Down and Out in the Stock Market:

The Law and Economics of the Delisting Process

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November 2003
This version February 2005

We gratefully acknowledge the assistance of Pink Sheets, Inc. for providing us with data. We also thank Sean Wang for research assistance, and Edward Altman, Ian Ayres, Ron Daniels, Simone Gervais, Oliver Hansch, Roberta Romano, Peter Schuck, George Sofianos, Peter Wallinson, Ingrid Werner, Eugene White, Carl Giangrasso (Pink Sheets), Shawn Jenkins (AMEX), Edward Knight (Nasdaq), James F. Duffy (NYSE), Ed Kwalwasser (NYSE), Richard Ketchum (NYSE), and Dina Maher (NYSE) for their help with this paper. We have also greatly benefited from the comments of seminar and conference participants at Berkeley, Boston College, Carnegie-Mellon, Cornell, New York University, the Yale Law School, the Financial Intermediation Research Society meetings in Capri, and the NBER Market Microstructure Meetings (December 2004)

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Abstract

Since 1995 more than 7300 firms have delisted from U.S. stock markets, with almost half of these being involuntary. This paper examines the law and economics of the delisting process. We examine economic rationales for delisting, the legal rules that define it, and the causes of delisting. Using a sample of NYSE firms delisted in 2002, we examine the effects of their delisting and subsequent trading on the Pink Sheets. We find huge costs to delisting, with percentage spreads tripling, volatility doubling, but volume remarkably high. We also show that delisting is applied inconsistently, with some firms trading for months after failing the listing requirements. We argue that the current delisting process is flawed, and we provide some alternatives.

Down and Out in the Stock Market:
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Lost in the turmoil surrounding the stock market's recent rise and fall is an interesting fact: since 1995, more than 7350 firms have delisted from U.S. stock exchanges and markets. Some of these delisted firms left voluntarily for reasons such as mergers, but almost half of all delistings were involuntary, forced upon firms by the very exchanges and markets on which they listed. The practice of delisting stocks that fail to meet certain financial criteria is curious for many reasons: it hurts the firms being delisted; it harms the investors holding those shares; and it removes from the exchange or stock market a security that traders wish to transact. Moreover, the delisting decision is generally left to the discretion of the listing venue, giving stock exchanges and markets a formidable amount of power over firms. Given the far-reaching impact of delisting, an analysis of this economic process seems overdue.

The purpose of this paper is to examine the law and economics of the delisting process. While we believe the delisting phenomenon is interesting and important in its own right, this process also provides a valuable lens through which the competitive behavior of stock markets can be viewed. Previous researchers have argued that the business of being a stock exchange has evolved dramatically, with the competitive calculus now involving primarily the provision of liquidity.[1] Against this competitive backdrop, we argue that, while delisting weak firms may have made economic sense a few decades ago, delisting companies whose economic performance has suffered is now much more questionable. We suggest that the costs and benefits of the delisting process are sub-optimally allocated, with the few benefits accruing to the

[1] See, for example, Macey and Kanda [1990]; Macey and O'Hara [1999; 2002].

exchanges and the large costs being borne by firms and their investors. Our analysis suggests a substantial re-thinking of the rules and practices of delisting stocks from U.S. equity markets

To develop our analysis, we first consider the economic and legal environment defining the delisting decision. We outline the economic rationales offered for delisting firms, and the various clienteles affected by the delisting decision. We then set out the rules governing delisting on the New York Stock Exchange (NYSE) and the Nasdaq (National Association of Securities Dealers Automated Quotation system), and we summarize the procedures used by the NYSE and Nasdaq in delisting actions. Despite the seeming clarity of these rules, we argue that the decision to delist is applied inconsistently, with both the NYSE and Nasdaq exercising considerable discretion in the application of their rules. This discretion reflects an ambiguity within the markets themselves regarding the optimality of delisting firms, particularly those with large trading volumes.

We then turn to the economic impact of delisting, and in particular to an analysis of the costs and benefits of delisting. Using a sample of firms delisted from the New York Stock Exchange in 2002, we examine the effects of delisting on the trading of these shares. The sample of firms we analyze is interesting for two reasons. First, for a variety of reasons, most delisted NYSE firms end up trading on the "Pink Sheets", a trading venue little analyzed in the literature. This paucity of research stems, at least in part, from data deficiencies, as data on pink sheet trading has been virtually unavailable. We use data provided to us by Pink Sheets, Inc. to examine the subsequent trading of these stocks, thus allowing us to analyze the specific effects of delisting on firms and their investors. A second feature of our data is that the delisted NYSE firms in 2002 include a number of very large (and prominent) firms such as Enron, Global Crossing, and USAirways. The post-delisting trading of such firms is interesting in its own right,

as the impact of delisting on liquidity adds yet another complication for the investors in these faltering firms. Our analysis of their subsequent trading in the over the counter market suggests that delisting may have very different effects across large and small firms.

Our research provides a number of contributions, a few of which we emphasize here. First, our analysis quantifies the very real effects that delisting has for the trading of, and the investors in, a stock. Investors clearly face very large costs, with share prices falling approximately in half when delisting occurs. Moreover, percentage spreads on average triple when a stock moves to the Pink Sheets, with a median spread of approximately 25% for our sample on the opening day on the Pink Sheets. Similarly, we find a dramatic increase in volatility between the two venues, with Pink Sheet volatility almost double compared to the volatility when the stocks traded on the NYSE. While prices continue to decline after delisting, volume remains remarkably high, with average first day trading in our sample of more than 2.25 million shares. These high volumes suggest that exchanges lose valuable trading opportunities by delisting shares. Our results here add to the limited, but very interesting, literature (see Sanger and Peterson [1990]; Shumway [1997]; and Shumway and Warther [1999]) on the economic effects of delisting. Our particular focus on NYSE stocks complements a recent paper by Panchapegesan and Werner [2004] looking at market quality issues surrounding the delisting of Nasdaq stocks.

Second, our analysis provides some interesting insights into the trading of non-listed securities. The literature here is particularly limited, with only a very few researchers having looked at OTC trading, and fewer still looking at trading over the Pink Sheets[2]. Our analysis

[2] The OTC (or over the counter) market is primarily composed of the OTCBB and the Pink Sheets. Because the OTCBB is owned and operated by the NASD, it is subject to greater regulation and disclosure requirements than the Pink Sheets. An interesting paper looking at the impact of SEC disclosure regulations on OTC firms is Bushee and Luez [2003]. For details on the operation of the OTCBB see also Panchapegesan and Werner [2004].

suggests that for, at least some firms, different trading mechanisms entail very different effects on the price process. While small firm trading appears to deteriorate on the Pink Sheets relative to on the NYSE, large firm trading is less affected. Indeed, we find the unexpected result that dollar spreads actually fall for large firms moving to the Pink Sheets. This difference may reflect the fact that liquidity for a firm's shares arises both endogenously (from characteristics of the firm and its equity issue) and exogenously from the trading mechanism. For firms with sufficient endogenous liquidity, the form of trading mechanism may primarily influence transactions costs. For some firms, it appears that these costs are actually lower on the electronic Pink Sheets venue than on the NYSE.

Third, our analysis sets out a number of important policy issues relating to the delisting and trading of faltering firms. We argue here that while delisting may be necessary in some cases, its current application is too arbitrary, with some firms trading for months (or even years) after violating the listing requirements. Moreover, we question whether the general application of delisting rules is draconian, resulting as it does in firms moving to a venue which is both illiquid and virtually unregulated. We conjecture that the inefficiency of the current delisting process stems from institutional rigidities in the adjustment of stock exchanges and markets to the new competitive environment characterizing securities trading. We outline a number of issues and alternatives for exchanges and regulators to consider with regards to the delisting process.

Finally, our results are also relevant for the recent research investigating the survival rates and mortality of firms (see, for example, Fama and French [2004]; Seguin and Smoller [1997]). Fama and French [2004] argue that the decreased survival rate of firms in the 1990's is at least partially related to changes in listing standards that allowed weaker firms to enter the markets.

Our analysis here shows that delisting procedures may also play a role in explaining firm mortality.

This paper is organized as follows. The next section sets out the economic rationale for delisting, and establishes the reasons why so many firms have been delisted in the past seven years. This section also sets out the legal framework surrounding delisting on both the NYSE and the Nasdaq. Section II then investigates the costs of delisting by looking at a sample comprised of the firms delisted from the NYSE in 2002. Our analysis here examines the impact of delisting and moving to the Pink Sheets on spreads, volumes, volatilities, and prices. Section III then discusses the implications of our results for the exchange delisting decision, the regulatory treatment of delisting, and alternatives for the trading of faltering stocks.

I. The Law and Economics of Delisting

From an economics perspective, delisting rules can be divided into two analytical categories. In the first category are those rules designed to insure that the exchange's relationship with the listed company remains profitable. It is costly for exchanges to continue to list firms whose trading is sporadic. Moreover, it may be difficult for specialists or market makers are to profitably quote a two-sided market if such episodic volume is too information-driven. Because exchanges derive their livelihood from fees associated with trading, it is economically sensible that trading not entail losses for the listing venue.

A second category of delisting rules is designed to protect the reputation of the trading venue where the shares list. In other work, we have argued that exchanges traditionally provided a vector of services to investors and issuers, including standardized rules, monitoring of trading, clearing and settlement, liquidity, and a signaling function. Delisting rules allowed the exchange

to preserve the value of the "signal" associated with listing on a particular trading venue. This could enhance the exchange's self-regulatory role by allowing it to expel errant firms, thereby enforcing the norms of the exchange. Furthermore, investors could rely on the integrity of firms listed on the exchange because their trading signified having met these underlying standards.

Whether such signal-based rules are still sensible is debatable. Certainly, investors have myriad sources of information today regarding firm's prospects, suggesting less reliance on the listing venue. A second complicating factor is that where a firm trades is now often divorced from where a firm lists (see Macey and O'Hara [2002] for discussion). These factors undermine the traditional investor protection argument for delisting, as issue we will return to in Section III of the paper. Similarly, the deterrent role of delisting is also questionable. As will be seen in the next section, despite the recent spate of corporate scandals, few firms are actually delisted for aberrant behavior. The intense competition between exchanges for listings may be at least partially responsible for this reticence to delist.[3]

The legal requirements that cover delisting are remarkably complex, even within the context of securities laws generally. Adding to the complexity of the delisting rules is the significant discretion that the trading markets have in their application of these rules. This discretion allows listing venues considerable latitude in determining when to apply their delisting standards.

In the U.S., virtually all firms list on one of three venues: the New York Stock Exchange, the Nasdaq, and the American Stock Exchange.[4] The regional exchanges have the ability to list

[3] Indeed, the ability of firms to voluntarily delist and move to another venue has created a recurrent problem for exchanges in enforcing their rules. Thus, the NYSE chose to abandon its rules against dual class shares in the face of General Motors and Dow Jones threats to move to the Nasdaq (where such share structures were allowed). See also Baglole [2004] for a discussion of similar problems at the Hong Kong Exchange.

[4] Traditionally, firms have not listed on more than one venue, and the voluntary movement of firms between listing venues has virtually always involved firms "graduating" from the Nasdaq or Amex to the NYSE (the exception to this is Aeroflex, Inc. which shifted from the NYSE to the Nasdaq in February 2000). This single-listing practice has

firms, but few do so actively. Just as listing criteria differ, so, too, do delisting criteria. As the NYSE and the Nasdaq rules cover most firms, it is useful to consider in more detail the specific rules of these two settings.

