

Down and Out in the Stock Market: The Law and Economics of the Delisting Process

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Abstract

Since 1995, more than 9,000 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 New York Stock Exchange 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 and volatility doubling but with volume being remarkably high. We also show that actual delisting times vary considerably, with some firms trading for months after failing the listing requirements. With exchanges transitioning to profit-seeking status, we argue that the current delisting process also needs to change, and we suggest properties of an optimal delisting rule and approaches to achieve it.

1. Introduction

Since 1995, more than 9,000 firms have delisted from U.S. stock exchanges and markets. Some firms left voluntarily for reasons such as mergers, but almost half of all delistings were involuntary, forced on companies by the very exchanges

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and markets that had courted their listings. The practice of delisting stocks that fail to meet the exchanges' self-imposed continuing listing 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. Delisting also imposes costs on trading venues by depriving them of revenues from listing fees and commissions on transactions. Given the far-reaching impact of delisting and the fact that the delisting decision is generally left to the discretion of the listing venue, an analysis of this economic process seems overdue.

The purpose of this paper is to examine the law and economics of the delisting process. As exchanges and markets become profit-seeking corporate entities, the issues of which firms should be allowed access to which markets and who should decide when that access is curtailed take on particular relevance. The Securities and Exchange Commission (SEC) has recently weighed in with some technical changes in delisting procedures, but we argue in this paper that a broader review is in order.¹ In particular, we suggest that the current delisting process is inherently flawed, with the few benefits from delisting generally accruing to the (now profit-seeking) exchanges and the large costs being borne by firms and their investors.

To develop our analysis, we outline the economic rationales offered for delisting and the various clienteles affected by the delisting decision. We then set out the legal rules and procedures governing delisting on the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotation system (NASDAQ). Despite the seeming clarity of these rules, we show that the actual process exhibits considerable variability, with some firms trading for extensive periods (months to years) after failing particular requirements.

Using a sample of firms delisted from the NYSE in 2002, we then examine the effects of delisting on the trading of these shares. The particular sample we analyze includes well-known entities such as Enron, Global Crossing, Kmart, and US Airways. What happens to the trading in such firms after delisting is intriguing because, for a variety of reasons, most delisted NYSE firms end up trading on the Pink Sheets, a trading venue that is little analyzed in the literature. We obtained proprietary data from Pink Sheets, Inc., to examine the subsequent trading of these stocks, which allowed us to analyze the specific effects of delisting on firms and investors.²

¹ In August 2005, the Securities and Exchange Commission (SEC) adopted amendments to its delisting rules intended "to reduce regulatory burdens on exchanges and issuers, and to make the delisting and deregistration process more transparent and efficient in the interests of investors and public" (Removal from Listing and Registration of Securities, Release No. 34-52029, 70 Fed. Reg. 42,456 [2005]). The amendments allow for electronic filing of required SEC notices and automatic enactment of delisting applications after a specified period.

² A limitation of our analysis is that these proprietary data were available only for 2002. While recognizing the limitations this places on drawing general conclusions, we believe our results provide ample evidence of the deleterious effects that accompany delisting from the New York Stock Exchange (NYSE).

Our research provides a number of contributions, a few of which we emphasize here. First, our analysis quantifies the very real effects that accompany delisting. We find that share prices fall by half, percentage spreads on average triple, and volatility almost doubles when delisting occurs. 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. Our results add to the interesting literature (see Sanger and Peterson 1990; Shumway 1997; Shumway and Warther 1999) looking at the economic effects of delisting on portfolio return measurement and investment decisions. Our particular focus on NYSE stocks complements a recent paper by Angel, Harris, Panchapegesan, and Werner (2004), who find similar effects on liquidity and market quality surrounding the delisting of NASDAQ stocks.

Second, our analysis provides interesting insights into the trading of nonlisted securities.³ We find that, for at least some firms, different trading venues 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, with dollar spreads actually declining for large firms moving to the Pink Sheets. Part of the explanation for this divergence is tick size. The NYSE minimum tick is 1 cent, while the Pink Sheets permits subpenny pricing. For actively traded stocks with very low stock prices (an almost universal characteristic of large delisting firms), this pricing grid difference can result in trading costs actually being lower by some metrics on the electronic Pink Sheets venue than on the floor-based NYSE.

