessment of securities' values. Through trading by the market participants, the price of the security is established.

¹¹⁵ In general, a positive externality occurs when an activity by one party produces a benefit to another party. In our case, those who reveal their own information by posting their price quotes facilitate the process of value discovery for other investors in the market.

¹¹⁶ See Cohen et al., supra note 16, at 156 ("A larger order has priority over an equally priced order that is smaller.").

B. *Multimarket Trading and Its Effects*

1. *Effects of Multimarket Trading on Liquidity: Competition and Fragmentation*

A major role of securities markets is to provide liquidity.¹¹⁷ The effect of multimarket trading on liquidity is ambiguous because of the conflicting effects of competition and fragmentation.¹¹⁸ On one hand, multimarket trading may generate liquidity improvements due to enhanced intermarket competition. On the other hand, it may hurt liquidity because it induces fragmentation of the order flow between markets¹¹⁹ and enables violations of rules designed to enhance liquidity *within* markets.¹²⁰ The net effect of these competing forces on liquidity depends on the circumstances of each security.

Competition between securities markets can enhance liquidity for a number of reasons. In fact, intermarket competition induced many securities markets to improve their trading systems out of fear that trading would shift to other markets.¹²¹ Over the last two decades,

¹¹⁷ See Amihud & Mendelson, *supra* note 21, at 369 (discussing how market trading mechanisms and trading rules affect liquidity); see also Macey & Kanda, *supra* note 21, at 1009-10 (discussing role of markets in providing liquidity as well as their role in monitoring, standardizing rules to reduce transaction costs, and signaling).

¹¹⁸ See Equity Market Structure Study, *supra* note 12, at 1531 (noting that while some commentators believe that competition has led to harmful fragmentation of equity markets, others view this competition as invigorating).

¹¹⁹ Fragmentation of the order flow occurs when the flow of orders by investors that normally would be directed to one market center is split, or fragmented, among a number of markets. The likelihood of finding a match between buyers and sellers in each market decreases because of the smaller number of orders in each market. As a result, under fragmentation of an order flow, the execution of a given order may produce results that are different from what could be obtained in a single auction market. See Cohen et al., *supra* note 16, at 150-69 (surveying consolidation-fragmentation debate); Haim Mendelson, Consolidation, Fragmentation, and Market Performance, 22 *J. Fin. & Quantitative Analysis* 189, 197-206 (1987) (providing comprehensive analysis of effects of market fragmentation on traders' benefits (surplus), volatility, and informativeness of asset prices); Mendelson & Peake, *supra* note 19, at 459-65 (discussing additional costs of fragmentation including information system, market selection, marketing, and regulatory expenses and providing proposal for consolidating order flow on single exchange per issue, where exchange is competitively selected). On exchange rules regarding order consolidation and on fragmentation, see Cohen et al., *supra* note 16, at 156-60; Schwartz, *supra* note 16, at 175-80; Lawrence E. Harris, Liquidity, Trading Rules, and Electronic Trading Systems 17-26, 35-40 (N.Y. Univ. Monograph Series in Fin. & Econ. 1990); Ananth Madhavan, Consolidation, Fragmentation, and the Disclosure of Trading Information 7-12 (Aug. 1994) (unpublished manuscript, on file with authors).

¹²⁰ This issue is explained in detail *infra* text accompanying notes 124-25.

¹²¹ See Cohen et al., *supra* note 16, at 163 (noting that competition has led to "the institution of more attractive trading systems by rival market centers"); Schwartz, *supra* note 16, at 172 ("The exchanges have reacted [to competition] by developing new products and new trading technologies. They have also opened their doors to new members, lengthened trading hours, tightened their regulation of the specialists, and greatly improved the intermarket trading system."); Electronic Bulls & Bears, *supra* note 5, at 52 (noting that,

competition drove markets around the world to introduce automation and modern trading procedures that facilitated investors' access to markets and reduced illiquidity costs.¹²² As is usually the case with competition, it is expected to improve liquidity by reducing rents inflated as a result of market power.¹²³

Multimarket trading, however, may reduce liquidity because it can cause fragmentation when a security's order flow is split among a number of markets that are not perfectly coordinated. In that case, the number of bids and offers to buy and sell the security in each market declines, as does the resulting aggregate trading volume, relative to a regime under which the entire order flow is consolidated in one market. As a result, an order of a given size sent to a market for execution will find fewer limit orders or quotes available on the other side at any given price. Both the price impact of the order and the bid-ask spread it faces in each market will tend to be higher than if trading were confined to a single market. Thus, fragmentation as a result of multimarket trading may increase illiquidity costs compared to the case where the entire order flow is consolidated in a single market.

Multimarket trading can also hurt liquidity by inducing free riding¹²⁴ by dealers in one market on other markets' quotes. The most common problem arises when peripheral markets free ride on the principal market's quotes and trade information, with traders in the peripheral market using the price information included in the quotes presented in the principal market for their own trading in that periph-

according to some critics, "a universal message switch (UMS) that would automatically route brokers' orders to the market where the best price was being displayed," as opposed to SEC-approved Intermarket Trading System (ITS), "would encourage the regional exchange specialists to more effectively compete by offering better prices than offered by the NYSE or AMEX specialist").

¹²² See *Electronic Bulls & Bears*, supra note 5, at 3 (noting advent of "automated systems" in United States markets in 1970s and movement on foreign exchanges toward "completely electronic marketplaces"); *Trading Around the Clock*, supra note 2, at 2 (noting emergence of "highly automated markets" as part of "movement toward 'round-the-clock global securities trading'").

¹²³ A basic tenet of economics is that competition between suppliers of a service leads to a reduction in the cost of that service to consumers. In contrast, a supplier that possesses market power would charge higher prices that provide it with a rent. Here, competition between markets would drive down the cost to investors of the liquidity services that these markets provide. Put differently, the cost to investors of executing trades would decline.

¹²⁴ Free riding occurs when one entity is using a product of another entity without paying for the use of that product. For a detailed analysis of the free-rider problem, see Cohen et al., supra note 16, at 161; Amihud & Mendelson, *European Capital Markets*, supra note 16, at 83-84; Amihud & Mendelson, *Option Markets*, supra note 16, at 17-20; see also Lawrence Harris, *Consolidation, Fragmentation, Segmentation and Regulation*, *Fin. Markets Institutions & Instruments*, Dec. 1993, at 1, 1-28.

eral market. Free riding reduces the incentive of dealers in one market to provide liquidity by placing quotes and limit orders that improve upon the quotes in other markets. A dealer in one market who receives a market order can choose either to execute it herself or to send it to another market for execution. In the U.S. stock markets (which are linked by the Intermarket Trading System), an order must be executed at the best quote available in any market or at a better price. This is accomplished either by executing the order on the market with the best quote or by matching (or improving) the best quote.¹²⁵ Thus, a dealer in one market can offer to execute orders at the price quoted in another market without the need to attract investors' orders by quoting better prices. Within the exchanges, however, incoming orders are executed according to price priority and then by time priority. Though this provides an incentive to quote early and stand ready to provide liquidity, the price priority and time priority incentives are circumvented by the ability in each market to match the quoted prices of the best markets. This reduces the incentive to provide liquidity to the market. The party that placed an early best quote in the principal market not only loses the advantages provided by price and time priorities, but is in fact at a disadvantage: She will receive orders entered for execution through other markets only when it is disadvantageous to execute those orders in the market in which the order was placed. The erosion of the benefits to the party who quoted early will make her less willing to place early quotes. The predictable result is fewer or less competitive quotes and public limit orders, wider bid-ask spreads, greater price impact, and lower liquidity. As the following discussion illustrates, empirical evidence supports these predictions.

Most regional exchanges in the United States, as well as some of the proprietary trading systems linked to the NASDAQ Stock Market, have instituted formal procedures and mechanisms for automatic matching of the best prices quoted systemwide or for improving upon the quotes—for example, by exposing an incoming order for a specified time interval so as to enable traders to improve on the best quote.¹²⁶ Evidence shows a relatively high frequency of transactions

¹²⁵ See *Electronic Bulls & Bears*, *supra* note 5, at 48 (“The ITS does not require that an order be routed to the market with the best quote. The order can be executed in the market in which it is received, provided the specialist or a floor broker matches the best quote available elsewhere.”); see also *Equity Market Structure Study*, *supra* note 12, at 1530 (noting that ITS has “increased the opportunities for brokers to secure the best execution of their customers’ orders without developing order-by-order routing systems”).

¹²⁶ See *Order Execution Obligations*, 60 Fed. Reg. 52,792, 52,794 (1995) (commenting on technological advances aimed at improving handling and execution of customer orders);

inside the best quoted bid-ask spread, meaning that the quoted prices do not provide the best available liquidity.¹²⁷ That is, the quoted ask (or offer) price is higher than the price at which one could buy the stock. In reality, the buyer is able to execute his order at a price that is lower than the quoted price. Similarly, the quoted bid price is lower than the price at which it is eventually feasible—as the data show—to sell the stock. This disparity implies that the effective bid and ask prices at which transactions can be executed are more favorable than those quoted and that the effective bid-ask spread is narrower. Accordingly, the quoted prices representing wider bid-ask spreads reflect lower liquidity. Those who quote these prices have no incentive to quote better ones.

Empirical evidence indicates that indeed peripheral markets ride on the quotes in the principal markets. Garbade and Silber showed that for dually listed securities, the price changes in the principal market lead to price changes in the other markets where the security is listed.¹²⁸ Hasbrouck examined the price discovery process in a multiple-markets setting and found that over ninety percent of the price discovery takes place on the New York Stock Exchange.¹²⁹ Most of the information is incorporated into stock prices on the NYSE, with the peripheral markets following its lead. The information share of the NYSE is greater than its market share in volume, suggesting that trading in peripheral markets is free riding on the NYSE information.¹³⁰ Similarly, Blume and Goldstein found that the bid and ask prices of the NYSE quotes are the primary determinants of the best displayed prices in all markets.¹³¹ The peripheral markets free ride on the NYSE quotes by matching them and attract trading by various other means.¹³² Anticipating this free riding, the displayed

Payment for Order Flow, 59 Fed. Reg. 55,006, 55,009 (1994) (discussing systems designed to offer price improvements for small orders in listed securities).