A. The NYSE

The NYSE sets out three numeric requirements for delisting, and numerous more subjective criteria. First, listed companies must meet minimum distribution requirements for their shares. Specifically, the New York Stock Exchange will consider delisting a firm if the number of total stockholders drops below 400, or the total number of stockholders is less than 1,200, and the average monthly trading volume for the previous twelve months is less than 100,000 shares.[5] The Exchange also will consider delisting when the number of publicly-held shares is less than 600,000.[6] These distribution rules seem designed to insure that there is continued trading volume in order to justify the costs to the Exchange of listing a stock.

Second, the Exchange will consider delisting if a company fails to meet certain market capitalization requirements.[7] The Exchange will consider delisting when either the average "global market capitalization" over a consecutive 30 trading-day period is less than $15 million. If total stockholders equity falls below 50 million, the average global market capitalization must be at least $50 million.[8] For companies that qualified for original listing under the global market

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recently been called into question by Nasdaq's offer to waive listing fees for Dow-Jones Index funds listed on the NYSE, thus setting the stage for dual-listing. In February 2004, Hewlitt-Packard became the first firm to officially dual list on both markets. For a discussion of listing issues see Macey and O'Hara [2003] and Foucault and Parlour [2004].

[5] NYSE Listed Company Manual § 802.01(A). (hereinafter NYSE). These numerical cutoffs are designed to insure that there is a minimum amount of trading interest in securities listed on the NYSE. The total number of stockholders can fall to 400, unless the average monthly trading volume for the previous twelve months is less than 100,000 shares, in which case the total number of shareholders must be 1,200. Where total stockholders equity falls below the $50 million threshold, the global market capitalization increases from $15 million to $50 million

[6] *Id.*

[7] NYSE § 802.01(B).

[8] NYSE § 802.01(B)(i) and (ii). As with the numerical cutoffs regarding the number of shareholders the numerical cutoffs regarding market capitalization are designed to insure that there is a minimum amount of trading interest in

capitalization standard, the Exchange will consider delisting if either the companies average global market capitalization over a thirty trading-day period is less than $100 million or the average global market capitalization over a thirty trading-day period is less than $500 million and total revenues are less than $20 million over the last twelve months, unless the entity qualifies for listing under a different original listing standard.[9]

Third, the Exchange will consider delisting if the average closing price of a security is less than one dollar over a consecutive thirty trading-day period.[10] If, however, the minimum average closing price is the only criteria the company fails to meet, it will not automatically be subject to the Exchange's delisting procedures.[11] Instead, the Exchange will notify the company, and provide it with six months to cure the deficiency.[12] If, after six months, the average closing price remains below one dollar, the Exchange will begin standard delisting procedures.[13]

In addition to the numeric criteria, just described, the Exchange will, at its discretion, consider delisting the company if it fails to meet a number of other criteria. The Exchange will consider delisting if the company's operating assets have been substantially reduced in size, regardless of the reasons for the reduction.[14] If the company files for bankruptcy, or announces its intention to file, "under any of the sections of the bankruptcy law," then the Exchange may consider delisting.[15]

The Exchange will also consider delisting if any of the following occurs: (1) the Exchange receives authoritative advice that the security is without value; (2) the securities

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securities listed on the NYSE. Where total stockholders equity falls below the $50 million threshold, the global market capitalization increases from $15 million to $50 million.

[9] NYSE § 802.01(B)(iii). Affiliated companies are not subject to the market capitalization standard, as long as their parent companies meet the standard and still control the affiliate.

[10] NYSE § 802.01(C).

[11] *Id.*

[12] *Id.*

[13] *Id.*

[14] NYSE § 802.01(D).

[15] *Id.*

registration is no longer effective; (3) proxies are not solicited for all meetings of stockholders; (4) the company violates its listing agreement; (5) whenever an entire class, issue, or series of securities are retired through payment or redemption; or (6) the company engages in operations that, in the opinion of the Exchange, are contrary to the public interest. Moreover, the Exchange will also consider delisting when any of the following conditions are met: (1) the number of publicly held-shares is less than 100,000; (2) the number of holders is less than 100; or (3) the aggregate market value of shares is less than $1,000,000.[16]

Finally, the Exchange reserves the right to "make an appraisal of, and determine on an individual basis, the suitability for continued listing of an issue in the light of all pertinent facts whenever it deems such action appropriate, even though a security meets or fails to meet any enumerated criteria."[17]

B. Nasdaq

The delisting requirements on the Nasdaq have many of the same features as the NYSE requirements. A company whose shares are listed on the Nasdaq National Market must meet certain "Maintenance Standards" in order to remain listed.[18] Specifically, Nasdaq will consider delisting if any of the following minimum criteria are not met: (1) stockholders' equity of $10 million, (2) 750,000 shares publicly held, (3) market value of publicly held shares of at least $5 million for thirty consecutive business days, (4) bid price not less than one dollar for thirty consecutive business days, (5) 400 shareholders of round lots, and (6) at least two market makers for ten consecutive business days. In addition, securities must be in compliance with the quantitative maintenance criteria in the NASD's Rule 4300 series. In addition, Nasdaq may also

[16] *Id.*
[17] An intriguing example of such discretionary delisting is the NYSE's delisting on February 20, 1961 of five Cuban railroads and sugar companies following the expropriation of the their assets by Fidel Castro's communist government.
[18] NASD Manual § 4450. (hereinafter NASD).

delist if the company files, or announces that the board has authorized liquidation, under any section of the bankruptcy laws.[19]

Like the NYSE, the Nasdaq Stock Market's formal justification for its continued listing requirements is, in essence, a signaling argument:

> The Nasdaq Stock Market stands for integrity and ethical business practices in order to enhance investor confidence, thereby contributing to the financial health of the economy and supporting the capital formation process. Nasdaq issuers, from new public companies to companies of international stature, by being included in Nasdaq, are publicly recognized as sharing these important objectives of The Nasdaq Stock Market. Nasdaq, therefore, in addition to applying the enumerated criteria set forth in the Rule 4300 and 4400 Series, will exercise broad discretionary authority over the initial and continued inclusion of securities in Nasdaq in order to maintain the quality of and public confidence in its market. Under such broad discretion… Nasdaq may deny initial inclusion or apply additional or more stringent criteria for the initial or continued inclusion of particular securities or suspend or terminate the inclusion of particular securities based on any event, condition, or circumstance which exists or occurs that makes initial or continued inclusion of the securities in Nasdaq inadvisable or unwarranted in the opinion of Nasdaq, even though the securities meet all enumerated criteria for initial or continued inclusion in Nasdaq.[20]

C. Corporate Governance Listing Standards

Both the NYSE and Nasdaq may delist companies not in compliance with their respective corporate governance listing standards. Delisting for noncompliance with these standards, however, is rare; the exchanges tend to encourage compliance through "negotiation with issuers."[21] Foreign companies can even obtain waivers for these requirements if similar requirements do not exist in the foreign state's law.[22] In light of the recent corporate scandals, both the NYSE and the Nasdaq have tightened their corporate governance listing standards. Whether such heightened standards result in actual delistings remains to be seen.

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[19] NASD § 4450(a)(1)-(a)(6); (e)(1)-(e)(3).
[20] NASD § 4300

[21] 57 Bus. Law 1487, 1491.
[22] *Id.* at 1514.

D. The Delisting Process

If the NYSE determines that delisting procedures are appropriate, then the Exchange staff will notify, in writing, the company, which must then issue a press release to that effect.[23] The company may request that the Committee of the Board of Directors of the Exchange review the decision within ten days of receiving the notification.[24] The Committee will receive briefs and oral arguments on the delisting.[25] The request for review usually stays the delisting proceedings. During the review, however, the Exchange may, at its discretion, suspend trading of the security.[26] Failing such review, the Exchange will suspend trading and apply to the Securities and Exchange Commission to strike the security from listing.[27]

Similarly, on the Nasdaq if the administrative staff deems it appropriate to begin delisting procedures, the staff will notify the company, which must then issue a press release disclosing that delisting has begun.[28] The company may appeal to the Nasdaq Hearing Panel.[29] The appeal automatically stays the delisting.[30] After an adverse judgment by the Nasdaq Hearing Panel, the company may appeal to the Nasdaq Listing and Hearing Review Council.[31] This appeal does not, however, stay the delisting.[32] While it is possible to appeal an adverse judgment by either the NYSE or the Nasdaq to the SEC and then to the U.S. Court of Appeals for the District of Columbia, this is rarely done.

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[23] NYSE § 804.00.
[24] *Id.*
[25] *Id.*
[26] *Id.*
[27] *Id.*
[28] NASD § 4815(a), (b).
[29] NASD § 4820(a).
[30] *Id.* Nasdaq may suspend trading of the security during the hearing period.

[31] NASD § 4840.
[32] NASD §4840(b).

E. Trading After Delisting

If an issue has been delisted from the Nasdaq Stock Market, the issue will be available for immediate quotation on the Nasdaq Over-the-Counter Bulletin Board (OTCBB), but only for firms that are not in bankruptcy, and that are current in their financial reporting with the Securities and Exchange Commission. There also is a formal requirement that market makers must have issued price quotations in the security during the 30-day period preceding its removal in order to be eligible for quotation on the OTCBB.[33] In principle, this means that, while many delisting Nasdaq stocks automatically can avail themselves of the liquidity provided by the OTCBB, firms delisted from the NYSE may face some delay because their shares have not been quoted by a market maker during the previous thirty days. In practice, however, this constraint appears to be frequently waived.

Because the OTCBB is a quotation medium for subscribing members and not an issuer listing service, a delisted Nasdaq or NYSE issuer cannot "list" themselves on the OTCBB. A delisted issuer that wishes to be quoted on the OTCBB must submit a request to the SEC and contact prospective broker-dealer firms to request that these firms register to quote their securities. The SEC typically expedites the approval process for NYSE firms, so that qualifying firms that are not bankrupt and have their SEC filings current can move quickly to the OTCBB upon delisting.

[33] Upon the delisting of a security not in bankruptcy and current in its SEC filings, market makers who have quoted the security during the 30-day period preceding its removal have 24 hours in which to register quote the security on the OTCBB. If the issuer does not meet all of the above criteria at the time of its delisting, voluntarily delists from the Nasdaq, or if no market makers register to quote the security, the usual Form 211 filing and review process will apply.

Most stocks delisted from the NYSE, and some stocks delisted from Nasdaq, move to the "Pink Sheets," a trading system operated by the private firm "Pink Sheets LLC."[34] The origins of the Pink Sheets date to 1904, when the National Quotation Bureau began as a paper-based, inter-dealer quotation service linking competing market makers in OTC securities. The Pink Sheets currently quote some 3900 issues, and it is essentially an electronic quotation system for market makers willing to trade in these issues. There are no listing standards, and the Pink Sheets does not regulate the market.[35] This has led, in the past, to concerns about the market's fairness and opacity.