Third, our analysis highlights a number of important policy issues relating to the delisting and trading of faltering firms. We argue here that the current rules are antiquated, forcing exchanges to remove firms for violating strictures of dubious modern-day value. Moreover, the flexibility accorded exchanges in effectuating delistings is problematic, with some firms trading for months (or even years) after violating the listing requirements and others being removed almost immediately. As exchanges move to for-profit status, the incentives surrounding the exchange's decision to delist become ever more complex. We argue that the current delisting process does not reflect the economic realities of these new incentives. We propose an optimal delisting policy that takes into account the various clienteles affected by delisting, and we discuss alternative approaches to implement this policy.

This paper is organized as follows. Section 2 sets out the economic rationale and causes for delisting and the legal framework surrounding delisting on both the NYSE and the NASDAQ. Section 3 then investigates the costs of delisting

³ The over-the-counter (OTC) market is composed primarily of the Over-the-Counter Bulletin Board (OTCBB) and the Pink Sheets. Because the OTCBB is owned and operated by the National Association of Securities Dealers, it is subject to greater regulation and disclosure requirements than are 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 Angel et al. (2004).

for a sample of 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 4 discusses the implications of our results for the exchanges' delisting decisions and the regulatory treatment of delisting.

2. The Law and Economics of Delisting

Delisting rules can be divided into two distinct categories. In the first category are 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 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 sensible that trading not entail losses for the listing venue.

A second category of delisting rules is designed to protect the trading venue's investment in reputational capital. Exchanges traditionally provide a vector of services to investors and issuers, including standardized governance rules, monitoring of trading, clearing and settlement, liquidity, and a signaling function. Delisting rules allow the exchange to preserve the value of the reputational signal associated with listing on that trading venue. Expelling errant firms also allows the exchange to enforce the norms expected of listed firms. To the extent that all firms whose shares are listed meet the exchange's listing standards, investors can rely on the integrity of the firms listed on the exchange.

Whether such signal-based rules are still sensible is debatable. Investors now have myriad sources of information regarding a firm's prospects, which suggests less reliance on the listing venue. A second complicating factor is that where a firm trades is 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, an issue we return to in Section 4. Similarly, the deterrent role of delisting is also questionable. Despite the recent spate of corporate scandals, few firms are actually delisted for aberrant behavior. The intense competition between exchanges for listings is likely to contribute to this reticence to delist.⁴

In the United States, virtually all firms list on one of three venues: the NYSE,

⁴ 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's and Dow Jones's 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 Stock Exchange.

the NASDAQ, and the American Stock Exchange (AMEX).⁵ The regional exchanges have the ability to list firms, but few do so actively. Just as listing criteria differ among these venues, so too do delisting criteria. 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.

2.1. *The New York Stock Exchange*

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 NYSE will consider delisting a firm if the number of total stockholders drops below 400, if the number of publicly held shares is less than 600,000, or if the average monthly trading volume for the previous 12 months is less than 100,000 shares (NYSE, *Listed Company Manual* [hereafter NYSE], sec. 802.01[A]).⁶ Second, the NYSE will consider delisting if a company fails to meet certain market capitalization requirements (NYSE, sec. 802.01[B]). These distribution and capitalization rules seem designed to insure that there is continued trading volume and interest sufficient to justify the costs to the NYSE of listing a stock.

Third, the NYSE will consider delisting if the average closing price of a security is less than \$1.00 over a consecutive 30-day trading period (NYSE, sec. 802.01[C]). If the minimum average closing price is the only criterion the company fails to meet, the NYSE will provide the company with up to 6 months to cure the deficiency (NYSE, sec. 802.01[C]).⁷ If after 6 months the average closing price remains below \$1.00, the NYSE will begin standard delisting procedures (NYSE, sec. 802.01[C]).

In addition, the NYSE will consider delisting if the company's operating assets have been substantially reduced in size or if the company files for bankruptcy or announces its intention to file, "under any of the sections of the bankruptcy law" (NYSE, sec. 802.01[D]). The NYSE will also consider delisting if (1) the NYSE receives authoritative advice that the security is without value, (2) the securities registration is no longer effective, (3) proxies are not solicited for all meetings of stockholders, (4) the company violates its listing agreement, (5) an

⁵ 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 American Stock Exchange to the NYSE (a recent exception here is Charles Schwab, which shifted from the NYSE to the NASDAQ in 2005). This single-listing practice has 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, Hewlett-Packard became the first firm to officially list on both markets. For a discussion of listing issues, see Macey and O'Hara (2002).