¹²⁷ For example, more than 20% of NYSE trades were estimated to take place strictly between the best ITS bid and the best ITS ask. See Market 2000, *supra* note 24, at Exhibit 39.

¹²⁸ See Kenneth D. Garbade & William L. Silber, *Dominant and Satellite Markets: A Study of Dually-Traded Securities*, 61 *Rev. Econ. & Stat.* 455, 455-60 (1979).

¹²⁹ See Joel Hasbrouck, *One Security, Many Markets: Determining the Contribution to Price Discovery*, 50 *J. Fin.* 1175, 1197 (1995) (concluding that "price discovery appears to be concentrated at the NYSE: the median information share is 92.7 percent").

¹³⁰ See *id.* ("[F]or twenty-eight of the Dow stocks, the information share is larger than the NYSE's market share (by trading volume).").

¹³¹ See Marshall E. Blume & Michael A. Goldstein, *On the Integration of the US Equity Markets* 13-15 (Jan. 12, 1995) (unpublished manuscript, on file with authors).

¹³² These means include personal service and cultivation of long-term relationships. Also, over-the-counter and regional market-makers attract customer orders by paying brokers for order flow. See *Equity Market Structure Study*, *supra* note 12, at 1537 (noting that "[a]s competition among firms providing automatic execution systems has increased, it ap-

quotes on the NYSE itself do not reveal all the trading interest, and some orders are negotiated and executed within the spread.¹³³ Thus, the mechanism instituted in multimarket trading, matching other markets' quotes, encourages dealers to circumvent price and time priorities, thereby removing a major incentive to provide the best quotes early. These incentives result in lower liquidity.

Quote matching in multimarket trading can also hurt liquidity by reducing the information content of price quotes. Those who quote early provide a positive "information externality":¹³⁴ They disclose their valuation of the security and thus produce information to the public which is used by others to update their own price estimates.¹³⁵ As the bid-ask spread narrows, this information becomes more precise. Naturally, absent other incentives, each trader will prefer to see the other trader's price information first and only then update her own.¹³⁶ Because the quote providers cannot capture the full benefit of the free information they produce, there is systematic underproduction of quote information: There are either too few quotes, or the quotes are less accurate, that is, the bid-ask spreads are wider. Time priority creates an incentive to provide quotes to the market because the party that quotes early is able to execute early. However, when dealers' quotes are matched and executed in another market, the benefit of quoting early is eroded, and the incentive to provide accurate price information is diminished, and, in turn, liquidity is diminished.

Free riding on the information in the principal market also occurs when there are differences in market transparency,¹³⁷ which may have

pears that firms increasingly use payment for order flow as a means of attracting order flow to their automated execution systems").

¹³³ See *supra* note 127.

¹³⁴ See Cohen et al., *supra* note 16, at 161 (discussing nature of price discovery as public good); Amihud & Mendelson, *European Capital Markets*, *supra* note 16, at 83-84 (discussing information externality provided by quotes in securities markets); Amihud & Mendelson, *Option Markets*, *supra* note 16, at 17-19 (same). For empirical evidence on the existence of such an externality, see Yakov Amihud et al., *Market Microstructure and Securities Values: Evidence from the Tel Aviv Stock Exchange 17-19* (Feb. 1996) (unpublished manuscript, on file with authors).

¹³⁵ See Kenneth D. Garbade et al., *On the Information Content of Prices*, 69 *Am. Econ. Rev.* 50, 50-59 (1979) (reporting results of empirical study on information content of prices in dealer markets).

¹³⁶ Each trader prefers that the other side be the first party to provide a quote, which then becomes a "sitting duck" to be picked off by the other party who may have superior information. See Yakov Amihud & Haim Mendelson, *An Integrated Computerized Trading System, in Market Making and the Changing Structure of the Securities Industry* 217, 221 (Yakov Amihud et al. eds., 1985) (analyzing role of open-auction trading procedures in context of computerized exchange).

¹³⁷ For a discussion of the market transparency issue in the international context, see *Equity Market Structure Study*, *supra* note 12, at 1538-39.

adverse effects on liquidity. While NYSE rules require the immediate disclosure of block transactions, blocks of U.S. stocks can be executed in other markets—for example, in London—without immediate disclosure.¹³⁸ Given the considerable information content of block trades, as evident from the strong price movements that they generate,¹³⁹ asymmetry in disclosure requirements between markets may increase asymmetry of information between traders and consequently may reduce liquidity.¹⁴⁰ Investors who want to hide information will execute their block trades in markets with lenient reporting requirements, free riding on those who trade in an exchange that provides prompt trade reports. The order flow into the market that enforces trade reporting rules may also decline, further reducing liquidity.

Markets also provide monitoring and rule-making which reduce the costs of contracting and monitoring for listed companies.¹⁴¹ This can induce companies to pay for listing on exchanges with appropriate rules. However, the ability to trade freely on other markets that do not provide these functions can hurt the integrity of markets. Such intermarket competition may result in a race to the bottom because the markets that establish strict regulations, while attracting companies to list, could lose traders who, for self-serving reasons, will trade elsewhere.¹⁴² The SEC has stated: “Markets around the world are

¹³⁸ On block trading in the United States, see *Electronic Bulls & Bears*, *supra* note 5, at 50-51. For a discussion of block trading in the London Exchange, see John Board & Charles Sutcliffe, *The Effects of Trade Transparency in the London Stock Exchange: A Summary 54-62* (Financial Mkts. Group, London Sch. of Economics Special Paper No. 67, Jan. 1995).

¹³⁹ See Alan Kraus & Hans R. Stoll, *Price Impacts of Block Trading on the New York Stock Exchange*, 27 *J. Fin.* 569, 574-78 (1972) (examining price effects within day of block trade).

¹⁴⁰ Asymmetric information between traders increases the bid-ask spread and reduces liquidity. See, e.g., *Glosten & Milgrom*, *supra* note 97, at 71-100 (demonstrating effect of traders with superior information on bid-ask spread through model of securities market).

¹⁴¹ See *Macey & Kanda*, *supra* note 21, at 1022-23 (noting cost-saving role of exchanges in monitoring insider trading, share price manipulation by market professionals, and contract adherence, as well as in providing standard rules for intrafirm contracting).

¹⁴² The “race to the bottom” is a situation where markets compete by lowering standards in the hope that lower and more lenient standards will attract more trading. As a result, the general level of standards across markets keeps declining, and markets continue to lower the standards.

A recent example of a race to the bottom is the relaxation of rules of the Paris Bourse in September 1994 in an effort to regain part of the trading volume in French stocks that had migrated to London’s SEAQ. On the Paris Bourse’s CAC trading system, where orders are executed according to pure price and time priorities, block trades were usually executed at a price within the bid-ask spread. If executed at a price outside the spread, they had to satisfy all other orders already on the book with higher priority. This practice preserved priority rules and protected smaller investors. Traders, however, could circumvent these rules by trading French stocks on SEAQ in London, where rules were less strict. The Bourse, trying to regain trading from London, relaxed its rules to allow both block

competing for order flow in world-class U.S. equities, and broker-dealers seek to execute trades in the cheapest market, both in terms of fees and regulations."¹⁴³ There are cases in which "the U.S. customer and U.S. broker-dealer agree to terms of the trade involving U.S. stocks in the U.S., and the broker-dealer merely faxes the order slip to a foreign desk for execution."¹⁴⁴ This type of agreement is made in order "to evade trade reporting requirements, exchange fees, or regulatory requirements in the U.S.,"¹⁴⁵ and will hurt the integrity of markets and reduce their incentives to impose strict rules.

In summary, multimarket trading enables market participants to violate rules designed to increase liquidity which are enforced within one market (or in one country) but not across markets. These violations, coupled with the harmful effects of fragmentation, must be balanced against the potential benefits of intermarket competition. It is not known a priori which of the two opposite forces will prevail.

2. *Empirical Results on the Effects of Multimarket Trading on Liquidity*

Empirical findings on the effects of multimarket trading on liquidity and on securities values are mixed. Khan and Baker examined the effects of dual trading through UTP of AMEX and NYSE stocks on regional exchanges.¹⁴⁶ They found that at the announcement of application for UTP, stock prices rose significantly (controlling for the stock index return on those days).¹⁴⁷ However, these were only average results; a sizable proportion of the stocks experienced price declines.¹⁴⁸ In addition, while liquidity measures showed an improvement on average, a sizable proportion of the stocks suffered worsening liquidity.¹⁴⁹ For example, the effective bid-ask spreads declined for 53% of the stocks and increased for 47%.¹⁵⁰

trading outside the bid-ask spread and a substantial delay in the disclosure of block transactions. See Alexandros Benos & Michel Crouhy, *Changes in the Structure and Dynamics of European Securities Markets 9-10* (1995) (unpublished manuscript, on file with authors).

¹⁴³ Equity Market Structure Study, *supra* note 12, at 1539.

¹⁴⁴ *Id.* at 1531.

¹⁴⁵ *Id.* at 1532.

¹⁴⁶ See generally Walayet A. Khan & H. Kent Baker, *Unlisted Trading Privileges, Liquidity, and Stock Returns*, 16 *J. Fin. Res.* 221 (1993).

¹⁴⁷ See *id.* at 226-30.

¹⁴⁸ See *id.* at 229.

¹⁴⁹ See *id.* at 230-33.

¹⁵⁰ See *id.* at 234.