F. The Delisting Decision: Recent Evidence

Table 1 provides data on the total number of delistings from the NYSE, the Nasdaq, and the American Stock Exchange for the period 1995 – 2002. As is apparent, the number of delistings grew on all three exchanges, peaking at 1231 firms in 1999. Delistings have fallen somewhat since then but they are still substantial, with more than a 1000 firms delisting in 2001 and 747 in 2002. The large number of delistings has resulted in markets growing smaller, with fewer firms listed in 2002 than was the case in the previous years in the sample.

The delisting requirements discussed above allow exchanges to delist firms for a wide range of reasons. In addition, voluntary delistings occur as the natural consequence of a merger, a decision to take the firm private, or a voluntary liquidation. It is also becoming more common for non-U.S. firms to withdraw listings voluntarily as part of a retrenchment to listing only in their home market. **Table 2** provides evidence on the mix between voluntary and involuntary delistings. As is apparent, voluntary delisting is a much more important factor for the NYSE

[34] See www.pinksheets.com. The term "pink sheets" derives from the color of the paper on which stock prices for the firms traded in this market are printed and distributed to traders. Currently the screen on which quotes and other market information, along with market makers' phone numbers are displayed is pink in color.
[35] Specifically, under securities law the Pink Sheets is categorized as a SIP, or a securities information processor.

than it is for the Nasdaq. Nonetheless, both venues have a substantial number of involuntary, or regulatory, delistings, and for the Nasdaq market regulatory and voluntary explanations have approximately equal incidence.

Firms that are involuntarily delisted often fail more than one of the delisting criteria. To determine the exact causes of delisting, we reviewed all of the involuntary delistings on the NYSE and the Nasdaq for the period 1999- 2002. Based on the statements given in the delisting announcement, we then categorized the main causes for delisting. These data are given in **Table 3** (note that the number of causes exceeds the total number of delisted firms due to multiple reasons for delisting). Not surprisingly, bankruptcy is an important cause for delisting on both markets. And clearly many firms also fail the minimum assets or market capitalization criteria. What is more intriguing is the important role played by minimum share price requirement. Indeed, on the Nasdaq, failure to meet the $1.00 share price is the most commonly cited cause of delisting, and it is the second most common reason on the NYSE.

One might have conjectured that firms whose share prices drop below the $1 level could have avoided delisting by various means such as reverse stock splits, debt-reducing exchange offers, or even the potential sale of the company. Certainly, many companies do pursue such strategies, and occasionally avoid, or at least forestall, delisting. For example, Nortel announced a reverse split in April 2003 specifically to avoid being delisted by Nasdaq, a strategy that is thus far successful.[36] Yet, Popmail found its 10-for-1 reverse split in October 2000 ineffective in

[36] On April 24, 2003, Nortel announced a reverse stock split in order to avoid delisting. See http://www.nortelnetworks.com/corporate/investor/icorner.html (accessed June 17, 2003). The "huge" stock split was effectuated in order to "fend off a "near-term delisting possibility." The split was designed to bring the firm's share price from a price of 64¢ to a price in the $10 to $20 range. See http://www. cnet.com/investor/brokeragecenter/newsitem-broker/0-9910-1082-20468497-0 (accessed June 17, 2003). Another successful example is 7-Eleven, the Dallas convenience-store chain, who completed a 1-for-5 reverse split in May 2000. The refinancing brought 7-11's share price up to $20.94 the day of the split from $4.19. Subsequently, the firm turned around its fortunes by reducing debt and improving earnings. The split also had "an important psychological effect in raising 7-Eleven shares above $10." Id.

supporting its stock price, leading to its delisting in January 2001.[37] And a similar fate confronted London Pacific Group whose reverse split did not forestall its delisting in 2002 by the NYSE.

This ineffectiveness is not surprising. Hwang [1995] finds a negative price drop of more than 9% in his analysis of reverse splits by Nasdaq-listed firms, and similar negative effects are reported for reverse splits on the NYSE and the ASE (see Woolridge and Chambers [1983]). Consequently, firms are often extremely reluctant to utilize reverse stock splits because this strategy provides a very negative signal to the market.[38] Lie, Lie, and McConnell [2001] report a similar problem arising with debt-reducing exchange offers (DREO), noting their "results are consistent with the idea that the information conveyed by an announcement of a DREO is that a firm's future prospects are even more bleak than would have been anticipated on the basis of public information prior to the announcement". Thus, while some firms do succeed in raising their stock prices via such extraordinary methods, its rarity suggests that for many firms the costs of doing so are simply too high. For those firms, involuntary delisting becomes a reality.

Having been delisted, the firm now faces the challenge of finding liquidity for its shares in another trading venue. The stockholders of such firms thus face a double devastation: having seen the value of their shares decline due to adverse fortunes, they now face the prospect of greatly reduced liquidity for these distressed shares. How large these liquidity costs are is clearly an important issue, and in the next section, we investigate these delisting costs in more detail.

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[37] See Ruth Simon, "More Companies Are Learning Harsh Lessons on Delistings," The Wall Street Journal, March 20, 2001, at C1.

[38] Barry Siegel, chairman and chief executive of Driversshield.com made the point succinctly: "Make no mistake, a reverse split is an act of desperation. It sends a terrible signal that management has tried everything it knows to lift the stock price and nothing has worked." http://www.twinight.org/avid/2001/avidchat0619pm.html (Avid Traders Tuesday Evening Chat, accessed June 17, 2003).

III. From the NYSE to the Pink Sheets: The Impact of Delisting

A. Sample Firms

As noted earlier, stocks delisted from the NYSE face a limited choice of trading venues. Although the listing requirements of the American Stock Exchange and the Nasdaq are less stringent, the commonality of many of the listing (and delisting) criteria precludes moving to those venues for many delisted NYSE firms. Moreover as noted earlier, the OTCBB may not be immediately available for these NYSE firms, particularly for firms who are bankrupt or not current in their SEC filings. Consequently, most NYSE-delisted securities are relegated to trading on the Pink Sheets.

To investigate the impact of delisting, we examined all firms involuntarily delisted from the New York Stock Exchange in year 2002. We found 63 such forced delistings, with 5 firms moving to the Amex, 1 to the Nasdaq, and the remaining 57 to the Pink Sheets.[39] As our interest is in post-delisting liquidity, we restricted our sample to those 57 firms moving to the Pink Sheets to avoid confounding effects arising from different trading mechanisms. We collected data from Compustat on firms' asset size (with two firms being deleted due to incomplete trading or asset value data) We obtained from Pink Sheets, Inc. daily data giving the closing price, spread, and volume for each stock in our sample for the first sixty trading days post delisting. Pre-delisting data on these variables is taken from CRSP. We also deleted one firm from the sample due to the lack of trading activity.[40] The final sample is thus 54 firms, which are listed in **Table 4**.

[39] Of the sample firms moving to the Pink Sheets, 49 of 57 firms also end up trading on the OTCBB. For some stocks, listing on the OTCBB is approximately concurrent with Pink Sheet listing, but for other firms there is a delay. Interestingly, Enron did not trade on the OTCBB at any point in 2002.

[40] An examination for outliers in our trade data revealed one firm Panavision (PVI) had an average dollar spread more than 50% higher than any other stock in our sample. Further investigation found the stock to have the lowest NYSE volume (165 shares a day) and the lowest daily Pink Sheet volume (953 shares a day) of any stock in the sample. Further, PVI had positive volume on only 15 of the 60 days in our post-delisting period (for comparison,

Our sample includes a number of very prominent firms, including Enron, Global Crossing, USAirways, and Owens Corning, as well as some less familiar names such as Coastcast Corporation and Grubb &Ellis. Another interesting feature of our sample is firm age: 32 firms had been trading on the NYSE for 10 years or more before their delisting, with several representing some of the oldest U.S. firms (Bethlehem Steel, for example, incorporated in 1906, but its origins trace back to 1857). Only 5 of the delisted firms listed since 2000, and three of these were actually spin-offs of larger firms trading on the NYSE.[41]

The diversity in our sample firms suggests the effects of delisting may vary across firms, particularly if firm size is considered. Firm size data at the time of delisting is apt to be misleading, so we considered as alternative proxies for firm size the market capitalization as of January 2, 2001 and total assets as of Jan. 1, 2001. Our sample firms all delist at some point in 2002, so these data predate delisting by at least 12 months for each firm. The results with either size measure were virtually the same, so we report results based on total assets. As shown in Figure 1, total assets range from over $65 billion (Enron) to $38 million (Philips International Realty Corp.). For the overall sample, 11 firms have total assets above $5 billion, 20 firms range between $5 billion and $1 billion, and 23 firms have total assets below $1 billion. In the following analysis, we report results for both the overall sample and for various size-based subsets.

We also include in Table 4 the main explanations cited by the NYSE for each firm's delisting. Many of the firms violate multiple delisting criteria, but the most cited factors are

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the stock with the second highest spread traded on 57 of 60 days). To avoid spurious inferences, we deleted PVI from the sample.

[41] Recent studies of firm mortality (for example, Fama and French [2004]) attribute increased mortality rates to the influx of weaker firms coming to market in the late 1990's. Our sample includes 15 firms that listed between 1996-1999, but overall our sample includes a wide variety of firms. The findings of Fama and French are more applicable to the Nasdaq market where firm tenure before delisting is shorter than on the NYSE.

share price below the minimum (39 firms) and market capitalizations below the minimum (37 firms). While these two conditions are often congruent, they are not always the same: 11 of the 37 firms delisted for market capitalization did not fail the share price requirement. Bankruptcy led to the delisting of 19 firms in our sample, with 16 of these firms also failing the share price requirement.

Earlier we noted that the listing venues can exercise considerable discretion in the application of the delisting criteria. To investigate how this discretion affects actual delistings, we first consider delisting for firms failing the minimum price rule. The NYSE average share price rule requires delisting if the 30 day average share price falls below $1.00, or delisting can occur if the share price is "abnormally low", which is typically defined as below $1.00. For the 39 firms delisted for share price reasons, we calculated the number of trading days prior to the last day of trading on the NYSE a stock was in violation of the 30 day average price rule or the overall $1.00 rule.

Table 5 clearly shows a wide disparity in application of the delisting rules. Bethlehem Steel, for example, violated the 30 day rule for more than 7 months (154 trading days), while Mutual Risk Management was delisted after only 1 day. Similarly, Acceptance Insurance Companies was booted out after failing the $1.00 requirement for 10 days, while Asia Pacific Wire &Cable Corp traded below $1.00 for more than 215 days. What can account for this disparity? One possible explanation is size; specifically, the exchange may be more likely to allow larger, more active stocks to remain in violation. Using our small, medium, and large size cutoffs, however, we found no significant difference between the mean number of days in violation for large stocks (49 days) or other stocks (47.75).[42] Perhaps this lack of consistency is

[42] The mean number of days for the small stocks was actually higher at 58 days, but this difference is not statistically significant.

more related to a general ambivalence on the part of the exchange towards enforcing its own standards.

A similar discrepancy is exhibited for the 19 firms delisted for bankruptcy reasons. Although the NYSE rule is to delist all bankrupt firms, there is clearly considerable leeway in how quickly this actually occurs. For example, Global Crossing was delisted on the day following its bankruptcy filing, Enron was delisted after 30 trading days, while Owens Corning traded for more than 2 years after its bankruptcy filing. For the firms in our sample, the average time between bankruptcy filing and delisting was 131 trading days. Conversely, 4 of the 19 firms the NYSE delisted for bankruptcy never actually went bankrupt; these firms were delisted after they announced the possibility of a bankruptcy filing. At a minimum, discretion seems to play a large role in the NYSE's decision to delist for bankruptcy reasons.