⁶ The total number of stockholders can fall to 400, unless the average monthly trading volume for the previous 12 months is less than 100,000 shares, in which case the total number of shareholders must be 1,200.

⁷ The cure period may be extended to the date of the company's next annual board meeting if that is more than 6 months away.

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 NYSE, are contrary to the public interest. Finally, the NYSE 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” (NYSE, sec. 802.01[D]).⁸

2.2. *National Association of Securities Dealers Automated Quotation System*

The NASDAQ’s delisting requirements have many of the same features as the NYSE requirements. Specifically, NASDAQ will consider delisting if any of the following minimum criteria are not met: (1) stockholder equity of \$10 million, (2) 750,000 shares publicly held, (3) market value of publicly held shares of at least \$5 million for 30 consecutive business days, (4) bid price not less than \$1.00 for 30 consecutive business days, (5) 400 shareholders of round lots, and (6) at least two market makers for 10 consecutive business days (*NASD Manual* [hereafter *NASD*], sec. 4450). In addition, NASDAQ may also delist if the company files or announces that the board has authorized liquidation under any section of the bankruptcy laws (*NASD*, secs. 4450[a][1]–[6], 4450[e][1]–[3]).

Like the NYSE, the NASDAQ’s delisting criteria provide for considerable 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” (*NASD*, sec. 4300).

2.3. *Corporate Governance Listing Standards*

Both the NYSE and NASDAQ may also delist companies not in compliance with their corporate governance listing standards. Delisting for noncompliance with these standards, however, is uncommon; the exchanges tend to encourage compliance through “negotiation with issuers” (Lang et al. 2002, p. 1491). Foreign companies can even obtain waivers for these requirements if similar requirements do not exist in the foreign state’s law (Lang et al. 2002, p. 1514). 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.

⁸ 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 their assets by Fidel Castro’s communist government.

2.4. *Trading after Delisting*

A firm delisted from the NASDAQ stock market is available for immediate quotation on the NASDAQ Over-the-Counter Bulletin Board (OTCBB), provided the firm is not in bankruptcy and is current in its financial reporting with the SEC. There is also a formal requirement that market makers must have issued price quotations in the security during the 30-day period preceding its removal. In principle, this means that, while many delisting NASDAQ stocks automatically begin trading on 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 30 days.

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 must submit a request to the SEC and contact prospective broker-dealer firms to request that these firms register to quote their securities on the OTCBB. The SEC typically expedites the approval process for NYSE firms.

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, Inc.⁹ The origins of the Pink Sheets date to 1904, when the National Quotation Bureau began as a paper-based, interdealer quotation service linking competing market makers in OTC securities. The Pink Sheets is essentially an electronic quotation system for market makers willing to trade in these shares, and it currently quotes some 4,744 issues. There are no listing standards, and the Pink Sheets does not regulate the market.¹⁰ This has led, in the past, to concerns about the market’s fairness and opacity.

2.5. *The Delisting Decision: Recent Evidence*

Table 1 provides data on the total number of delistings from the NYSE, the NASDAQ, and the AMEX for the period 1995–2005. The number of delistings varied over the time period, peaking at 1,231 firms in 1999. Delistings have decreased somewhat since, then but they are still substantial, with more than 500 firms delisting in 2005.

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, a voluntary liquidation, or a company’s decision to list only in its home market. Table 2 provides evidence on the mix between voluntary and involuntary delistings. As is apparent, voluntary delisting is much more prevalent on the NYSE than on the NASDAQ, but both venues have a substantial number of involuntary, or regulatory, delistings.

⁹ The name “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, including the market makers’ phone numbers, are displayed is pink.

¹⁰ Specifically, under securities law, Pink Sheets is categorized as a securities information processor, or SIP.