Kahn, Baker, and Edelman analyzed AMEX and NYSE stocks in which unlisted trading began on the Pacific Stock Exchange.¹⁵¹ On the dual-listing day, stock prices fell significantly (controlling for the market index return).¹⁵² The decline was particularly strong for stocks with low liquidity, which apparently suffered the most from the market fragmentation brought about by the dual listing.¹⁵³ The prices of the dually listed stocks continued to fall afterwards and later recovered to the extent that fifty days after the dual listing, the cumulative return for all stocks (relative to the market) was practically nil.¹⁵⁴ They also found that the effect of the dual listing on volume was mixed.¹⁵⁵

Battalio, Greene, and Jennings studied the effects of two recent experimental trading programs: the Cincinnati Stock Exchange preferencing dealer program and the Boston Stock Exchange competitive specialist initiative.¹⁵⁶ Both programs enabled brokers to internalize order flow, i.e., execute incoming orders themselves at the best bid and offer prices (usually displayed on the NYSE) without competing for orders by quoting narrower spreads. Of the NYSE stocks that entered these experimental trading programs, they found that 67% enjoyed a decline in the bid-ask spread but that 33% of the securities suffered increases in their bid-ask spreads.¹⁵⁷ Thus, while multimarket trading was beneficial for most securities, a significant proportion of securities was harmed.¹⁵⁸

Evidence on international dual listing is also mixed. The bid-ask spreads on French stocks traded in London narrowed after the opening of the Paris Bourse, their home market, and widened again after the Bourse had closed,¹⁵⁹ while the opposite resulted for Italian stocks

¹⁵¹ See Walayet A. Khan et al., *Competition Versus Consolidation of Order Flow: Common Stock Listing on Dual Domestic Exchanges* (1994) (unpublished manuscript, on file with authors).

¹⁵² See *id.* at 13-14, 18.

¹⁵³ See *id.* at 13-15, 18-19.

¹⁵⁴ See *id.* at 15-18.

¹⁵⁵ See *id.* at 18 (noting that while daily average trading volume increased for low liquidity group and decreased for high liquidity group, these changes were not statistically significant).

¹⁵⁶ See Robert Battalio et al., *Do Competing Specialists and Preferencing Dealers Affect Market Quality? An Empirical Analysis* (Nov. 15, 1995) (unpublished manuscript, on file with authors).

¹⁵⁷ See *id.* at 32.

¹⁵⁸ See *id.*

¹⁵⁹ See Marco Pagano & Ailsa Röell, *Dually-Traded Italian Equities: London vs. Milan* 12 (Mar. 1991) (unpublished manuscript, on file with authors) (citation omitted) (“[M]inute-by-minute price data reveal total absence of arbitrage opportunities [between the London and Paris exchanges].”).

traded in both Milan and London.¹⁶⁰ For the Italian securities, fragmentation of trading between the two markets was associated with wider bid-ask spreads.¹⁶¹ On the other hand, Neal found that multimarket trading and intermarket competition in options trading were beneficial: AMEX options that were also traded in other markets enjoyed narrower bid-ask spreads than options that traded exclusively on the AMEX.¹⁶²

Both theory and empirical evidence thus show that multimarket trading is beneficial in some cases and harmful in others. We therefore suggest that a regulatory policy should not uniformly enforce either consolidation of trading or unrestricted multimarket trading. We doubt that regulators can discern a priori for each case which of the policies is preferable.

This problem is exacerbated in the international context. Even if the global enforcement of a uniform regulatory rule favoring either solution were feasible, it would be practically impossible to determine which of the many rules that are now enforced in the different markets are beneficial and should be enforced globally. As Grundfest has noted:

Having observed that there are several dimensions in which international cooperation and coordination are potentially desirable, it should be emphasized that complete standardization is not necessarily in the world economy's best interest. Put another way, it is doubtful that the world's securities markets would be improved if they were subject to the control of a single über-regulator enforcing a consistent, worldwide set of regulations. There is value in diversity. . . . Regulation, therefore, does not necessarily imply standardization, either on an international level or within a single jurisdiction. Regulations can be carefully tailored to address apparent externalities, and these externalities can vary across jurisdictions, across transactions, and over time.¹⁶³

Given the impossibility of assessing the desirability of multimarket trading for each security and for every situation, the current U.S. regulatory regime that encourages and even enforces multimarket trading is inappropriate. "One size fits all" regulation is clearly undesirable. As we demonstrate below, the issuer is the party with

¹⁶⁰ See *id.* at 11-12, 14-17 (examining size of "market touch" in London when Milan markets were and were not open).

¹⁶¹ See Marco Pagano & Ailsa Röell, *Stock Markets*, *Econ. Pol'y*, Apr. 1990, at 63, 97-100 (noting that Italian securities suffer greater fragmentation, which results in higher price volatility).

¹⁶² See Robert Neal, *Potential Competition and Actual Competition in Equity Options*, 42 *J. Fin.* 511, 521-25 (1987).

¹⁶³ Grundfest, *supra* note 20, at 371-73.

the best incentive to make the proper determination and, consequently, should be permitted to control multimarket trading in its securities.

III

A SELF-REGULATORY PROPOSAL OF MULTIMARKET TRADING

A. *A New Rule: Invoking Issuer Consent*

If all parties affected by the trading regime of a security could choose *and enforce* the regime that is collectively beneficial, no regulation would be necessary. However, as a result of liquidity and information externalities,¹⁶⁴ trading decisions of individuals who hold claims in a company are not always consistent with maximizing its value. While each security holder trades in a way that is beneficial to herself, her actions can adversely affect the security's liquidity and value, thereby hurting the entire group of the security's holders. The adverse effects of multiple trading on liquidity are eventually borne by the security holders as a group, because lower liquidity induces lower value for any given cash flow generated by the security.¹⁶⁵ The *issuer* of a security represents this collective interest when considering the public offering of the security because the security's trading regime and liquidity will affect its value and thus will also affect the issuer's proceeds from the sale. Accordingly, the issuer has the incentive to guarantee a trading regime that will maximize the security's liquidity and value. After the public offering, the *management* or board of directors of the issuing company (or entity) represents the collective interests of all claim holders and has a fiduciary duty to maximize their values.¹⁶⁶ Therefore, management's decision on the trading regime should serve the interests of the current security holders taken as a group. The decision on the market(s) in which the securities will be traded thus becomes part of the corporate financial strategy aimed at maximizing the company's value.

¹⁶⁴ See *supra* Part II.B.1.

¹⁶⁵ See *supra* Part II.A.

¹⁶⁶ Naturally, conflicts of interest may arise both between managers and security holders and between the holders of different classes of securities. As a result, there may be agency costs that are value-decreasing to the security. While these may be serious problems, they are but a special case of the many other agency problems that are encountered in a corporation. In our analysis, we assume these problems away because they are not pertinent to our particular proposal. In general, parties deal with these problems by designing appropriate incentive schemes and contractual arrangements. We assume that these agency problems, when they arise in conjunction with our proposal, are dealt with in the proper way so as to make this issue moot.

Permitting the issuer¹⁶⁷ to make the decision regarding a security's allowed trading location(s) is also consistent with the broader macroeconomic interests that would be served by having a public planner or regulator make the decisions. Given that (*ceteris paribus*) the company's propensity to invest increases when its cost of capital (the required return on its securities) is lower, selecting a trading regime that enhances liquidity lowers the hurdle rates to which investment projects are subjected and thereby increases the level of investment.¹⁶⁸ There is, therefore, *an alignment of interests* between the issuer, the security holders (taken as a group), and a hypothetical economic planner with regard to the trading regime of the securities. A rule that authorizes the issuer to choose the trading regime will also be economically beneficial to all parties. Compared to a regulatory agency, the issuer has better knowledge regarding its securities and the tradeoffs associated with fragmentation or consolidation of trading. Moreover, the issuer has better knowledge regarding the effects of intermarket competition as it applies to its own securities and has a stronger incentive to balance the two effects in order to maximize its securities' values. Based on these observations, we propose the following rule: *The security's issuer has the exclusive right to decide where its securities will be traded. Trading the security in any securities market or trading system requires the issuer's consent.*

Pursuant to this rule, the prospectus of issued securities will state the location where they will be traded and the procedures for changing the trading location. For example, in the same way that a company's charter now includes articles on establishing the state of incorporation, it will include the necessary articles on the procedure for determining the market where corporate securities will be traded in the same way. Bond indentures will also state, among other obligations of the issuer, an obligation to list the bonds in a specified market, and any change will require the consent of the bond trustee or the bondholders.

As formulated, our proposed rule accommodates the current regime as a special case. If the choice of a market is a matter of indiffer-

¹⁶⁷ For simplicity, we refer both to the initial issuer and to the company's board of directors or management as "the issuer."

¹⁶⁸ When a security's liquidity is improved, the required return by investors declines because the required return on a security is increasing in the security's illiquidity. See Amihud & Mendelson, Bid-Ask Spread, *supra* note 22, at 237-46 (showing that, for cross-section of NYSE-listed stocks, the higher a security's bid-ask spread, the higher its return, after adjusting for security's risk). The firm's cost of capital is the return on investing in its securities required by market investors. See Stephen A. Ross et al., *Essentials of Corporate Finance* 309-10 (1996). Therefore, improvement in liquidity, which reduces the cost of capital, induces business firms to increase their investments.

ence to the issuer, or if the issuer prefers that its securities are traded in multiple markets, the issuer can allow that status, and the situation will remain as it is today: unrestricted multimarket trading. Our rule does not add any constraint not desired by issuers, nor does it impose any additional cost on them relative to the current situation. The implementation of the option to have the security traded under the current regime, however, depends on the default provision of the rule. As formulated above, the default rule is that trading in any market is prohibited without explicit permission by the issuer (or by management's subsequent decisions). An alternative formulation of the rule permits the current regime of unrestricted multimarket trading to operate as the default rule. In that case, the implementation of our rule will imply that the issuer can affirmatively bar trading on specific exchanges if it so desires. Under this formulation, if the security's prospectus or indenture (or subsequent management decision) is silent on this matter, the default is the current regime of unrestricted trading.

As another option, regulators or issuers could include in our rule a sunset provision or a requirement for periodic review and renewal of the listing decision. This rule would facilitate modification if the base of security holders changes and, correspondingly, its preferences change. Absent a mandatory periodic review of the listing decision, the normal procedure to alter the trading location would be either by management's perception of the need for change or by security holders' initiative to amend the decision. However, such initiative might rarely be undertaken due to the existence of the free-rider problem.¹⁶⁹ Therefore, a rule requiring periodic renewal of the listing could facilitate the process. If this renewal procedure were valuable to security holders, it would be instituted by the issuer and put in the corporation's charter as well as in the security's prospectus or indenture, because it would increase the proceeds from the initial sale of the security to the public.