A second complication in investigating the impact of delisting is that the timing of delisting and subsequent trading on the Pink Sheets varies across the firms in our sample.[43] For example, for 20 firms, the NYSE announcement of delisting occurs on the last day of NYSE trading, while the other 34 firms continue to trade on the NYSE for a few days following the announcement. Similarly, 27 firms in our sample begin trading the next day on the Pink Sheets, while the others face a short hiatus before the resumption of trading (the average hiatus for this group was 1.24 days). To enhance comparability, we define the delisting date as the announcement date of delisting. The opening date on Pink Sheets is the first day on which share transactions occur. Thus, our analysis for Pink Sheet trading is comparable across firms, but some firms may have interim trade data between the announcement date and Pink Sheet trading date that is not analyzed.

[43] Shumway [1997] finds similar disparities in the delisting and subsequent trading of NYSE stocks. He also notes that while some stocks' delisting is pre-announced by the company, this is not the case for approximately two-thirds of his sample.

B. Pretty in Pink? Trading on the Pink Sheets

Table 6 provides data on the first day of Pink Sheet Trading for the stocks in our sample. We first examine the trading data from the overall sample, which is given in Panel A. A striking result is that trading volume is both large and variable on the opening day, ranging from 100 shares to more than 53 million shares. The average volume is just over 2.25 million shares while the median volume equals 77,500 shares. Thus, while trading volume is small for some firms, it is extremely large for others.

Part of the explanation for these large volumes is portfolio rebalancing, as the investor clientele changes to reflect the unlisted status of these shares. SEC rules preclude most institutions from holding unlisted shares, thus forcing some owners to move out of these shares. Another factor contributing to large volumes is the very low trading prices of the stocks. Fully 75% of our sample is trading at prices below 50 cents, while 25% of the sample is below 10 cents. As the data show, the value of trade on day 1 averages a little over half a million dollars, with the largest volume stock involving only $16 million in trading value. This value of trading actually rises over the first five days of trading, and then gradually declines over the first 60 days of trading. Perhaps not surprisingly, delisted stocks tend not to be strong performers.

Panels B, C, and D provide data for the three size subsets of our sample. Again, the data show surprisingly large trading volumes, with the largest 11 stocks in the sample averaging 9 million shares trading on opening day, and the next largest 20 stocks trading close to 900 thousand shares. Median volumes are significantly lower, suggesting a wide disparity across sample stocks. How ever one measures volume, these data suggest that, for at least the largest stocks, exchanges forego substantial trading revenue when they delist the security.

Investors also appear to face substantial costs, as evidenced by the average first day percentage spread of 40% and the median spread of more than 24%. These first day spreads appear to be quite volatile, suggesting that median first week spreads might give a better indication of trading costs. Here we find a median spread of 14.59% for the overall sample. For the sample as a whole, these median spreads remain relatively stable over the first 60 days of trading, and actually fall to an average of 11.39% for the three-month period. Nonetheless, the data suggest that investors face substantial costs in trading stocks moving to the Pink Sheets.

Examining the three subgroups, however, suggests that these costs are very different for traders in the largest stocks. For the 11 firms in our top size group, first day median spreads are just 3.39%, and these spreads remain relatively constant (3.27 %) when measured over the first 60 days of trading. By comparison, the 60 day median spread for the middle 20 stocks is 13.60% and it is 15.80% for the smallest 23 stocks in the sample. This disparity in spreads suggests that the trading mechanism per se is not the sole determinant of trading cost. Instead, the liquidity of firms also is affected by endogenous characteristics such as trading volume and the number of shareholders.

An interesting question is how these new entrants to the Pink Sheets fare in terms of return to their investors. Unfortunately, the very low prices of many of the sample stocks greatly complicate determining such returns, and render standard analyses (such as CAR measures) unreliable. For example, with a stock price at .03 cents daily returns of 400% or even 600% arise, causing our overall return figures to be largely driven by outliers. For the 11 stocks in our largest firm category, these problems are less severe, although still present (Global Crossing's stock price, for example, was below .10 cents in the delisting period). We calculated market adjusted cumulative returns for a portfolio of these stocks using closing prices over the first 60

days of trading on the Pink Sheets. Overall, the portfolio value ended more than 20% lower by then end of the period, suggesting that a profitable trading strategy based on delisting is not feasible. Including the large transactions costs accompanying Pink Sheet trading into the analysis only underscores the conclusion that investors do not fare well when stocks hit the Pink Sheets.

The Impact of Delisting: Before and After Comparisons

The data show that traders face substantial liquidity costs once stocks begin trading on the Pink Sheets. What is not clear, however, is whether these costs are any greater than the costs accompanying trading on the NYSE before delisting. A related question is how the delisting decision, per se, affects the overall price, volume, and trading behavior of the stock. To address these issues, we gathered data for the 60 day pre-delisting period for each stock in our sample from the TAQ data base and from CRSP. **Table 7** summarizes this data for prices, volumes, spreads and volatility.[44]

Perhaps the most immediate impact of the delisting announcement is on price. As Panel A shows, on the last day of NYSE trading, the average stock in our sample closed at a price of $0.95; on the first day of Pink Sheet trading the average stock closed at $0.48. For large stocks, the divergence is even higher, with prices dropping from 0.63 to 0.28. Focusing only on stocks **not** delisted for bankruptcy, we find a price drop from $1.09 to 0.59.[45] The size and magnitude of these effects suggest both that the delisting event was not anticipated by the market, and that it is a traumatic event for the stock and its investors. Essentially, being "evicted" reduces the

[44] We report t-statistics to provide a measure of the statistical significance of our results. For the 120 day pre/post sample there is clearly sufficient data to make these measures meaningful. For the 10 day pre-post sample the validity of the t-statistics is less apparent. Thus we report non-parametric Kruskal-Wallis test statistics for this shorter time sample. The results using the Kruskal-Wallace tests are the same as those using t-statistics, suggesting that the effects are sufficiently large and robust.

[45] For the bankrupt sample, the drop is from 0.70 to 0.28. Recall that the average stock in our bankrupt sample filed for bankruptcy more than 100 days before their delisting.

stock's value by almost one-half.[46] We caution that, as noted earlier, specific welfare comparisons across individual stocks are problematic due to the different timing of the actual delisting and subsequent Pink Sheet trading.

These deleterious effects are even more evident from the spread data. **Figure 2** depicts average percentage spreads for the 60 day period before delisting and the 60 day period after Pink Sheet trading begins. For the sample as a whole, percentage spreads increased from an average of 5.91% in the pre-period to 15.58% in the post-period. Focusing on a five-day pre and post-window, spreads widened from 7.46% to a stunning 26.08%. Intriguingly, the percentage spread behavior for the 11 large stocks shows a different pattern. While spreads rise in the 60 day pre-and-post window (from 3.06% to 4.10%), spreads actually fall when measured in the 5 day pre-and post-delisting period, decreasing from 5.21% during the last week of trading on the NYSE to 3.56% during the first week of Pink Sheet trading. As indicated in Table 7, all of these changes are statistically significant.

Figure 3 provides the corresponding average dollar spread data for the sample. For the sample as a whole, the average dollar spread increases from .055 to .0719 in the 60 day intervals, and from .0497 to .1066 in the 5 day intervals. Again we find differential behavior for the large stock average dollar spread. This spread actually falls from .0252 to .0079 when measured across the combined 120-day interval, and it drops from .0273 to .0107 when measured across the combined 10-day interval. That average dollar spreads are lower in the Pink Sheets than they were on the NYSE for these large stocks is an intriguing, and unexpected, finding.

To investigate this result further, we plotted in **Figure 4** the average dollar spread and the average stock price over the combined 120 trading days for the 11 large firm sample. The graph

[46] Note that these price effects may include direct effects due to the liquidity effects of losing access to the NYSE trading platform, and indirect effects due to the revised beliefs that the company's future prospects were too bleak for the NYSE to continue listing.

clearly shows the dramatic price decline preceding the stock's delisting and the large increase in dollar spreads in the week before NYSE delisting. What remains a puzzle are the spreads on the NYSE in the overall pre-delisting period. Here we find that despite the dramatic fall in price, spreads remain virtually constant at around .02 per share, and only drop when the stock shifts to trading on the Pink Sheets.

One conjecture for this behavior is that the spreads reflect a higher fixed cost of market making on the NYSE. Evidence in support of this conjecture can be found in the data on volume and volatility. A basic insight in market microstructure models (see O'Hara [1995]) is that bid-asked spreads generally decrease as trading volume goes up and increase as price volatility goes up. **Figures 5** and **6** clearly show that volume decreases when stocks move to the Pink Sheets, and volatility more than doubles for the sample as a whole. Thus, the anomalous NYSE spread behavior is not explained by natural properties of the order flow, as the volume and volatility effects would be expected to increase, not decrease, dollar spreads.

These findings, in turn, suggest two things about the NYSE trading environment. First, the data show the important role played by the penny pricing increment in use at the NYSE. The NYSE does not permit price quotes at the sub-penny level, dictating that spreads also cannot be less than one cent. The Pink Sheets allows sub-penny pricing, and the dramatic drop in spreads for the largest stocks to approximately one-half cent reflects this greater price flexibility.[47] Second, the data suggests that the Exchange specialist's "affirmative obligation" to maintain a high quality, continuous two-sided market for listed stocks actually does cause specialists to

[47] Taking Enron as an example, in the 60 day period before its delisting there is never a sub-penny quote, and spreads fluctuate between 1 and 2 cents. Upon moving to the Pink Sheets, spreads in the first week are approximately ½ cent.

behave differently than they would in the absence of such obligations.[48] In particular, our data are consistent with a cross-subsidization effect in which stocks with higher trading volumes subsidize stocks that trade relatively infrequently. The dramatic deterioration of liquidity for the smaller, less traded stocks in our sample is consistent with this effect. Our finding here reinforces recent findings of Huang and Liu [2003] who demonstrate similar subsidization behavior using data from individual specialist firms.

Returning to the volume and volatility data, we see some intriguing patterns in the data. The distribution of volume is relatively stable in the period before and after delisting, with the exception of a spike approximately 30 days prior to delisting. This spike is largely due to Enron's bankruptcy filing. Overall, volumes increase when stocks move to the Pink Sheets, possibly due to portfolio rebalancing of institutional investors unable to retain unlisted securities in their portfolios. Volatility increases dramatically, with closing price volatility more than twice as high, and volatility measured from closing bid prices on the order of 50% higher (0.1063 to 0.1540).[49]

One final issue we consider in our analysis is the differential behavior of firms delisted because of bankruptcy. Panel B of Table 7 gives the relevant data for the 60 day pre and post delisting periods for the 19 delisted bankrupt stocks and the 35 delisted non-bankrupt stocks.