Table 1
Delistings from U.S. Stock Exchanges and Markets, 1995–2005

Year	NYSE	NASDAQ	AMEX	Annual
2005	135	332	87	554
2004	134	322	73	529
2003	140	460	84	684
2002	145	569	80	794
2001	213	665	94	972
2000	286	475	111	872
1999	254	873	104	1,231
1998	209	769	101	1,079
1997	183	688	112	983
1996	105	557	87	749
1995	102	547	77	726
Total	1,906	6,257	1,010	9,273

Sources. New York Stock Exchange (NYSE), Facts and Figures (<http://www.nyxdata.com/factbook>); National Association of Securities Dealers Automated Quotation (NASDAQ), DataStore (<https://data.nasdaq.com>); NASDAQ Web page (<http://www.nasdaq.com>); American Stock Exchange (AMEX), Market Data Services (<https://www.amexdata.com/index.aspx?pg=MDOverview>).

Note. Values are the number of firms delisting in each year from the NYSE, AMEX, and the NASDAQ market. These numbers include both voluntary and involuntary delistings.

We reviewed all involuntary-delisting announcements on the NYSE and the NASDAQ for the period 1999–2004. Table 3 provides data on the causes for regulatory delisting (the number of causes exceeds the total number of delisted firms because of multiple reasons for delisting). Not surprisingly, bankruptcy is an important cause for delisting on both markets, as is the failure to maintain the minimum assets or market capitalization criteria. More intriguing is the important role played by minimum share price requirement: failure to meet the \$1.00 share price is the most commonly cited cause of NASDAQ delisting, and it is the second most common reason on the NYSE.

One might have conjectured that a firm whose share price drops below \$1.00 could avoid delisting by 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 the NYSE, a strategy thus far successful.¹¹ Yet Popmail found its 1-for-10 reverse split in October 2000 ineffective in supporting its stock price, leading to its delisting in January 2001 (Simon 2001). A similar fate befell Oakwood Homes, whose 1-for-5 reverse split in June 2001 did not forestall its 2002 delisting by the NYSE.

¹¹ Another successful example is 7-Eleven, the Dallas convenience store chain, which completed a 1-for-5 reverse split in May 2000. The refinancing brought 7-Eleven'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" (Elstein 2001).

Table 2
Voluntary and Regulatory Delistings, 1998–2004

	1998	1999	2000	2001	2002	2003	2004
NYSE:							
Voluntary	180	204	225	148	82	77	116
Regulatory	29	50	61	65	63	63	18
Total delistings	209	254	286	213	145	140	134
NASDAQ:							
Voluntary	280	433	235	275	289	267	258
Regulatory	489	440	240	390	280	193	64
Total delistings	769	873	475	665	569	460	322

Sources. New York Stock Exchange (NYSE), Facts and Figures (<http://www.nyxdata.com/factbook>); National Association of Securities Dealers Automated Quotation (NASDAQ), DataStore (<https://data.nasdaq.com>); NASDAQ Web page (<http://www.nasdaq.com>).

Note. Values are the total number of firms delisted from the NYSE and the NASDAQ market. 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.

The ineffectiveness of the reverse-split strategy is not surprising. Reverse stock splits provide a very negative signal to the market.¹² Hwang (1995) finds a negative price drop of more than 9 percent in his analysis of reverse splits by NASDAQ-listed firms, and similar negative effects are reported for reverse splits on the NYSE and the AMEX (see Woolridge and Chambers 1983). Lie, Lie, and McConnell (2001, p. 182) report a similar problem arising with debt-reducing exchange offers (DREOs), 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, the strategy's rarity suggests that for many firms the costs of doing so are simply too high. For those firms, involuntary delisting becomes a reality. What happens to those firms that delist (and to their stockholders) is less clear. In Section 3, we provide evidence on these issues by examining the effects of delisting for a sample of firms involuntarily delisted from the NYSE.

3. From the New York Stock Exchange to the Pink Sheets: The Impact of Delisting

3.1. Sample Firms

Investigating the impact of delisting requires data on firms' trading before and after their removal from the listing exchange. Unfortunately, trading data

¹² 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” (Avid Trading Company, Avid Traders Prior Tuesday Evening Chat [<http://www.twilight.org/avid/2001/avidchat0619pm.html>]).