The implementation of the proposed rule will apply to both exchanges and proprietary trading systems as well as to institutions and to systems for organized trading of securities. Direct bilateral transactions between two counterparties, however, are beyond the scope of the rule.

These definitions will apply worldwide. Global enforcement of our proposed rule will require an international covenant of the type that now exists with respect to the protection of intellectual property

¹⁶⁹ A single small security holder will refrain from action when he alone bears the costs of such action and the benefit to him is too small to justify the cost. While the total benefit which accrues to all security holders may exceed the costs, no single small security holder will have sufficient incentive to take action.

rights.¹⁷⁰ Naturally, each securities trading organization is within a country and is subject to that country's laws and regulations. An international covenant will enable issuers to enforce the rule *privately* worldwide and to take action if violated. For example, an issuer will be able to seek a remedy from a market in which unauthorized trading in its security occurred.

B. Prospective Effects of the Proposed Rule

Our proposed rule will change the behavior of securities markets and reduce the need for close regulation by legislators and the SEC. Markets (and self-regulatory organizations) will have the incentive to *self-enforce* rules that are beneficial to the securities holders as a group and to the economy as a whole. A market's objective will be to attract issuers in order to allow the market to trade in their securities. Under the current regime, this is not always necessary because securities can be traded without the issuer's consent. Therefore, some markets, especially small ones, may have the incentive to attract traders by allowing them to execute trades in a way that violates the rules of better-regulated markets. The current regime thus promotes a race to the bottom in self-regulation by markets and therefore needs regulation by a central authority. Our rule will obviate the need for a central regulator to scrutinize each proposed change in markets' trading systems to ensure that they operate in investors' best interests because markets themselves will have the incentive to do so.

Our proposal will bring about greater diversity and innovation in trading rules and mechanisms offered by securities markets, replacing much of the uniformity imposed by regulators. Under the current system, regulators enforce across markets trading rules that they deem valuable for a broad array of constituents. This system has been criticized on the grounds that it discourages experimentation, innovation, and diversity in securities markets and does not produce rules that are cost-effective.¹⁷¹ Under our proposed regime, however, markets will have an incentive to experiment with new practices and approaches

¹⁷⁰ International intellectual property law is governed by a series of multilateral and bilateral treaties between countries. For example, the Berne Convention, created in 1886, protects the copyrighted works of one country in each of the other member countries. See generally, M.M. Boguslavsky, *Copyright in International Relations: International Protection of Literary and Scientific Works* 54-66 (David Catterns ed. & N. Poulet trans., Australian Copyright Council Ltd. 1979) (1973).

¹⁷¹ In his analysis of the SEC's decisionmaking processes, Grundfest notes: Regulations adopted by the SEC are often based on acts of faith more than on the exercise of reason. The cost-benefit analyses included in many adopting releases are, at bottom, nothing more than extended *ipse dixit*s that argue that, if the Commission is willing to adopt a rule, then the rule's benefits must of

because, if successful, they will attract issuers and reap the benefits. In particular, markets might look for niche solutions to take advantage of the diversity of the clientele that they serve. Trading rules that are value-increasing will survive the competitive selection process applied by securities issuers and will be self-enforced without the need for outside regulatory intervention. In this way, markets will help issuers achieve value maximization with the resulting policies that are consistent with the objectives of a (hypothetical) benevolent government regulator.

Empowering issuers to determine where their securities will be traded will force markets to court them in order to be allowed to trade their securities. As a result, wealth may be redistributed from markets to issuers. For example, issuers currently pay markets for listing, or markets list without issuers' consent. Under our rule, some markets that gain from their volume of trading might be willing to pay issuers to be allowed to trade their securities. Besides the obvious payment in cash, markets will try to attract issuers by investing in advanced trading systems that will enhance liquidity and thereby increase securities values.

Additionally, our rule will lead to the creation of wealth in the economy. Trading practices which are harmful to liquidity and value, although partially benefitting some parties, generate dead weight costs.¹⁷² If the implementation of our rule curbs such practices, these costs will be averted and additional wealth will be created. Thus, our rule will produce results that are consistent with those of regulators, such as eliminating dead weight costs and increasing wealth.

Under the regime that we envision, the regulators' key role will be transformed from active rule-making and micromanagement of securities markets to enforcement of issuers' property rights. Markets (and proprietary trading systems) will face a minimal burden of regulation: They should not infringe on the issuer's right to determine where its securities are traded.

course exceed the rule's costs because otherwise the Commission would not adopt the rule.

Joseph A. Grundfest, *Zen and the Art of Securities Regulation*, in *Modernizing U.S. Securities Regulation: Economic and Legal Perspectives* 3, 8 (Kenneth Lehn & Robert W. Kamphuis, Jr. eds., 1992).

¹⁷² Dead weight costs are those costs which constitute a loss to all parties involved without benefitting any of the parties. Whereas some costs constitute a transfer from one party to another (e.g., labor costs), in the case of dead weight costs, neither of the parties involved benefits. In the case at hand, the dead weight costs result from inefficiency in trading procedures that make trading more expensive.

C. Implementation: The Effect of the Proposed Rule on Trading Mechanisms

In this section, we illustrate the manner in which the proposed regulatory regime will lead to the selection of the trading method and procedure that is most desirable for each issuer based on that issuer's particular characteristics and needs. Pursuant to our rule, the issuer, representing its securities holders (taken as a group), will opt for the markets that provide the best liquidity for their traded claims, thereby maximizing value. Because the issuers will be the focal point of competition, markets will evaluate their trading mechanisms and rules according to the expected effects on issuers' choices and will compete to attract securities issuers instead of attracting part of the traders who may pursue trading practices that privately benefit them at the expense of others.¹⁷³ The key evaluation criterion for trading mechanisms offered by securities markets will be their impact on liquidity and securities values.

1. Minimum Tick Size

Price quotations for stocks traded on U.S. securities exchanges are mostly limited to integer multiples of \$1/8, which is the tick, or the minimum price increment. On the NYSE, price quotations must be in \$1/8 increments for stocks selling above \$1 per share.¹⁷⁴ On the AMEX, the tick is \$1/8 for stocks priced above \$5 per share and \$1/16 otherwise.¹⁷⁵ Should the exchanges be required to refine their pricing to decimals in order to enhance liquidity?

A minimum price increment may be necessary to prevent market failure.¹⁷⁶ This is because dealers' marginal cost of providing liquidity services is lower than their average cost, given the considerable fixed cost of engaging in dealership.¹⁷⁷ Marginal cost pricing in competition will render dealers unable to cover their costs, driving them out of the

¹⁷³ As discussed in Part III.A, issuers' choices on the liquidity dimension are consistent with the interests of securities holders (taken as a group).

¹⁷⁴ See N.Y. Stock Exch. Rule 62, 2 N.Y.S.E. Guide (CCH) ¶ 2062.

¹⁷⁵ See Am. Stock Exch. Rule 127, 2 Am. Stock Ex. Guide (CCH) ¶ 9277.

¹⁷⁶ See Sanford J. Grossman & Merton H. Miller, *Liquidity and Market Structure*, 43 J. Fin. 617, 630 (1988) (stating that minimum tick size should be "high enough to sustain a viably competitive supply of floor traders, but not so high as to give rise to the problems of rationing and queue discipline so often encountered under price controls" (footnote omitted)). For an empirical analysis of the tick size, see Lawrence E. Harris, *Minimum Price Variations, Discrete Bid-Ask Spreads, and Quotation Sizes*, 7 Rev. Fin. Stud. 149, 149-78 (1994); see also James J. Angel, *Tick Size, Share Prices and Stock Splits 1-9* (Nov. 7, 1994) (unpublished manuscript, on file with authors) (comparing approaches to tick size in several countries).

¹⁷⁷ See Grossman & Miller, *supra* note 176, at 629 (proposing that because fixed costs tend to be larger than "entry-inhibiting trading risks, a competitive market may not be

market and resulting in lower overall liquidity. Another reason for a larger tick is that when time priority is the rule, a larger tick size brings about greater compensation for placing quotes and limit orders early and provides a greater incentive to do so.¹⁷⁸ From these perspectives, a larger tick size has a positive effect on liquidity. Further, a nonnegligible tick size results in fewer feasible prices at which to carry out a transaction within a given price range. This limitation decreases the complexity and cost of negotiating a price, thereby reducing another component of the cost of illiquidity. Finally, discrete pricing with some minimum tick size has been shown to reduce the value of private information, thereby benefitting liquidity traders and enhancing liquidity.¹⁷⁹

The \$1/8 minimum tick, however, is likely to be excessive for many highly liquid securities.¹⁸⁰ For this reason, a number of stocks traded on the NYSE with a \$1/8 tick trade at lower price increments (\$1/16 or \$1/32) on electronic trading systems such as Instinet and Posit. The halving of the minimum tick on the AMEX on September 3, 1992, for low-price stocks slightly reduced the bid-ask spread, but its effect on the trading volume and on the market depth¹⁸¹ was mixed and insignificant.¹⁸² In summary, the overall effect of the tick size on liquidity is not uniform and may depend on security-specific circumstances.

There is likely to be an optimal tick size for each security, and different trading systems and markets may require different appropriate ticks. Currently, however, the \$1/8 minimum increment is a "one size fits almost all" solution. In its "Market 2000" Report, the SEC's Division of Market Regulation examined this issue and concluded:

The two obvious alternatives are: (1) narrowing the minimum spread to sixteenths or thirty-seconds or (2) using a decimal pricing system. The Division believes that decimal pricing is preferable and may be inevitable. The Division realizes that the markets and their

viable because market makers would have no way of recovering their fixed costs of maintaining a presence on the floor").

¹⁷⁸ See *supra* Part II.B.1.

¹⁷⁹ See V. Ravi Anshuman & Avner Kalay, *Market-Making Rents Under Discrete Prices* § 3.2 (Dec. 1995) (unpublished manuscript, on file with authors) (proposing that "informed traders make less expected profits when prices are discrete," resulting in "a wealth transfer from informed traders to the market maker").