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[48] Specialists are expected to stabilize stock price movements by buying for and selling from their dealer accounts against the prevailing trend of the market, i.e., to purchase on minus and zero minus ticks, and sell on plus and zero plus ticks. For a discussion of the specialist's obligations see Stoll [1998]. The Exchange currently uses several programs to measure specialist performance including (1) specialist capital utilization, which focuses on a specialist unit's use of its own capital in relation to the total dollar volume of trading activity in the he unit's stocks; (2) the so-called "near neighbor" approach which compares the performance in a stock over "rolling" three-month periods to the performance of stocks with similar trading characteristics; and (3) the standards of acceptable performance specified in Rule 103A. Information on these measures is supplied to the Allocation Committee for its use in determining the allocation of listing companies. Stocks are allocated to specialists by the NYSE Allocation Committee. NYSE Information Memo 97-55. Listing firms are not permitted to choose their specialists, and the allocation committee looks, among other things, at the distribution of high volume and low volume stocks among the specialist firm's current portfolio of stocks when making its decision about which specialist firm should receive a new allocation.

[49] Closing trade prices are subject to bid/ask bounce. Measuring volatility by spread mid-points results in an increase from 0.1010 to 0.1445.

The data from the bankrupt sample suggest dramatic differences between trading on the NYSE and trading on the Pink Sheets. Overall, percentage spreads double for bankrupt firms moving to the Pink Sheets, but their dollar spreads actually improve with the move. Conversely, trading costs for the non-bankrupt stock deteriorate no matter how one measures them. We tested for whether differences in dollar spreads moving from the NYSE to the Pink Sheets are different depending upon whether the stock is bankrupt or not. We can strongly reject the hypothesis (t-stat. 2.543; p-value 0.0155) that the two populations are the same.

Perhaps more intriguing are the volume effects, with trade executions for the bankrupt sample falling from more than 5 million shares a day to just over 2 million shares a day on the Pink Sheets. Conversely, volume is little affected for the non-bankrupt sample, with no statistically significant difference in trading before and after delisting occurs. One explanation for these divergent effects is simply size. As shown in Table 4, the bankrupt firms include a preponderance of the largest firms in our sample, and comparison of the bankrupt and large firm samples in Table 7 reveals very similar behavior.

Overall, the data provide compelling evidence that moving from the NYSE to the Pink Sheets imposes large costs on traders. Moreover, the large volumes that transact for at least the larger stocks suggest that the Exchange loses valuable trading opportunities as well. Having established these costs, we turn in the next section to the questions of who benefits from delisting and whether the current delisting process is optimal.

III. The Delisting Dilemmas: Why and When?

Given the substantial costs associated with delisting, what then is the rationale for continuing this practice? To address this query we need to consider who benefits from delisting

stocks. The analysis above suggests that it is not the firms whose stocks are delisted, nor is it their shareholders. By virtually every metric, moving from being Exchange-listed to trading on the Pink Sheets is "hazardous to your wealth". But there other constituencies to consider, most notably the exchange itself, the general trading public, and even the overall capital market: Does anyone actually benefit from delisting stocks?

Certainly, for very infrequently traded stocks, the exchange benefits from delisting. As we have seen, some firms, particularly the very small ones, trade infrequently both on the NYSE and on the Pink Sheets. The deterioration of spreads upon moving to the Pink Sheets is consistent with these firms being expensive to trade, suggesting that the NYSE's practice of delisting these firms is motivated by economic grounds. Nonetheless, the lengthy delay in delisting many stocks suggests that the costs of retaining the listing on the NYSE must not be that large, at least for all but the very small stocks.

Alternatively, it can be argued that delisting benefits exchanges because it upholds the signaling value attached to an exchange listing. Here the relation between listing and delisting comes into play. Over the past decade, exchanges in general, and the Nasdaq in particular, actively sought new listings as a means to generate greater revenue for the exchange. Fama and French [2004] argue that the lowering of listing standards is one explanation for the sharp rise in firm mortality as lower quality firms were allowed access to the capital markets. Delisting such lower quality firms is one way for exchanges to remove such listing "mistakes", but it does so by shifting the costs of poor exchange decision-making to investors. A more efficacious approach would be to tighten listing standards, and then provide the liquidity firms need to support the efficient trading of their stock.

Moreover, the case for signaling would be stronger if, in fact, delisting was proactive (the exchanges finding and removing corporate miscreants) rather than reactive (the exchanges eventually removing firms after some malfeasance or insolvency is publicly reported). Our data show clear evidence that delisting is a reactive process, occurring after, sometimes long after, the revelation of firm difficulties. Indeed, a compelling alternative hypothesis is that exchanges delist when it appears that firms may be unable to pay ongoing listing fees.

Is delisting needed to protect potential investors? The argument here relies on the notion that investors draw inferences from, and indeed make trading decisions based on, the very fact that a firm is listed on a particular exchange. Thus, exchanges must ensure that only firms meeting the standards of the exchange are traded there, otherwise investors are misled. While plausible on some dimensions (delisting in the cases of company fraud, for example), we find two problems with this argument more generally. First, it is just not clear how important the listing venue is for individual traders: would more people really be willing to invest in Intel if it were listed on the NYSE than on the Nasdaq? Second, and perhaps more to the point, if investor protection is really the rationale for delisting, why do exchanges allow firms that fail the listing requirements to remain trading for months and months? Our data in Table 5 show little consistency in delisting application, and the Nasdaq has a similar track record when it comes to delisting stocks whose price falls below the mandated $1.00 level. Perhaps part of Nasdaq's reluctance to delist such low-priced firms is due to their prevalence; after the bursting of the "dot.com bubble" in the Summer of 1998, as many as 10 percent of all Nasdaq stocks were failing this requirement.[50]

[50] Aaron Lucchetti, "Tough Rules, Bear Market Throw Stocks Off Nasdaq," The Wall Street Journal, October 12, 2003, at C1.

Finally, is delisting needed to support the exchange's regulatory responsibilities? Certainly, in cases such as fraud the exchange should expeditiously remove errant firms. But the data provide little evidence that this ever actually happens, with delisting instead occurring only after months of firms being in violation of exchange rules and practices. Furthermore, the scandals involving firms such as Enron and Global Crossing suggest that the stock exchange plays no role in bringing errant firms to the market's attention. This may be because, as noted earlier, delisting for corporate governance short-comings rarely, if ever, happens.

A more recent example of exchange indifference to enforcing delisting rules is demonstrated by Fannie Mae and Freddie Mac.[51] Freddie Mac has not filed financial statements in almost two years, and Fannie Mae is now approaching a similar period without financial statements. Can a company be listed on the New York Stock Exchange if it doesn't have current financial statements? Apparently, for some firms, the answer is yes. Delisting as either a corporate sanction or a deterrent, therefore, appears to be at best inefficient, and at worst ineffective.

If, as we have argued, the NYSE delisting process is inefficient, why then does it persist? One explanation is simply institutional inertia. The current delisting rules reflect traditions from eras past, when information on firms was less available, and rules-of-thumb were appropriate tools for decision-making. The provision that a firm delist when its share price falls below $1, for example, now seems particularly pointless because it is predicated on share price rather than market capitalization. Unfortunately, the $1.00 rule is not harmless, as it also triggers a number of other market and regulatory responses that tend to depress stock prices.[52]

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[51] We thank Peter Wallison for suggesting this example to us.

[52] The regulatory odds are stacked heavily against firms as their share price drops below the $5 and the $1 per share thresholds. The Securities and Exchange Commission has especially strict "suitability" rules designed to discourage inexperienced investors from buying so-called "penny stocks" whose price is below $1 per share. The Securities

A second, and related, explanation is due to transitional difficulties. Stock exchanges worldwide are facing a new competitive reality: whereas once sheltered, quasi-monopolies, exchanges now face competition from a host of competitors. This is causing changes in exchange business models and corporate governance alike, as exchanges are evolving to meet these new economic realities. While a number of exchanges have begun intensively competing on listing fees, delisting practices are a low priority, probably because delisting typically affects firms whose market capitalizations are small, and becoming smaller.

What then is the "right" way to handle delisting? We offer three alternatives for consideration. First, we advocate a compromise between the "death penalty" of delisting from the NYSE and the alternative of simply continuing with a listing. Where a specialist wishes to continue to trade and to provide market-making services in a stock that fails to meet the NYSE's continued listing criteria, the firm's shares could be given a new ticker-symbol designation, perhaps an X appended to the old designation, in order to signal to potential investors and other market participants that the firm no longer qualifies for listing. Bushee and Leuz [2003] report that such an appended symbol was used on the OTCBB to indicate firms that had not yet come into compliance with new SEC mandated disclosure rules.

This compromise implicitly recognizes the "bargain" made by listing firms and the exchange when the listing decision was made in better times. Now that the firm is facing adverse times, the shareholders need for a trading venue is perhaps even more important;

Enforcement and Penny Stock Reform Act of 1990 provides additional powers to the Securities and Exchange Commission to police penny stocks, makes it easier for litigants to prove that such stocks have been manipulated, and imposes added requirements on brokers and market-makers in penny stocks (for more discussion of this Act see Beatty and Kadiyala [2003]). Brokerage firms typically don't follow penny stocks. For example, at Merrill Lynch, the largest retail brokerage, brokers are prohibited from recommending shares that aren't rated by the firm's research analysts. With regard to non-regulatory responses, analysts generally don't rate penny stocks. Even Internet message boards discourage discussions related to penny stocks. For example, the Motley Fool does not allow discussion of stocks unless they have traded over $5 per share for the past 30 consecutive days. Of course, these market reactions are linked to the regulatory responses: when companies' shares are delisted, it becomes more difficult to obtain information about them, so trading becomes more costly for market participants.

continued trading on the exchange, even as an "unlisted" security, provides this benefit. We suggest that this compromise position would actually improve the quality of the signal provided by delisting. Firms that commit fraud, or otherwise present dangers to current or future investors could, and should, still be formally delisted. But viable firms simply undergoing temporary business set-backs should not be expelled from exchange or market trading merely because they fail to meet some arbitrary rule such as the $1 minimum bid requirement.

Second, there needs to be a more formal market for firms who do not, or can not, remain on their original trading venues. The current free-fall for firms to a trading venue featuring no listing standards, no corporate governance requirements, and no market regulation is hardly satisfactory. Here, the Nasdaq market seemed to be evolving towards a solution, with delisting from the Nasdaq National Market resulting in relegation to the Nasdaq Over-the-Counter Bulletin Board (OTCBB), which, at one point, was scheduled to be replaced by an even more attractive alternative, the Nasdaq Bulletin Board Exchange (BBX). However, the competitive difficulties of the now publicly-traded Nasdaq market have caused a retrenchment in Nasdaq's plans, and the BBX has been scrapped, at least for the time being.

Other alternatives that might fill this gap are the new ArcaBB, an alternative trading system owned by Archipelago (now AracEx), and the Alternative Display Facility (ADF) run by the NASD. But ArcaBB, formerly known as GlobeNet, has not flourished thus far, and the ADF is still mired in the political controversy surrounding SuperMontage and its competition with the ECNs. It seems unlikely that these alternatives will evolve into a market for delisting securities any time soon. This inertia suggests that the current market structure may characterize unlisted stock trading for some time to come.

A final issue we raise for consideration is who should make the delisting decision. While listing and delisting have traditionally been the purview of individual exchanges, there is now a reconsideration of this issue world-wide, prompted in part by the conversions of exchanges from being cooperative enterprises to corporate entities.[53] In both the United Kingdom and Germany, the ability to list and delist securities has been moved from the exchange to the regulator. This shift reflects concerns that the incentives of profit-seeking exchanges may not be congruent with the overall interests of the capital markets.[54] Our arguments developed here would support the argument that exchanges may not be adequately weighing the costs and benefits of delisting.