Table 3
Reasons Given for Regulatory Delisting, 1999–2004

	Total	1999	2000	2001	2002	2003	2004
From NYSE:							
Total	320	50	61	65	63	63	18
Price below minimum	139	6	28	46	43	11	5
Market cap below minimum	184	25	44	50	44	12	9
Bankruptcy, financial restructuring, or liquidation	86	13	19	19	22	8	5
Delinquent in SEC filings	12	3	1	3	1	1	3
Net tangible assets or net income below minimum	21	21	0	0	0	0	0
Other	15	3	2	2	4	2	2
From NASDAQ:							
Total	1,607	440	240	390	280	193	64
Bid price below minimum	771	257	97	218	109	83	7
Market capitalization below minimum	129	0	4	3	8	95	19
Bankruptcy or liquidation	229	31	36	79	48	19	16
Delinquent in filings	196	40	31	53	32	25	15
Net income below minimum	637	190	95	138	133	65	16
Insufficient public float	183	93	31	54	0	5	0
Public interest concern	167	28	29	71	17	13	9
Insufficient number of market makers	78	40	15	23	0	0	0
Other	194	57	26	34	11	56	10

Note. 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 New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotation (NASDAQ) delisting announcements. The Other category for NYSE delistings includes reasons such as accounting irregularities, going-concern emphasis by auditors, and investigation of the company by the Securities and Exchange Commission (SEC) for misstatements. The Other category for NASDAQ delistings includes failure to provide requested information, failure to comply with qualifications, failure to comply with corporate governance requirements, and violations of reverse-merger requirements.

from venues such as the Pink Sheets (where most delisted NYSE firms trade) have traditionally been unavailable. We were able to obtain a proprietary data set from Pink Sheets, Inc., for all firms involuntarily delisted from the NYSE in year 2002. While acknowledging the limitations of such a short sample period, our sample does include a number of the most recognizable (and notorious) delistings, including those of Enron, Global Crossing, US Airways, Kmart, and Owens Corning. Our analysis is thus useful for illuminating the issues connected with the postfailure trading of these prominent firms as well as what happens to small, less well known companies.

In 2002, there were 63 forced delistings from the NYSE, with five firms moving to the AMEX and the remaining 58 to the Pink Sheets.¹³ We restricted our sample to those 58 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 because of incomplete trading or asset

¹³ 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 Sheets listing, but for other firms there is a delay. Interestingly, Enron did not trade on the OTCBB at any point in 2002.

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 60 trading days postdelisting. Predelisting data on these variables are taken from the Center for Research in Securities Prices (CRSP). We also deleted one firm from the sample because of the lack of trading activity.¹⁴ The final sample is 55 firms, which are listed in Table 4.

An interesting feature of our sample is firm age: 33 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 traces its origins to 1857, while Kmart had traded for 84 years on the NYSE before its delisting). Only five of the delisted firms listed since 2000, and three of these were actually spinoffs of larger firms trading on the NYSE.¹⁵ While our sample includes a number of well-known established firms, it also includes a number of lesser known entities such as Coastcast Corporation and Airlease, Ltd.

The diversity in our sample suggests that delisting effects may vary across firms, particularly if firm size is considered. Firm size data at the time of delisting are apt to be misleading, so we consider as alternative proxies for firm size the market capitalization as of January 2, 2001, and total assets as of January 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, 12 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.

We also include in Table 4 the main explanations cited by the NYSE for each firm's delisting. Many firms violate multiple listing criteria, but the most cited factors are share price below the minimum (39 firms) and market capitalization below the minimum (37 firms). These two conditions are often, but not always, congruent: 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 to meet the share price requirement.

Earlier we noted that the listing venues can exercise considerable discretion

¹⁴ An examination for outliers in our trade data revealed that one firm Panavision (PVI) had an average dollar spread more than 50 percent 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 Sheets 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 postdelisting period (for comparison, the stock with the second highest spread traded on 57 of 60 days). To avoid spurious inferences, we deleted PVI from the sample.

¹⁵ Recent studies of firm mortality (see, for example, Fama and French 2004) attribute increased mortality rates to the influx of weaker firms coming to market in the late 1990s. Our sample includes 15 firms that listed between 1996 and 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.