¹⁸⁰ See Harris, *supra* note 176, at 153-54 (noting that decrease in minimum price variation would clearly benefit small, liquidity-demanding traders while large liquidity-demanding traders will benefit in most circumstances).

¹⁸¹ Market depth refers to the quantities quoted at the best bid and ask prices.

¹⁸² See Hee-Joon Ahn et al., *Tick Size, Spread, and Volume*, 5 *J. Fin. Intermediation* 2, 3-4, 13-14 (1996) (noting that "there is no significant increase in trading volume attributed to the reduction in tick size").

participants would incur expenses in converting to decimal pricing, but it is unclear how extensive these costs would be. In contrast, a transition to sixteenth pricing would not present major technical difficulties for the industry. Indeed, some stocks already trade with such pricing. Thus, the Division recommends that the SROs convert to a minimum variation of one-sixteenth as soon as possible.¹⁸³

Notably, the SEC's Division of Market Regulation did not consider any deviation from "one tick fits all" as a viable option. Instead, as cited above, it proposed to mandate a compromise solution on all securities and on all markets.

Under our proposal, the minimum tick size will be determined through experimentation and competition between markets in a way that is consistent with securities value maximization. Exchanges already allow different tick sizes for different securities based on inflexible criteria such as price alone.¹⁸⁴ As power shifts to the issuers, they will be able to demand the optimal tick size for their traded securities or else they will choose to have their securities traded elsewhere. If a \$1/8 tick size is excessive and reduces liquidity, the penalty is borne by the issuer through the higher returns required on its claims. If a \$1/8 tick is optimal, a uniform rule that makes the minimum tick \$1/16 will hurt the issuer. Our proposed regime will encourage issuers and securities markets to experiment with alternative tick sizes, examine the results, and only then agree on the optimal tick. Such flexible market-based solutions are antithetical to the current system, where markets and regulators dictate not only where but also how securities are traded.

2. *Market Transparency and Disclosure of Trade Information*

Suppose that shareholders in a company collectively agree on the need for prompt disclosure of trade information (including block trades) and thus prefer to list the stock for trading on an exchange that enforces such reporting. However, individual parties (buyer and seller) in a block transaction may benefit from not disclosing it promptly and may therefore prefer to execute it in another market that enables delayed reporting.¹⁸⁵ Under the current regime, markets

¹⁸³ Market 2000, *supra* note 24, at app. IV.

¹⁸⁴ See Harris, *supra* note 176, at 178 n.1 (summarizing rules for determining tick sizes in primary U.S. stock markets); *supra* text accompanying notes 174-75.

¹⁸⁵ This benefit may accrue because disclosure of, for example, a discounted sale is likely to depress the stock price. The UK Securities and Investment Board has argued that "[the] SIB acknowledges the need to strike a balance between the desirability of promoting transparency and the risk of reducing liquidity." Securities & Invs. Bd., Regulation of the United Kingdom Equity Markets 33 (June 1995). This argument seems to be concerned with the liquidity interests of *some*, but not all, traders. In fact, on the London Stock

are competing for order flow. Consequently, they might enable delayed reporting of trades, and in particular of block trades.¹⁸⁶ By doing so, they enable some traders to benefit to the detriment of others.

Market transparency is an important consideration for traders, and it induces them to migrate from one market to another.¹⁸⁷ Such traders benefit from delayed reporting at the expense of uninformed or “noise” traders—those whose trades are motivated by a need to buy or sell securities and are not based on information or a judicious trading strategy. These traders thus indirectly subsidize the profits of informed traders. Analyzing the effect of disclosure of transaction, Madhavan found:

Compared to a consolidated market, informed traders and large liquidity traders who pursue dynamic trading strategies in a market without disclosure are strictly better off because they obtain higher revenues when selling and incur lower outlays when buying. However, the effect of non-disclosure on noise traders is ambiguous; compared to a consolidated market, initial bid-ask spreads without disclosure are narrower but spreads in the later period are wider.¹⁸⁸

If mandatory disclosure of large trades causes large traders to migrate to other markets where disclosure can be delayed, it induces market fragmentation and a reduction in liquidity. If all markets were committed to mandatory disclosure, however, this fragmentation would not occur. Using our rule, if an issuer could prevent the trading of its securities on markets that do not enforce prompt disclosure, the fragmentation of the market for these securities would be avoided. However, the effect on liquidity is not entirely clear. Even if traders cannot execute their large trades in markets with delayed reporting, they can still reduce their propensity to trade in the security altogether and, as a result, have a negative effect on liquidity.

Exchange, rules enable delayed reporting of block trades. See Board & Sutcliffe, *supra* note 138, at 6-7 (discussing transparency regime of London Stock Exchange). On the price movements surrounding block trades, see Minder Cheng & Ananth Madhavan, *In Search of Liquidity: Block Trades in the Upstairs and Downstairs Markets 12-14* (New York Stock Exchange Working Paper No. 94-02, Oct. 1994) (finding that both upstairs and downstairs markets allow for large block trades without significant price movements).

¹⁸⁶ See Equity Market Structure Study, *supra* note 12, at 1538-39 (discussing regulatory considerations regarding market transparency); Board & Sutcliffe, *supra* note 138, at 1-2 (noting that delayed publication can protect against additional inventory risk).

¹⁸⁷ Pagano and Röell, who analyzed the European markets, pointed out that the London market, which allows delayed reporting of large trades, attracted large traders. See Marco Pagano & Ailsa Röell, *Auction and Dealership Markets: What is the Difference?*, 36 *European Econ. Rev.* 613, 613-23 (1992) (arguing that differences between alternative trading technologies affect traders' choice of trading systems).

¹⁸⁸ Madhavan, *supra* note 119, at 15.

Currently in the United States, immediate reporting of transaction information is required in all markets,¹⁸⁹ apparently reflecting a belief that this benefits stockholders as a group. However, this rule again suffers from the “one size fits all” approach to regulation. Given the mixed evidence on the value of transaction reporting, this approach is inappropriate. Seguin studied the effects of joining the NMS where real-time reporting is required of transaction prices and volumes.¹⁹⁰ Stocks that joined the NMS enjoyed, on average, a decline in their bid-ask spread and volatility.¹⁹¹ However, for a significant proportion of the stocks—over forty percent—the effect was the opposite.¹⁹² The reason for the mixed results could be that for some investors, prompt disclosure reduces their flexibility to trade blocks and reduces the attractiveness of investing in the stock.

Under our proposed regime, imposing regulations that mandate the disclosure of transaction information will be unnecessary. Issuers that consider prompt disclosure important will shun markets that allow delayed reporting and thus forbid trading of their stock there. Issuers who consider prompt reporting unimportant, and even harmful to liquidity, will not insist on prompt disclosure. In addition, a market may choose to implement different rules for different securities based on their issuers’ preferences. Either way, a central regulator will not have to set or enforce a rule on this issue. Rather, our approach allows a diversity of rules and incorporates issuer choice among them.

3. *Display of Limit Orders*

Markets now differ in the extent to which they expose limit orders to the public. The display of limit orders is an important and difficult issue of market design. On one hand, transparency and the availability of information are the hallmarks of an efficient market. On the other hand, full disclosure of limit orders reduces the propensity of dealers and investors to place them in the first place. As already discussed,¹⁹³ displaying a limit order releases valuable information to the general public and increases the risk to the party placing the order. This disclosure is also important in the case of block transactions. For example, the seller of a large block is unlikely

¹⁸⁹ See Market 2000, *supra* note 24, at 4-5 (“In the United States, for exchange-listed and NASDAQ stocks, all market centers (exchanges and OTC market-makers) must report trade prices and volumes within seconds of the trade, as well as the quotes at which they are prepared to buy and sell securities.”).

¹⁹⁰ See Paul J. Seguin, *The Value of Transaction Reporting* 8-18 (Sept. 1992) (unpublished manuscript, on file with authors).

¹⁹¹ See *id.* at 8, 12-13.

¹⁹² See *id.* at tbl.2.

¹⁹³ See *supra* Part II.B.1.

to place a large limit order that exposes her intentions to the market, because the disclosure is likely to increase the price impact of the sale. The result of mandated disclosure may thus be fewer limit orders and less liquidity.

Securities markets address this problem in different ways. For example, the new Swiss Electronic Exchange allows for hidden size orders, whereby a trader may enter an order in the order book in such a way that only part of it is visible to third parties.¹⁹⁴ The Paris Bourse permits limit orders on the book to be hidden, but those orders will be executed against any executable order on the other side according to its priority.¹⁹⁵ The Toronto Stock Exchange does not require members to show the orders they receive prior to putting through a trade.¹⁹⁶ In practice, however, the members usually show part of every order to the Exchange while attempting to set up the other side of the trade.¹⁹⁷ The London Stock Exchange displays only the best bid and offer prices on the Inter Dealer Broker screen; the full order book is not displayed.¹⁹⁸

The optimal choice is likely to be related to the composition of the security's holders: Institutional investors, which are more likely to hold large blocks of securities, may be deterred by limit order disclosure rules, whereas small investors may benefit from such rules. Thus, the effect of limit order disclosure requirements may depend on the security's clientele. Under our proposal, the issuer will ultimately determine the extent of limit order disclosures for its securities. This determination will be made either by choosing an exchange or trading system that has the desired rules, or through a menu of limit order disclosure rules offered to different securities on the same exchange. More generally, there is a role for claimholder clienteles, and the issuer will be able to choose the mechanism that optimizes liquidity given the preferences of its desired clientele.

4. *Foreign and After-Hours Trading*

The trading in U.S. stocks can be characterized as a two-tiered regime consisting of the highly regulated securities markets (the National Securities Exchanges and the NASDAQ Stock Market) and the virtually unregulated trading that occurs on foreign markets after nor-

¹⁹⁴ See Maurice Anslow, *Zurich's Trading Rings Consigned to History*, *European Sec. Trading*, Aug.-Sept. 1996, at 13, 16.

¹⁹⁵ See Benos & Crouhy, *supra* note 142, at 10.