Delisting is a traumatic event for both firms and shareholders alike. As we have shown in this paper, the rationale for delisting is questionable, but the deleterious effects are not. The SEC is currently considering a number of trading practices in the U.S. markets that have been typically left to the discretion of markets, including the dual-listing of stocks, the self—regulation of markets, and the corporate governance of exchanges. We suggest that the delisting of stocks is another area where greater policy analysis is needed.

[53] For an analysis of exchange conversions see Mendiola and O'Hara [2003].
[54] Baglole [2004] argues that exchanges may in fact have too little incentive to delist given the dependence of exchange revenue streams on listing fees. The recent decision by Hong Kong's Financial Secretary to leave delisting power with the Hong Kong Exchange was justified by noting "We are under no pressure to please any party".

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Table 1
Delistings from U.S. Stock Exchanges and Markets 1995- 2002

This table gives the number of firms delisting in each year from the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the Nasdaq market. These numbers include both voluntary and involuntary delistings. The data are taken from the NYSE Fact Book; NYSE delisting announcements on web site; the Nasdaq web site; and from data provided by the AMEX Research Department.

YEAR	NYSE	Nasdaq	AMEX	Annual
2002	145	569	33	747
2001	213	665	125	1003
2000	286	475	73	834
1999	254	873	104	1231
1998	209	769	101	1079
1997	183	688	112	983
1996	105	557	87	749
1995	102	547	77	726
Total period	1497	5143	712	7352

Table 2
Voluntary and Regulatory Delistings 1998-2002

This table gives the total number of firms delisted from the New York Stock Exchange and the Nasdaq market for the years 1998-2002. Voluntary delistings are those instigated by the firm and arise for reasons such as mergers or a firm's decision to move to another exchange or to go private. Regulatory delistings are instigated by the exchange or market when a firm is in violation of the listing requirements. Data are taken from the NYSE web site and the Nasdaq web site.

	1998	**1999**	**2000**	**2001**	**2002**
New York Stock Exchange					
Total Delistings	209	254	286	213	145
Voluntary	180	204	225	148	82
Regulatory	29	50	61	65	63
Nasdaq Market					
Total Delistings	769	873	475	665	569
Voluntary	280	433	235	275	289
Regulatory	489	440	240	390	280

Table 3
Causes of Delisting 1999-2002

Panel A. Regulatory Delistings from the New York Stock Exchange

This table gives data on reasons cited for firms delisting from the NYSE. Regulatory delistings often are for violations of several standards, so the total number of causes exceeds the total number of firms delisted in a given year. Data are from the NYSE delisting announcements.

	Total	1999	2000	2001	2002
NYSE Regualtory Delistings	239	50	61	65	63
Reasons Stated for Delisting:					
Price below minimum	123	6	28	46	43
Market cap below minimum	163	25	44	50	44
Bankruptcy	73	13	19	19	22
Delinquent in SEC filings	8	3	1	3	1
Net Tangible Assets / Net Income below minimum	21	21	0	0	0
Other	11	3	2	2	4

The Other category for NYSE delistings includes reasons such as: accounting irregularities, going concern emphasis by auditors, and company under investigation by SEC for misstatements.

Panel B. Regulatory Delistings from the Nasdaq Market

This table gives data on reasons cited for firms delisting from the Nasdaq market. Regulatory delistings often are for violations of several standards, so the total number of causes exceeds the total number of firms delisted in a given year. Data are from the Nasdaq delisting announcements.

	Total	1999	2000	2001	2002
Nasdaq Regulatory Delistings	1350	440	240	390	280
Reasons Stated for Delisting:					
Price below minimum	681	257	97	218	109
Market cap below minimum	15	0	4	3	8
Bankruptcy / Liquidation	194	31	36	79	48
Delinquent in SEC filings	156	40	31	53	32
Net Tangible Assets / Net Income below minimum	556	190	95	138	133
Market Float / Insufficient shares held by public	178	93	31	54	0
Public Interest	145	28	29	71	17
Insufficient number of market makers	78	40	15	23	0
Other	128	57	26	34	11

The Other category for Nasdaq delistings includes: failure to provide requested information, failure to comply with qualifications and violations of reverse merger requirements.

Table 4
Sample stocks delisted from NYSE in 2002: Total Assets and Delisting Causes

		NYSE stated reasons for Delisting:			
Company	**Total Assets fiscal year 2000 ($ millions)**	**Share Price below minimum**	**Market cap below minimum**	**Bankruptcy**	**Other**
Enron Corp	65,503	•		•	
Conseco	58,589	•		•	
Global Crossing	30,185	•		•	
NTL	28,384	•	•		
The FINOVA Group	12,089	•	•	•	
Federal-Mogul Corporation	10,255	•		•	
US Airways Group	9,127			•	
Comdisco	8,754	•		•	
Williams Communications Group	7,409	•		•	
Owens Corning	6,912	•	•	•	
Bethlehem Steel Corporation	5,467	•		•	
Mutual Risk Management	4,860	•			•
Budget Group	4,520	•	•		
Armstrong Holdings	3,875			•	
Asia Global Crossing	3,633	•		•	
Kaiser Aluminum Corporation	3,343	•	•	•	
Covanta Energy Corporation	3,295	•		•	
Encompass Services Corporation	2,700	•	•		
National Steel Corporation	2,565		•	•	
Exide Technologies	2,299	•	•		
The Alpine Group	2,094		•		
Superior TeleCom	1,992	•	•		
Magellan Health Services	1,804	•	•		
Viasystems Group	1,611	•	•		
Polymer Group	1,508	•	•	•	
EOTT Energy Partners	1,493	•		•	
GenTek	1,351		•		
National Equipment Services	1,249	•	•		
APW	1,214	•	•		
Oakwood Homes Corporation	1,149	•	•	•	
Key3Media Group	1,065	•			
Acceptance Insurance Companies	964	•	•		
American Skiing Company	927	•	•		
Galey & Lord	896	•	•		
Cornerstone Propane Partners	851	•	•	•	
Personnel Group of America	744	•	•		
Guilford Mills	724	•	•		
NewPower Holdings	712	•			•
GAINSCO Inc	475	•	•		
China Enterprises	402	•	•		
Atchison Casting Corporation	342	•	•		
LASER Mortgage Management	328				•
BNS Co.	251		•		
Insteel Industries	245	•	•		
Asia Pacific Wire & Cable Corp	187	•	•		
A.C.L.N.	140				•
PlanVista Corporation	116		•		
Chart House Enterprises	108	•	•		
J Net Enterprises	105		•		
Grubb & Ellis Company	103		•		
Coastcast Corporation	99		•		
Clarion Commercial Holdings	82		•		
Airlease Ltd	62		•		
Philips International Realty Corp	38		•		•

The table displays the name, total assets and reasons given by the NYSE for delisting each of the 54 firms in the sample of stocks that were delisted from NYSE in 2002 and subsequently traded on Pink Sheets. The Other category includes failed merger arrangement (NewPower Holdings), planned liquidations (LASER Mortgage Management and Philips International Realty) and NYSE concerns about the adequacy of information disclosed by the company (both A.C.L.N. Ltd and Mutual Risk Management). The sample of 54 stocks is subdivided into three samples based on total assets at fiscal year end 2000. The largest subsample comprises 11 stocks, each with total assets in excess of $5 billion. The middle group contains 20 stocks with total assets between $1 billion and $5 billion. The remaining 23 stocks make up the third subsample with total assets less than $1 billion. Total Assets is Data item 6 on COMPUSTAT.

Table 5
Sample Firms Delisted for Minimum Share Price Reasons

The Table shows the number of trading days prior to the last day of trade on NYSE that the stock is in violation of the share price rules. Thirty-nine stocks in the sample of 54 delisted stocks are cited by the NYSE for having violated the minimum price rule. A stock violates the NYSE 30 day average price rule if its average daily closing share price calculated over the preceding 30 days is below $1. The left column shows the number of continuous trading days prior to the stock's last day of trade on NYSE that the stock is in violation of the 30 day average price rule. An entry of zero days indicates that the stock's 30 day average share price calculated on the date of last trade on NYSE was not less than $1. The right column shows the number of continuous trading days prior to the stock's last day of trade on NYSE that the stock had a price less than $1.

Companies cited for share price violations	Continuous trading days in violation of 30 day rule prior to last day NYSE	Continuous trading days with price less than $1 prior to last day NYSE
Enron Corp	3	25
Conseco	0	12
Global Crossing	14	32
NTL	49	59
The FINOVA Group	47	57
Federal-Mogul Corporation	31	45
Comdisco	140	63
Williams Communications Group	0	17
Owens Corning	23	11
Bethlehem Steel Corporation	154	163
Mutual Risk Management	1	17
Budget Group	81	92
Asia Global Crossing	21	34
Kaiser Aluminum Corporation	29	42
Covanta Energy Corporation	7	8
Encompass Services Corporation	73	88
Exide Technologies	7	24
Superior TeleCom	96	63
Magellan Health Services	19	40
Viasystems Group	91	104
Polymer Group	102	124
EOTT Energy Partners	0	2
National Equipment Services	29	40
APW	35	52
Oakwood Homes Corporation	9	29
Key3Media Group	25	41
Acceptance Insurance Companies	0	10
American Skiing Company	93	82
Galey & Lord	74	77
Cornerstone Propane Partners	6	17
Personnel Group of America	90	107
Guilford Mills	86	103
NewPower Holdings	62	78
GAINSCO Inc	29	45
China Enterprises	29	35
Atchison Casting Corporation	17	33
Insteel Industries	83	84
Asia Pacific Wire & Cable Corp	200	215
Chart House Enterprises	67	89

Table 6
Trading on the Pink Sheets

Panel A: Sample of 54 stocks

	Mean	Median	Minimum	Maximum
Volume (number of shares) on Day 1	2,251,813	77,500	100	53,341,600
Value of trade ($) on Day 1	517,809	10,064	65	16,269,188
Mean daily Value of trade, Days [1,5]	554,396	40,419	433	13,061,038
Mean daily Value of trade, Days [1,20]	317,591	39,340	244	7,235,380
Mean daily Value of trade, Days [1,60]	168,532	23,885	407	3,407,113
Percentage Spread (%) on Day1	40.04	24.26	0.84	177.36
Mean percentage spread, Days [1,5]	26.08	14.59	1.27	152.08
Mean percentage spread, Days [1,20]	18.61	12.67	1.13	123.25
Mean percentage spread, Days [1,60]	15.58	11.39	1.68	104.12
Panel B: Subsample of largest 11 stocks				
Volume (number of shares) on Day 1	9,362,827	1,330,900	325,500	53,341,600
Value of trade ($) on Day 1	2,331,649	717,035	119,214	16,269,188
Mean daily Value of trade, Days [1,5]	2,407,767	803,951	171,258	13,061,038
Mean daily Value of trade, Days [1,20]	1,346,474	906,552	127,274	7,235,380
Mean daily Value of trade, Days [1,60]	681,569	410,549	98,784	3,407,113
Percentage Spread (%) on Day1	4.35	3.39	0.84	14.29
Mean percentage spread, Days [1,5]	3.56	2.72	1.27	6.96
Mean percentage spread, Days [1,20]	3.58	2.69	1.13	7.25
Mean percentage spread, Days [1,60]	4.10	3.27	1.68	6.96
Panel C: Subsample of middle 20 stocks				
Volume (number of shares) on Day 1	868,445	220,850	100	6,131,800
Value of trade ($) on Day 1	77,583	17,843	65	655,512
Mean daily Value of trade, Days [1,5]	105,660	45,878	433	432,113
Mean daily Value of trade, Days [1,20]	79,901	53,368	1,108	277,105
Mean daily Value of trade, Days [1,60]	58,142	29,303	1,520	230,510
Percentage Spread (%) on Day1	46.75	41.21	3.77	133.33
Mean percentage spread, Days [1,5]	24.55	16.25	4.21	70.77
Mean percentage spread, Days [1,20]	16.59	13.42	3.75	50.14
Mean percentage spread, Days [1,60]	13.85	13.60	3.94	32.14
Panel D: Subsample of smallest 23 stocks				
Volume (number of shares) on Day 1	53,822	10,000	200	386,000
Value of trade ($) on Day 1	33,126	3,000	225	617,600
Mean daily Value of trade, Days [1,5]	58,205	11,759	434	714,901
Mean daily Value of trade, Days [1,20]	32,205	10,322	244	376,260
Mean daily Value of trade, Days [1,60]	19,158	7,772	407	159,900
Percentage Spread (%) on Day1	51.28	28.57	8.33	177.36
Mean percentage spread, Days [1,5]	38.18	24.76	8.25	152.08
Mean percentage spread, Days [1,20]	27.56	15.67	5.63	123.25
Mean percentage spread, Days [1,60]	22.57	15.80	3.57	104.12

The table displays summary trading data from Pink Sheets on a sample 54 stocks (Panel A) that were delisted from NYSE in 2002 and subsequently traded on Pink Sheets. The sample of 54 stocks is divided into three subsamples based on total assets at fiscal year end 2000. Panel B displays data on the largest 11 stocks being those firms with total assets in excess of $5 billion. Panel C displays the subsample of 20 stocks with total assets between $1 billion and $5 billion. Panel D shows the remaining 23 stocks which have total assets less than $1 billion. Day 1 refers to the first day of trade on Pink Sheets. Day [1,t] denotes the first t days of trade on Pink Sheets. Value of trade is defined as volume × closing share price. Percentage spreads are calculated as (closing ask price –closing bid price) / (midpoint of closing ask and bid prices)×100. Mean daily Value of trade, Days [1,t], for instance, is the mean over time of the daily Value of trade from Day 1 through to Day t.

Table 7: Before and After Delisting Trading: NYSE and Pink Sheets

Panel A	Average closing share price on last trading day – NYSE	Average closing share price on first trading day - Pink Sheets
Sample of 54 stocks	0.95	0.48
Sample of largest 11 stocks	0.63	0.28
Sample of 19 bankrupt stocks	0.69	0.27
Sample of 35 non-bankrupt stocks	1.09	0.59

Panel B	NYSE days [-60,-1]	Pink Sheets days [1,60]	t-statistic	p-value
Sample of 54 stocks				
Mean dollar spread ($)	0.0550	0.0719	-5.277	0.0001
Mean percentage spread (%)	5.91	15.58	-17.474	0.0001
Mean daily volume (number of shares)	1,978,760	924,608	5.369	0.0001
Mean volatility (closing prices)	0.1030	0.1954	-4.745	0.0001
Mean volatility (bid prices)	0.1063	0.1540	-2.892	0.0051
Sample of largest 11 stocks				
Mean dollar spread ($)	0.0252	0.0079	25.677	0.0001
Mean percentage spread (%)	3.06	4.10	-6.279	0.0001
Mean daily volume (number of shares)	8,769,861	3,734,231	5.381	0.0001
Sample of 19 bankrupt stocks				
Mean dollar spread ($)	0.0348	0.0176	11.713	0.0001
Mean percentage spread (%)	3.58	8.90	-15.684	0.0001
Mean daily volume (number of shares)	5,201,007	2,117,257	5.677	0.0001
Sample of 35 non-bankrupt stocks				
Mean dollar spread ($)	0.0660	0.1013	-7.937	0.0001
Mean percentage spread (%)	7.18	19.21	-16.65	0.0001
Mean daily volume (number of shares)	229,540	277,170	-1.701	0.0930

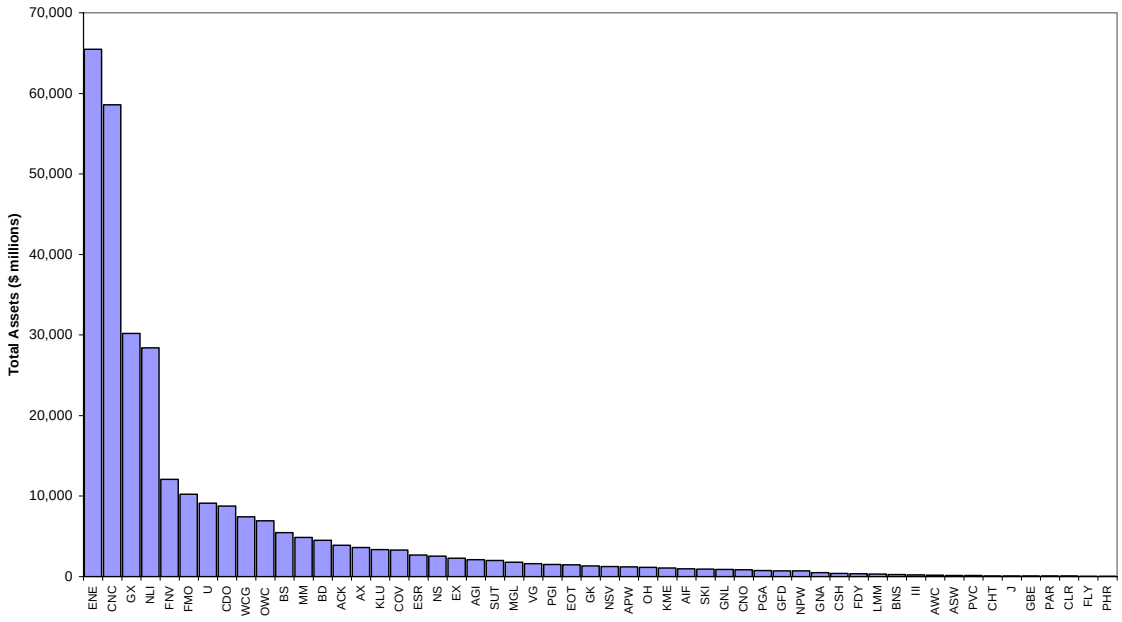
Panel C	NYSE days [-5,-1]	Pink Sheets days [1,5]	Kruskal-Wallis test statistic	p-value
Sample of 54 stocks				
Mean dollar spread ($)	0.0497407	0.106587	6.8182	0.009
Mean percentage spread (%)	7.460617	26.07857	6.8182	0.009
Mean daily volume (number of shares)	1,580,309	2,723,695	5.7709	0.0163
Mean volatility (closing prices)	0.121674	0.38771	6.8182	0.009
Mean volatility (bid prices)	0.122322	0.352535	6.8182	0.009
Sample of largest 11 stocks				
Mean dollar spread ($)	0.027273	0.0107	6.8182	0.009
Mean percentage spread (%)	5.205699	3.557604	6.8182	0.009
Mean daily volume (number of shares)	6,804,422	11,295,525	4.8109	0.0283

The table displays information about a sample of 54 stocks that were delisted from the NYSE in 2002 and subsequently traded on Pink Sheets. Also shown are sub-sample data for: the largest 11 of those stocks, 19 bankrupt stocks and the 35 non-bankrupt stocks. Panel A shows the average share price on the NYSE for the 54 stock sample and the largest 11 stock sub-sample on the day before the NYSE delisting announcement date and on the first day of

trade on Pink Sheets. The average share price is calculated as an equally weighted average of the share prices of the stocks comprising the sample. Panel B provides information on mean spreads, volume and volatility over a period of 60 days prior to the NYSE delisting announcement date and 60 days post listing on Pink Sheets. Dollar spreads are defined as (closing ask price – closing bid price). Percentage spreads are calculated as (closing ask price –closing bid price) / (midpoint of closing ask and bid prices)×100. Volatility for a given day is calculated as the standard deviation of daily returns of the 54 stocks in the sample. Panel C provides information on the same variables in Panel B except averages are taken over a period of 5 days before the NYSE delisting announcement date and 5 days after listing on Pink Sheets. Difference of means tests in Panel B are two-sided tests and assume unequal variances. Panel C displays Kruskal-Wallis test statistics and their associated p-values based on a Chi square distribution with one degree of freedom.

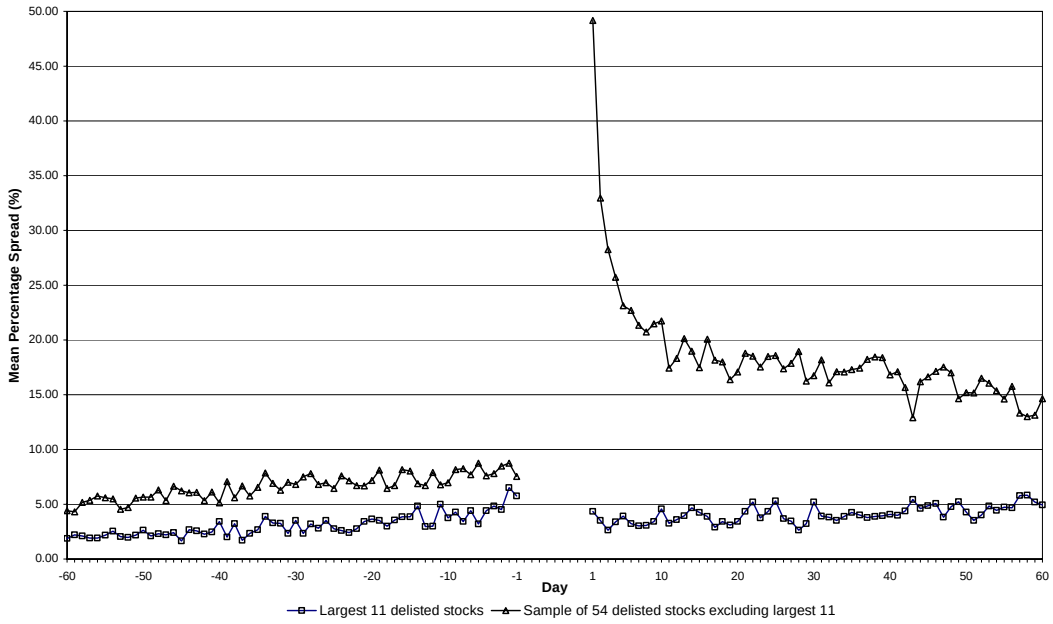
Figure 1

Total assets at fiscal year ended 2000 of sample of 54 stocks delisted from NYSE in 2002