¹⁹⁶ See Toronto Stock Exchange, *Final Report of the Rule Review Committee on the Operation of the Auction Market 67* (Dec. 7, 1989).

¹⁹⁷ See *id.*

¹⁹⁸ See Board & Sutcliffe, *supra* note 138, at 23.

mal trading hours.¹⁹⁹ In essence, broker-dealers and institutional investors who wish to avoid the rules and regulations of U.S. exchanges can always find a regulation-free channel through which to execute their trades, often by just “printing” the trade in the market of choice.²⁰⁰ For example, a trader who wants to avoid the transparency requirements of the U.S. markets may agree with a counterparty to execute the trade nominally after hours in London.²⁰¹ The result is that while most trades are subject to regulations designed to enhance liquidity, the benefits of these regulations are diminished once individual traders decide to trade in the unregulated tier. Under the current regime, the only conceivable solution is to widen the scope of trades subject to regulation and reporting in an attempt to minimize the impact of the unregulated tier.

Our proposal will allow such practices to continue to exist only if the issuer deems them desirable. In other words, they will only be selected if they are expected to enhance the security’s liquidity. Otherwise, the issuer will not consent to have its claims traded on these markets or trading systems and will employ the necessary means to stop the practice. Then, tightening the scope of trades subject to regulation will be unnecessary.

5. Electronic Cross-Markets Linkages Intermarket Trading Systems

Although our proposal will foster competition between markets, it will also induce cooperation between them when cooperation will help attract issuers. If two markets perceive that cooperation makes them more attractive to issuers, they may decide to establish an intermarket trading system that promotes liquidity. Such a system can be established by enforcing cross-market secondary priorities, such as those for time and size.²⁰² The rules that currently govern intermarket trading systems promote competition between markets, but they also promote, or at least enable, the quote matching and the free riding that hurt liquidity.²⁰³

¹⁹⁹ See Equity Market Structure Study, *supra* note 12, at 1539 (questioning whether order flow is going offshore for purpose of escaping transparency); Trading Around the Clock, *supra* note 2, at 19-22 (describing need for government participation to develop international standards for trading).

²⁰⁰ See, for example, the procedure discussed *supra* text accompanying notes 144-45.

²⁰¹ See *supra* text accompanying notes 144-45.

²⁰² See *supra* Part III.C.1-4.

²⁰³ See Amihud & Mendelson, Option Markets, *supra* note 16, at 19-20 (describing result of quote matching as undesirable for all market participants because it destroys incentives to enter competitive quotes and openly announce best buying and selling prices). Cooperation between markets may subject them to antitrust scrutiny. See Kenneth Lehn, Globalization of Financial Markets: A Comment, 34 Carnegie-Rochester Conf. Series on

Current SEC rules require the linkage of the National Securities Exchanges and the NASDAQ Stock Market through the Intermarket Trading System (ITS).²⁰⁴ The ITS displays the best intermarket quotes in listed securities and also enables the submission of orders from one market to another. In conjunction with the ITS, the exchanges and the NASD have adopted rules requiring their members to avoid effecting trades inferior to those displayed by another market.²⁰⁵ This fact may lead to the perception that the ITS improves overall market performance. However, the ITS enables quote-matching and free-riding behavior by dealers and regional markets and leads to violations of price priority.²⁰⁶ Indeed, the ITS reduces liquidity by encouraging free-riding behavior and reducing the incentive to place limit orders and quotes with a narrow bid-ask spread. This effect makes the SEC's position questionable.²⁰⁷ Because the ITS was mandated by the SEC, it is difficult to find direct empirical evidence that supports or refutes its value, and it is questionable whether the system would exist but for the SEC's enforcement.

In comparison, the voluntary market linkages that have developed between international futures exchanges allow an exchange to trade (typically after-hours) a futures contract listed on another exchange. Developed because their expected benefits exceeded their costs, they are deemed to have a net positive effect on market liquidity; otherwise, they would be discontinued. The linkage between the Chicago Mercantile Exchange and the Singapore International Monetary Exchange is already ten years old. The Chicago Board of Trade has established a partnership with the London International Financial Futures and Options Exchange, permitting each exchange's largest interest-rate contracts to be traded in the other's pits.²⁰⁸ The Philadelphia Stock Exchange has a similar agreement allowing its currency options to be traded in the Hong Kong Futures Exchange.²⁰⁹

Pub. Pol'y 97, 100-02 (1991) (arguing against relying solely on private incentives of exchanges).

²⁰⁴ See Equity Market Structure Study, *supra* note 12, at 1529-30 (describing role of ITS as facility created to establish "national" market); Electronic Bulls & Bears, *supra* note 5, at 48, 52-53 (explaining purpose of ITS and comparing it to proposed universal method switch which would route order to market with best quote).

²⁰⁵ See Equity Market Structure Study, *supra* note 12, at 1530.

²⁰⁶ See *supra* Part II.B. For empirical evidence raising questions about the adequacy of the ITS, see Charles M.C. Lee, Market Integration and Price Execution for NYSE-Listed Securities, 48 J. Fin. 1009, 1016-34 (1993).

²⁰⁷ See Amihud & Mendelson, Option Markets, *supra* note 16, at 14-20 (concluding that these problems are fostered by existence of ITS in its present form).

²⁰⁸ See Suzanne McGee, Futures Exchange Alliances Are Jilting Electronic Networks, Wall St. J., Mar. 23, 1995, at C1.

²⁰⁹ See *id.*

In the regime that our proposal will create, all electronic market linkages will be voluntary. Exchanges will experiment with such linkages to examine their impact on liquidity vis-à-vis their costs. For example, electronic linkages connecting exchanges that provide a high level of liquidity in different time zones may be beneficial for securities that draw international investor interest. An electronic market linkage that improves the liquidity of traded stocks will enhance the competitive position of the linked markets. However, if issuers consider some intermarket linkage systems as hindrances to liquidity, they will pressure the participating exchanges to discontinue them. Furthermore, if a system improves liquidity only for some securities, the exchange may choose to operate the system only for those securities. Either way, only the linkages that are economically justified will survive.

D. Contingent Claims

According to our proposed rule, the issuer will be authorized to select the trading locations for the securities it issues. Our rule can, however, be circumvented by creating and trading securities that emulate the original securities, commonly known as derivatives. An entity could issue a claim whose value is contingent on the price of a security in an attempt to track its price (or some function of its price) without the consent or authorization of the issuer of the original, underlying security. The values of contingent claims are explicitly and formally derived from the underlying security's prices or payoffs according to a formula stated in the contract defining the contingent (derivative) security. This loophole could effectively nullify our rule because the underlying security's value can be approximated through the use of appropriate derivatives that can be traded at their issuers' will.

The most obvious contingent claims are stock options—calls and puts—that can be listed and traded on an options market. Strips,²¹⁰ whose combination mimics the original security (bond), provide another example. Until recently, it was possible to issue against a stock a pair of claims which, according to some formula, divided the stock's value into a claim against the dividends and a claim against the capital gains.²¹¹ Together, these claims had a value that closely matched the

²¹⁰ Strips are claims that divide a security's cash flows into segments. The most prevalent are bond strips. Each individual claim is equal to one of the coupon payments on the bond. There is an additional claim against the principal. Putting the proper strips together effectively reconstitutes the original bond.

²¹¹ The claims, "score" and "prime," traded on the AMEX.

stock price.²¹² Furthermore, an issuer's security may be cited as part of an index.²¹³ Finally, consider a private contract to buy or sell a security at a price that is a function of the security's price on an authorized exchange at some future time. The question that arises is whether the consent of the issuer of the underlying security should be required prior to writing, listing, or trading claims that are contingent on the price of that security.

The introduction of contingent claims is a genuine concern of companies, as demonstrated in *Golden Nugget, Inc. v. AMEX*.²¹⁴ The empirical evidence regarding the effect of options on the underlying stocks is mixed. Some studies found that when options on some stocks list for trading, the stock prices rise, while other studies found no significant average effect.²¹⁵ Still other studies found that stock prices decline when options on them are listed.²¹⁶ When put options were listed, the average effect on stock prices was negative.²¹⁷

For the purpose of our analysis, the *average* effect of options listing on stocks is of little importance. Regardless of the average effect, some companies expect to benefit from options listing and realize a stock price increase, whereas other companies will consider options listing harmful. The question that arises is: How can the companies that are hurt by options listing protect against that result?

A possible approach in the framework of our rule is to require the consent of the issuer for any use of its securities prices in any contingent claim.²¹⁸ This approach, however, is unduly restrictive. In-

²¹² For an analysis, see Robert A. Jarrow & Maureen O'Hara, *Prime and Scores: An Essay on Market Imperfections*, 44 *J. Fin.* 1263, 1263-87 (1989).

²¹³ For example, the Dow Jones Industrial Index is composed of the prices of the stocks of thirty companies traded on the NYSE, and the Standard & Poor's 500 index is composed of the prices of the stocks of 500 companies traded on the NYSE and AMEX.

²¹⁴ 828 F.2d 586 (9th Cir. 1987); see *supra* text accompanying note 80 and the discussion in Part I.

²¹⁵ See Aswath Damodaran & Marti G. Subrahmanyam, *The Effects of Derivative Securities on the Markets for the Underlying Assets in the United States: A Survey*, *Fin. Markets Institutions & Instruments*, Dec. 1992, at 1, 5-8 (summarizing several empirical studies regarding effects of option listing on price levels and mean returns).

²¹⁶ See Rezaul Kabir, *Options Introduction and the Dutch Stock Market* (Dec. 1995) (unpublished manuscript, on file with authors) (finding that, in Netherlands, options introductions reduce shareholders' wealth). See generally Wing H. Watt et al., *The Impact of Option Listing on Underlying Stock Returns: The UK Evidence*, 19 *J. Bus. Fin. & Acct.* 485, 485-503 (1992).

²¹⁷ See Damodaran & Subrahmanyam, *supra* note 215, at 7.

²¹⁸ Consent would be required, for instance, in an index using the security's price, a listed option, or a private, over-the-counter option. This example is a special case of the broader issue of property rights on price information. On the effects of free riding on price information, see Amihud & Mendelson, *European Capital Markets*, *supra* note 16, § 3.2; Amihud & Mendelson, *Option Markets*, *supra* note 16, at 19-20. A comprehensive analysis of property rights in price information appears in J. Harold Mulherin et al., *Prices are*

stead, we must find a way to draw the line between (1) the legitimate use of the underlying security's price in derivative contracts and (2) the use of the underlying security's price for the creation of substitute securities to enable unauthorized trading in it. We thus want to distinguish between a "fair use" of the security's price in contingent contracts, falling under the first category and not requiring the consent of the underlying security's issuer and other uses that fall under the second category and require issuer consent.

What then should constitute "fair use" of a security's price information? Similar questions arise in the area of intellectual property rights and, in particular, that of copyright protection.²¹⁹ "Fair use" of copyrighted work (including copying) for purposes such as criticism, comment, news reporting, and teaching does not constitute copyright infringement. The U.S. copyright statute provides that:

In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include—

- (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
- (2) the nature of the copyrighted work;
- (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
- (4) the effect of the use upon the potential market for or value of the copyrighted work.²²⁰

The "fair use" doctrine "offers a means of balancing the exclusive rights of a copyright holder with the public interest in dissemination of information affecting areas of universal concern, such as art, science, and industry."²²¹

Our rule requires similar balancing between the protection of the issuer's liquidity interests and the public's right to use price information freely. Untraded private contracts and over-the-counter options²²² that use prices of traded securities will continue to be uninhibited under our proposal. However, our rule will require the issuer's consent before a market may allow public trading in contin-

Property: The Organization of Financial Exchanges from a Transaction Cost Perspective, 34 *J.L. & Econ.* 591, 591-644 (1991); see also Clifford W. Smith, Jr., Globalization of Financial Markets, 34 *Carnegie-Rochester Conf. on Pub. Pol'y* 77, 88 (1991) (concluding that "being located in a country with a long tradition of property rights security provides a competitive advantage").

²¹⁹ The copyright law gives authors exclusive rights over their work. For a description of those rights, see Copyright Act, 17 U.S.C. § 106 (1994).

²²⁰ 17 U.S.C. § 107 (1994).

²²¹ *Wainwright Sec. Inc. v. Wall St. Transcript Corp.*, 558 F.2d 91, 94 (2d Cir. 1977).

²²² Unlike standardized option contracts that trade in established exchanges, private over-the-counter option contracts are usually "tailor made" for end users, not for trading.

gent claims, such as listed options, that can serve as substitutes for the underlying traded security. Created with the intention of having their values formally dependent on the price of an underlying security, such options resemble derivative work in the copyright context.²²³ Borrowing from the copyright domain, our proposed rule should be extended to prohibit the trading of such derivative securities without the consent of the issuer of the underlying security unless the trade satisfies “fair use” provisions that are appropriate for our context.

But what constitutes “fair use” in our context, where a traded security is not a perfect substitute for another security, but its value is nonetheless contingent on the value of other securities? In the copyright context, courts have distinguished between “productive” and “unproductive” uses in the analysis of the first “fair use” factor.²²⁴ Courts favor secondary uses that are “productive” or “transformative” in that they produce a new purpose or result, which is different from the original. In other words, secondary uses that create a new product while using the copyrighted work rather than superseding the original are permitted. According to Judge Leval:

The use must be productive and must employ the quoted matter in a different manner or for a different purpose from the original. A quotation of copyrighted material that merely repackages or republishes the original is unlikely to pass the test; in Justice Story’s words, it would merely “supersede the objects” of the original. If, on the other hand, the secondary use adds value to the original—if the quoted matter is used as raw material, transformed in the creation of new information, new aesthetics, new insights and understandings—this is the very type of activity that the fair use doctrine intends to protect for the enrichment of society.²²⁵

²²³ A derivative work, as defined by the Copyright Act, is:

[A] work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a “derivative work”.

17 U.S.C. § 101 (1994).

²²⁴ See, e.g., *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 455 n.40 (1984) (noting, however, that distinction between productive and unproductive uses cannot be wholly determinative); *American Geophysical Union v. Texaco Inc.*, 802 F. Supp. 1, 10-11, 13 (S.D.N.Y. 1992) (finding that merely photocopying articles in scientific journals was neither productive nor transformative).

²²⁵ Pierre N. Leval, *Toward a Fair Use Standard*, 103 *Harv. L. Rev.* 1105, 1111 (1990) (footnotes omitted) (quoting *Folsom v. Marsh*, 9 F. Cas. 342, 348 (C.C.D. Mass. 1841) (No. 4901)).

The Supreme Court, explicitly accepting Judge Leval's analysis, has ruled that "transformative use" is central to the analysis of the first "fair use" factor.²²⁶ Coupling the first and third factors of the "fair use" inquiry, when the use is productive or transformative rather than duplicative and only a fraction of the copyrighted work is used in effecting the transformation, courts are more likely to find a "fair use."²²⁷

While these factors cannot be quantified in the copyright context, their securities counterparts can be.²²⁸ If one observes the prices of security *A* (the underlying security) and can calculate the prices of security *B* (the derivative security, a claim contingent on *A*) solely on the basis of the observed prices of *A*, then security *B* is clearly duplicative of *A*. In that case, the use of *B* is not "productive," because the prices of *B* do not add any new information to *A*'s prices. Further, the fourth "fair use" factor also comes into play in this case, since trading in *B* can serve as a substitute for trading in *A* and can thus affect *A*'s value.²²⁹

Rarely can the prices of derivative securities be perfectly inferred from those of the underlying security,²³⁰ and, as a result, the value of *B* will not perfectly track that of *A*. Thus, the actual test has to be *statistical*, based on the extent to which the price changes of the derivative security *B* can be calculated from *A*'s price changes. Consider daily data of returns on securities *A* and *B*. We can calculate the fraction of the returns on *B* that is due to (or can be predicted based on) the returns on *A*. We denote by V_A and V_B the variances²³¹ of returns on *A* and *B*, respectively, and by R the correlation coefficient²³² be-

²²⁶ See *Campbell v. Acuff-Rose Music, Inc.*, 114 S. Ct. 1164, 1171-73 (1994) (noting that the more transformative the new work is, the less significant the other factors will be).

²²⁷ *Id.* at 1175-76 (noting that level of copying recognized as fair use is dependent upon purpose and character of use).

²²⁸ This inability is one reason for both the difficulty of interpreting the "fair use" factors and the ensuing confusion. See Leval, *supra* note 225, at 1106-07 (noting divisions among courts and frequent reversals as evidence of lack of consensus regarding fair use).

²²⁹ This would be particularly true if *A*'s prices could be replicated given *B*'s prices.

²³⁰ The value of an option depends on other factors such as interest rate and price volatility that also may change over time.

²³¹ The variance is a measure of the volatility, or variability, of the returns around their mean. It is calculated as the average value of the squared deviations of the returns from their average.

²³² The correlation coefficient measures the extent to which returns on *A* and *B* move together relative to their means (we focus here on linear relationships). When R is equal to one, there is perfect correlation. In other words, the return of *A* (relative to its mean) is exactly proportional to the return of *B* (relative to its mean). When R is equal to zero, there is no correlation, meaning that the price changes of *B* are not linked to the price changes of *A*. In what follows, R is in fact the absolute value of the correlation coefficient. Alternatively, we could work with R^2 throughout.

tween the returns of A and B . Then, the statistic R^2 measures the fraction of V_B that can be explained using A 's returns. $R = 1$ corresponds to the case of perfect tracking described above, and $R = 0$ corresponds to the case of no relationship between the returns of A and B .

Using these tools, if R is sufficiently high and very close to one, the use of asset B is not "productive" with respect to A . This is because a large portion of the price changes in B are directly attributable to A 's price changes. Moreover, the prices of B contain practically no information beyond that which is already contained in the prices of A . In essence, B is then a substitute or a copy of A . In this case, trading in B in one market while A is already traded in another market is comparable to trading the same security in two markets, and therefore can generate the liquidity and value effects discussed earlier.²³³ In this scenario, we should find against "fair use" and invoke our rule requiring the consent of the issuer of A . Yet, if R is sufficiently low, then much of the variation in B is due to factors other than A , and B is a poor substitute for A . In other words, B is a security whose valuation is to a great extent independent from A , and B is therefore unlikely to have a meaningful impact on the market for A .

To specify our proposed "fair use" rules, we first define what we mean by a "traded derivative security." The statistical definition depends on a threshold level parameter R_0 which takes on a value between zero and one (below, we will suggest that R_0 should be quite high). We call contract B a "traded derivative security" with respect to the underlying A if the following three conditions hold:

- (i) The payoff of asset B depends explicitly on the price(s) of asset A ;²³⁴
- (ii) B is actively traded in a market or on a trading system; and
- (iii) A fraction of more than R_0^2 of the variance of the return on asset B can be explained using the returns of asset A . Put differently, the correlation between the return on asset B and the return on asset A exceeds R_0 .

Condition (i) requires that the payoff on B is defined explicitly in terms of A (contract B may involve other factors as well). Thus, if the dependence of B on A is strictly statistical in nature, that is, if the contract specifications of B do not make its payoff explicitly dependent on the prices of A , then B is not a traded derivative security with respect to A . Condition (ii) requires B to be actually traded; thus B is

²³³ See *supra* Part II.B.

²³⁴ This condition also includes any function of asset A 's prices, such as the returns on asset A .

not a "traded derivative security" if it is a private contract between two counterparties that satisfies only (i) and (iii) but not (ii).²³⁵ Condition (iii) requires a strong statistical relationship between *B* and *A*. For example, if the correlation coefficient between the returns on *A* and the returns on *B* is greater than R_0 , then condition (iii) will be satisfied.²³⁶

Given this definition, our "fair use" rule is as follows:

The prices of security *A* can be used in any contract *B* without the consent of *A*'s issuer unless either (i) *B* is a traded derivative security with respect to *A*; or (ii) *B* is a traded derivative security with respect to some security *C* that is itself a traded derivative security with respect to *A*.