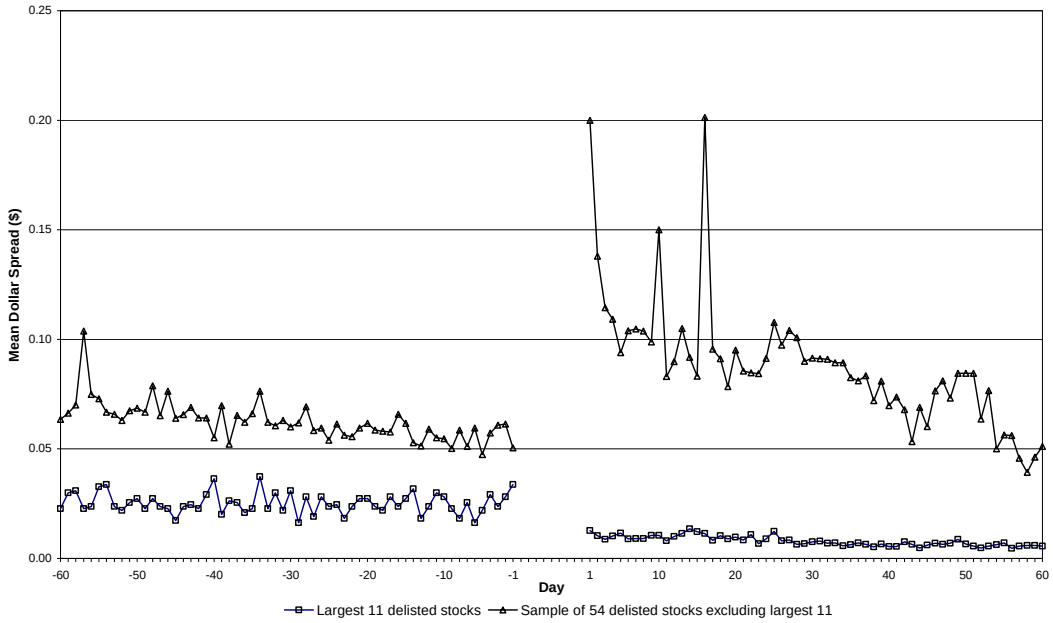
The graph plots the total assets in millions of dollars for fiscal year ended 2000 of the sample of 54 stocks delisted from NYSE in 2002. Total assets is Data item 6 in COMPUSTAT. Stocks are identified by their NYSE ticker symbols along the horizontal axis. Refer also to Table 4 for details on the Total Assets of delisted stocks.

Figure 2: Percentage Spreads on NYSE and Pink Sheets



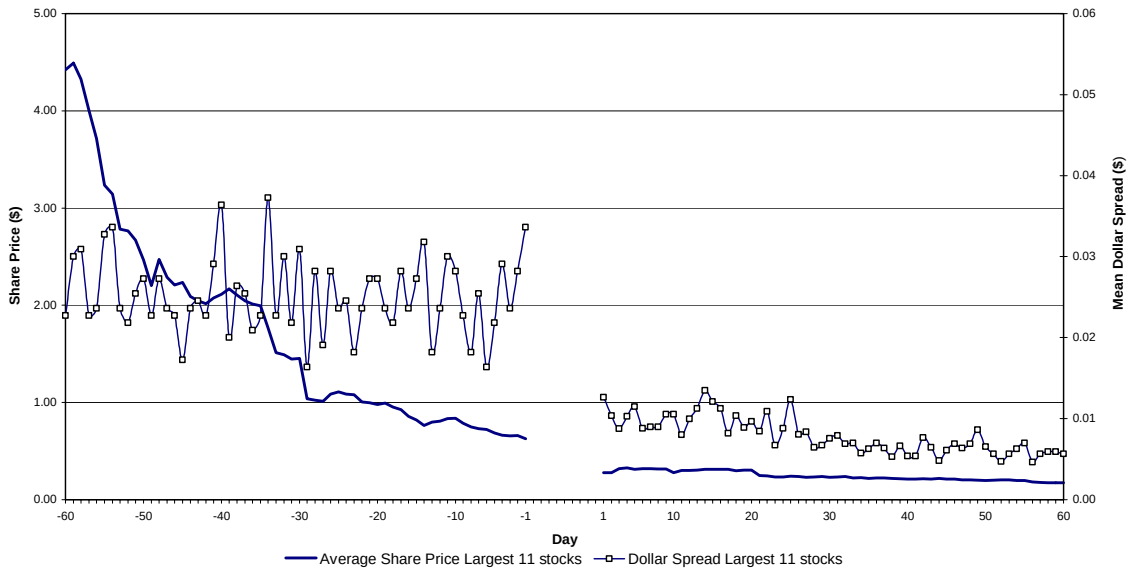
The graph plots the mean percentage spread over time of two samples of stocks that were delisted from NYSE and subsequently traded on Pink Sheets. One sample comprises the largest 11 by total assets of the 54 stocks delisted from NYSE in 2002 that went to Pink Sheets, the other comprises 43 stocks being the sample of 54 stocks exlcuding the 11 largest stocks. Days [-60,-1] denote the last 60 full days of NYSE trading prior to the NYSE delisting announcement date. Days [1,60] refer to the first 60 days of trading on Pink Sheets. Percentage spread is calculated as (closing ask price –closing bid price) / (midpoint of closing ask and bid prices)×100.

Figure 3: Dollar Spreads on NYSE and Pink Sheets



The figure plots the mean dollar spread over time of two samples of stocks that were delisted from NYSE and subsequently traded on Pink Sheets. One sample comprises the largest 11 by total assets of the 54 stocks delisted from NYSE in 2002 that went to Pink Sheets, the other comprises 43 stocks being the sample of 54 stocks exlcuding the 11 largest stocks. Days [-60,-1] denote the last 60 full days of NYSE trading prior to the NYSE delisting announcement date. Days [1,60] refer to the first 60 days of trading on Pink Sheets. Dollar spread is defined as (closing ask price – closing bid price).

Figure 4: Average share price and Dollar spread of the largest 11 delisted stocks



The figure plots the mean dollar spread and average closing share price over time of the largest 11 stocks delisted from the NYSE in 2002 that subsequently traded on Pink Sheets. Days [-60,-1] denote the last 60 full days of NYSE trading prior to the NYSE delisting announcement date. Days [1,60] refer to the first 60 days of trading on Pink Sheets. The average share price is calculated as an equally weighted average of the closing share prices of the 11 stocks in the sample. Dollar spread is defined as (closing ask price – closing bid price).

Figure 5: Volume of trade on NYSE and Pink Sheets

The graph shows the mean volume in millions of shares traded per day over time of a sample of 54 stocks delisted from NYSE in 2002 that subsequently traded on Pink Sheets. Days [-90,-1] denote the last 90 full days of NYSE trading prior to the NYSE delisting announcement date. Days [1,60] refer to the first 60 days of trading on Pink Sheets.

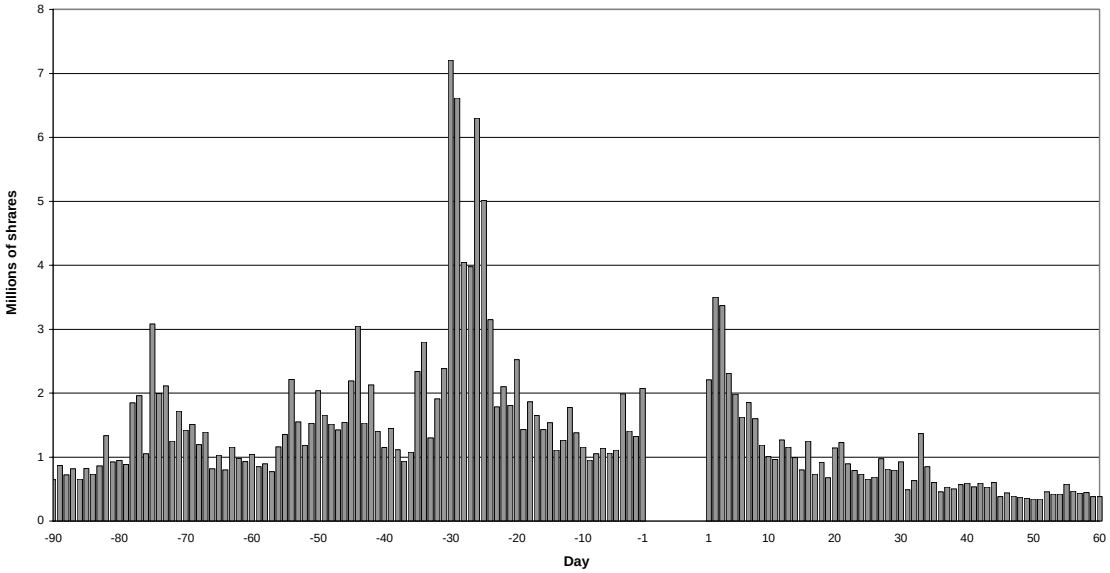
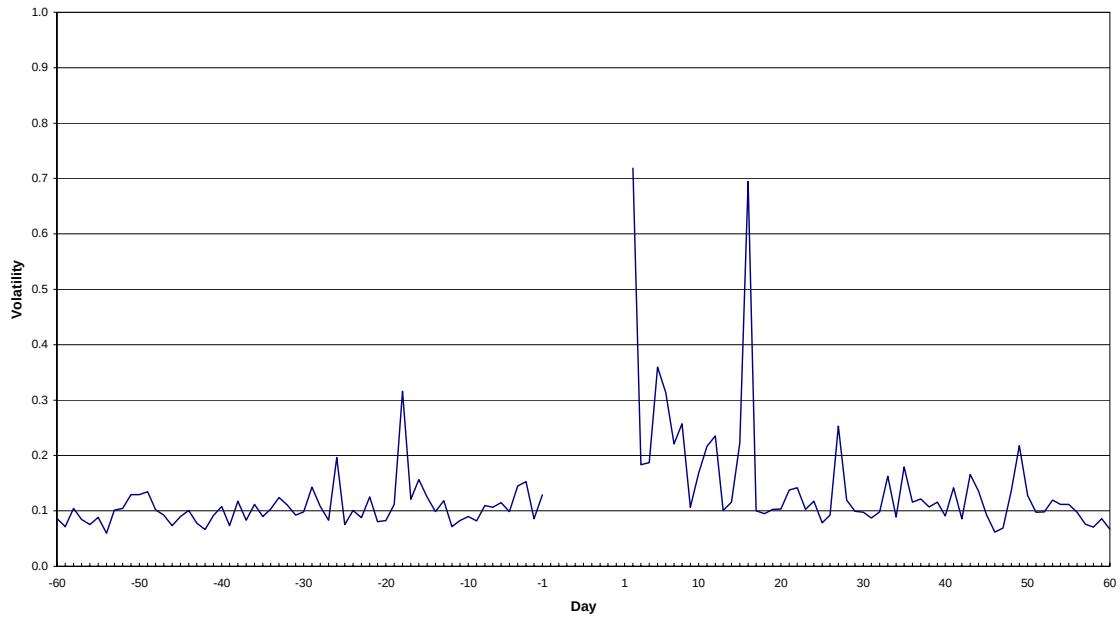


Figure 6
Volatility on NYSE and Pink Sheets



The graph plots volatility over time of a portfolio of 54 stocks that were delisted from NYSE in 2002 and subsequently traded on Pink Sheets. Volatility for a given day is calculated as the standard deviation of daily returns of the 54 stocks comprising the portfolio. Returns are calculated using closing bid quotes. Days [-60,-1] denote the last 60 full days of NYSE trading prior to the NYSE delisting announcement date. Days [1,60] denote the first 60 days of trading on Pink Sheets. The first volatility estimate for Pink Sheets trading is on day 2.