In order to get a sense of the magnitude of the numbers involved, consider, for example, the relationship between the Major Market Index (MMI), an index of the share prices of twenty highly capitalized NYSE stocks, and its components. Table 1 presents the correlations between the daily return on the index and the daily return on each of its constituent stocks over the period January 3, 1984, through October 27, 1994.²³⁷ The squared value of the correlation coefficient, or R^2 , measures the fraction of the variance of the stock's returns that can be explained by a linear function of the returns on the index.

We observe that the correlations between the daily return on the index and the daily return on each of its constituent stocks are strictly below 0.8. Now, suppose that we define *B* as a "traded derivative security" of asset *A* if the correlation between their returns exceeds the threshold $R_0 = 0.8$ ($R^2 = 0.64$). Then, by part (iii) of our definition, given that the correlation between the index and any of the stocks does not exceed the threshold correlation level of 0.8, the index cannot be considered a derivative of any of the stocks that constitute it. Thus, our rule will allow the listing of futures and options contracts using the index without the consent of any of the issuers of the stocks in the list.

To further examine the issue of constructing an index of stocks without issuer consent, we constructed an artificially narrow index—

²³⁵ Accordingly, the vast array of derivative contracts entered into for purposes of hedging, as well as contracts for compensation, are excluded. In fact, many private commercial contracts between parties include contingent claim features, but they do not satisfy condition (ii).

²³⁶ This follows because when we calculate the linear regression line expressing the returns on *B* as a function of the returns on *A*, if the correlation coefficient between the two return series is R , then the fraction of *B*'s return variance that is explained by the returns on *A* is R^2 .

²³⁷ The index composition is tabulated as of the end of February 1989. The returns on USX were available only as of April 12, 1991.

Table 1

Correlation coefficients between the daily returns on stocks that are components of the Major Market Index and the daily return on the index itself, 1/3/84-10/27/94.

Company	Ticker Symbol	Correlation, <i>R</i>
American Express	AXP	0.66
Chevron	CHV	0.56
Du Pont	DD	0.70
Dow Chemical	DOW	0.67
Eastman Kodak	EK	0.63
General Electric	GE	0.79
General Motors	GM	0.57
International Business Machines	IBM	0.63
International Paper	IP	0.68
Johnson & Johnson	JNJ	0.68
Coca Cola	KO	0.74
Minnesota Mining & Mfg.	MMM	0.77
Philip Morris	MO	0.62
Mobil Oil	MOB	0.60
Merck	MRK	0.64
Procter & Gamble	PG	0.72
Sears, Roebuck	S	0.65
American Telephone & Telegraph	T	0.69
USX	X	0.19
Exxon	XON	0.68

an equally weighted²³⁸ index of the five most highly capitalized stocks in the MMI list (IBM, XON, GE, T, and GM)—and subjected it to our test of whether it is considered a derivative of these stocks. We thus examined the correlations between the returns on the index that we constructed and the returns on its constituent stocks. We then repeated this construction with equally weighted indices consisting of the top four, top three, and top two stocks in the MMI list.²³⁹ The results are presented in Table 2.

²³⁸ Equally weighted means that each stock in the index has the same weight, and thus the return on the index on a given day is simply the average across stocks of the returns on the individual stocks that compose the index.

²³⁹ "Top" means having the largest market value of the outstanding stock as of the end of February 1989.

Table 2
 Correlation coefficients between the daily returns of equally weighted indices of the most highly capitalized stocks in the MMI and the daily returns of their constituent stocks, 1/3/84-10/27/94.

Stock Index	IBM	XON	GE	T	GM
Top 5 Stocks	0.73	0.70	0.81	0.76	0.70
Top 4 Stocks	0.75	0.74	0.81	0.79	
Top 3 Stocks	0.80	0.77	0.83		
Top 2 Stocks	0.85	0.82			

From Table 2, the correlation between the returns on the five-stock index and the stock of GE (which is a highly diversified conglomerate) is 0.81, which increases to 0.83 when using the narrower three-stock index. The two-stock index, which excludes GE, has a correlation of 0.85 with its largest component (IBM). That is, 72% (or 0.85²) of the variation of returns on an index constructed of IBM and XON stocks can be explained by the variation in IBM stock. If we set the threshold of R_0 at 0.85 or higher, the index IBM-XON would likely fall within our "fair use" provisions and listing such an index futures contract would not require the consent of the issuers of the component stocks. If the threshold were set lower, this index would not be listed for trading without the consent of the issuers of the component stocks (IBM and XON in this case). For example, a threshold of $R_0 = 0.8$ will require the consent of GE to trade an index composed of the largest five, four, or three stocks that include GE as a component.

Next, we examined the case of a call option on a stock—a classic derivative security. We calculated the correlation between the price changes of a theoretical option and the price changes of the actual option. The theoretical option price was calculated from a known function of the underlying security's price. If the correlation between the price changes of the theoretical option and the price change of the actual option were perfect—i.e., if $R = 1$ —then there is no new information in the actual option price which is not already revealed by the price of the underlying security (from which the prices of the theoretical option are calculated), and hence the option violates the "fair use" principle. If, however, the correlation between the price changes of the theoretical option and the actual option is low, it means that the actual option is not defined as a derivative of the underlying security that requires the consent of the issuer of the underlying security.

We illustrate this test of "fair use" using data on daily prices of the GE stock and of a GE call option traded in the market between April 4, 1994, and September 16, 1994 (all prices are the daily closing prices). We used the standard Black-Scholes formula²⁴⁰ to calculate the theoretical option price and thus obtained a series of theoretical daily prices for the option.²⁴¹ We then calculated the daily price changes of the theoretical option and of the actual option for the very same period and calculated the correlation R between the two series of price differences. The correlation between the two series was approximately $R = 0.9$.

Because a combination of option contracts can be used to closely track the price of any underlying stock, we would prefer not to consider a listed option contract as "fair use." On the other hand, we do not want to hamper the use of broadly based stock indices.²⁴² Thus, our numerical examples suggest that the threshold value R_0 should be between 0.85 and 0.90: This value will render listed equity options "traded derivative securities" requiring the consent of the issuer of the underlying stock, yet will still allow the creation of broad market indices without requiring the consent of the issuers of component individual securities.

CONCLUSION

This Article proposes that the issuer should have the exclusive right to determine the markets in which its securities will be traded. Our proposed rule is necessary because the trading regime of a security affects its liquidity and consequently its value. However, the effect depends on specific circumstances, and the issuer, whose objective is to maximize the value of its securities, would naturally choose the appropriate trading regime. Our proposal stands in stark contrast to the prevailing U.S. regulatory regime, under which markets can unilaterally decide to trade securities without their issuers' consent.

While the security's holders may collectively agree that constraining trading to one or a few markets will best serve their interests,

²⁴⁰ The Black-Scholes formula of options prices was developed in Fischer Black & Myron Scholes, *The Pricing of Corporate Liabilities*, 81 *J. Pol. Econ.* 637 (1973). It describes the price of an option on an underlying asset as a function of the price of that asset, using an additional four parameters: the variance of the price changes on the asset, the interest rate, the time until expiration of the option, and the exercise price of the option. See *id.* at 638-39. Given the four parameters, the changes in the option price can be traced to the changes in the price of the underlying asset. See *id.* at 637-54.

²⁴¹ The volatility was estimated for each daily calculation using the high, low, and close price data for the preceding 22 trading days. The risk-free rate was assumed to be 6%.

²⁴² Needless to say, others may choose to set the threshold value differently while still adhering to our proposed framework.

individual traders have an incentive to deviate from such an agreement even when this harms the security's liquidity and reduces its value. The issuer, however, has an incentive to make liquidity-enhancing choices because these choices minimize its cost of capital. Through its choice of trading method and location, a value-maximizing issuer (or the board of directors in a corporation) makes optimal choices on behalf of the securities holders taken as a group. At the same time, the results are consistent with maximizing overall wealth by reducing the cost of capital in the economy at large.

Regulators cannot make the optimal choices of trading methods and locations because these choices vary by security, by market, and over time. Regulators are incapable of knowing which trading regime is most beneficial for every security, and because they usually impose uniform rules that should apply to all securities and all markets, the regulatory solutions may not be appropriate to all. We suggest that the security's issuer is in the best position to make these choices. The issuer has both the information necessary to evaluate the costs and benefits associated with alternative trading regimes and the incentive to choose the optimal regime.

In contrast to the current U.S. regime where market performance hinges on regulatory approval and order flow, under our proposal, markets will have to compete to attract issuers to admit their securities for trading. The current regime sometimes induces smaller markets to attract some order flow by adopting trading procedures that circumvent the rules designed to enhance liquidity that are imposed by major exchanges, thereby harming liquidity. Following our scheme, markets will compete to provide the best liquidity to security holders taken as a group, thereby inducing markets to invest in flexible trading systems, to adopt rules that increase liquidity, and to eliminate procedures that hamper it. Only markets judged by the issuers as value-enhancing will survive.

One might argue that our proposal will inhibit competition and force securities holders to forego its benefits if the issuer limits trading to a single market, but we disagree. First, when the issuer deems intermarket competition valuable, it will allow multiple markets to trade the security. Second, if the issuer chooses a single market for trading the security, this market will be under constant threat of losing the issuer's securities if the market does not perform as expected. This contestability²⁴³ will keep markets in check and will promote competi-

²⁴³ See William J. Baumol, *Contestable Markets: An Uprising in the Theory of Industry Structure*, 72 *Am. Econ. Rev.* 1, 2 (1982) (defining "contestability" as generalization of perfectly competitive markets that applies to all industry structures).

tive behavior even when trading in a given security is confined to a single market.

Our proposal posits a market where choices between trading rules and systems will rest with issuers, who represent the collective welfare of their security holders. This scheme will replace administrative regulatory choices and the micromanagement of trading markets with self-regulation induced by the issuers' interests in improving liquidity. It will also eliminate the regulatory differences between national securities exchanges, over-the-counter markets, and proprietary trading systems. Our proposed regime will provide a market-based solution to market regulation that is consistent with value maximization, with shareholders' aggregate interests, and with overall economic welfare.