Table 4
Sample Stocks Delisted from the New York Stock Exchange (NYSE) in 2002:
Total Assets and Delisting Causes

Company	Total Assets, Fiscal Year 2000 (\$ Millions)	NYSE Reason for Delisting			
		Share Price below Minimum	Market Cap below Minimum	Bankruptcy	Other
Enron Corporation	65,503	Yes		Yes	
Conseco	58,589	Yes		Yes	
Global Crossing	30,185	Yes		Yes	
NTL	28,384	Yes	Yes		
Kmart Corp.	14,630	Yes		Yes	
The FINOVA Group	12,089	Yes	Yes	Yes	
Federal-Mogul Corporation	10,255	Yes		Yes	
US Airways Group	9,127			Yes	
Comdisco	8,754	Yes		Yes	
Williams Communications Group	7,409	Yes		Yes	
Owens Corning	6,912	Yes	Yes	Yes	
Bethlehem Steel Corporation	5,467	Yes		Yes	
Mutual Risk Management	4,860	Yes			Yes
Budget Group	4,520	Yes	Yes		
Armstrong Holdings	3,875			Yes	
Asia Global Crossing	3,633	Yes		Yes	
Kaiser Aluminum Corporation	3,343	Yes	Yes	Yes	
Covanta Energy Corporation	3,295	Yes		Yes	
Encompass Services Corporation	2,700	Yes	Yes		
National Steel Corporation	2,565		Yes	Yes	
Exide Technologies	2,299	Yes	Yes		
The Alpine Group	2,094		Yes		
Superior TeleCom	1,992	Yes	Yes		
Magellan Health Services	1,804	Yes	Yes		
Viasystems Group	1,611	Yes	Yes		
Polymer Group	1,508	Yes	Yes	Yes	
EOTT Energy Partners	1,493	Yes		Yes	
GenTek	1,351		Yes		
National Equipment Services	1,249	Yes	Yes		
APW	1,214	Yes	Yes		
Oakwood Homes Corporation	1,149	Yes	Yes	Yes	
Key3Media Group	1,065	Yes			
Acceptance Insurance Companies	964	Yes	Yes		
American Skiing Company	927	Yes	Yes		
Galey & Lord	896	Yes	Yes		
Cornerstone Propane Partners	851	Yes	Yes	Yes	
Personnel Group of America	744	Yes	Yes		
Guilford Mills	724	Yes	Yes		
NewPower Holdings	712	Yes			Yes
GAINSCO Inc.	475	Yes	Yes		
China Enterprises	402	Yes	Yes		
Atchison Casting Corporation	342	Yes	Yes		
LASER Mortgage Management	328				Yes
BNS Co.	251		Yes		
Insteel Industries	245	Yes	Yes		
Asia Pacific Wire & Cable Corp.	187	Yes	Yes		
A.C.L.N.	140				Yes
PlanVista Corporation	116		Yes		

Table 4 (Continued)

Company	Total Assets, Fiscal Year 2000 (\$ Millions)	NYSE Reason for Delisting			
		Share Price below Minimum	Market Cap below Minimum	Bankruptcy	Other
Chart House Enterprises	108	Yes	Yes		
J Net Enterprises	105		Yes		
Grubb & Ellis Company	103		Yes		
Coastcast Corporation	99		Yes		
Clarion Commercial Holdings	82		Yes		
Airlease, Ltd	62		Yes		
Philips International Realty Corp.	38		Yes		Yes

Note. Data are for 55 firms that were delisted from the NYSE in 2002 and subsequently traded on Pink Sheets. The Other category includes failed a 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 (A.C.L.N. Ltd. and Mutual Risk Management). Total Assets is data item 6 on COMPUSTAT.

in the application of the delisting criteria. This is clearly shown in the data for firms failing the minimum-price rule. The NYSE average share price rule allows for delisting if the 30-day average share price falls below \$1.00. For the 39 firms delisted because of share price, we calculated the number of trading days prior to the last day of trading on the NYSE that a stock was in violation of the 30-day average price rule or the overall \$1.00 rule.

Table 5 shows a wide disparity in violation times before firms were delisted. 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 removed 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 explanation is the cure period the NYSE allows some firms to remediate the deficiency. This cannot be a complete explanation, however, as some firms remained listed long after the maximum 6-month period, and it begs the question of how the NYSE determines the particular cure period for a specific company in any case. An alternative explanation is size; specifically, the exchange may be more likely to allow larger, more active stocks to remain in violation. Using our cutoffs for small, medium, and large size, however, we found no significant difference between the mean number of days in violation for large stocks (49 days) or other stocks (47.75).

A similar discrepancy is exhibited by the 20 firms delisted because of bankruptcy. Although NYSE rules allow for delisting of bankrupt firms, these rules give the NYSE considerable leeway as to when or even whether to delist. For example, Global Crossing was delisted on the day following its bankruptcy filing, Enron was delisted after 30 trading days, and 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,

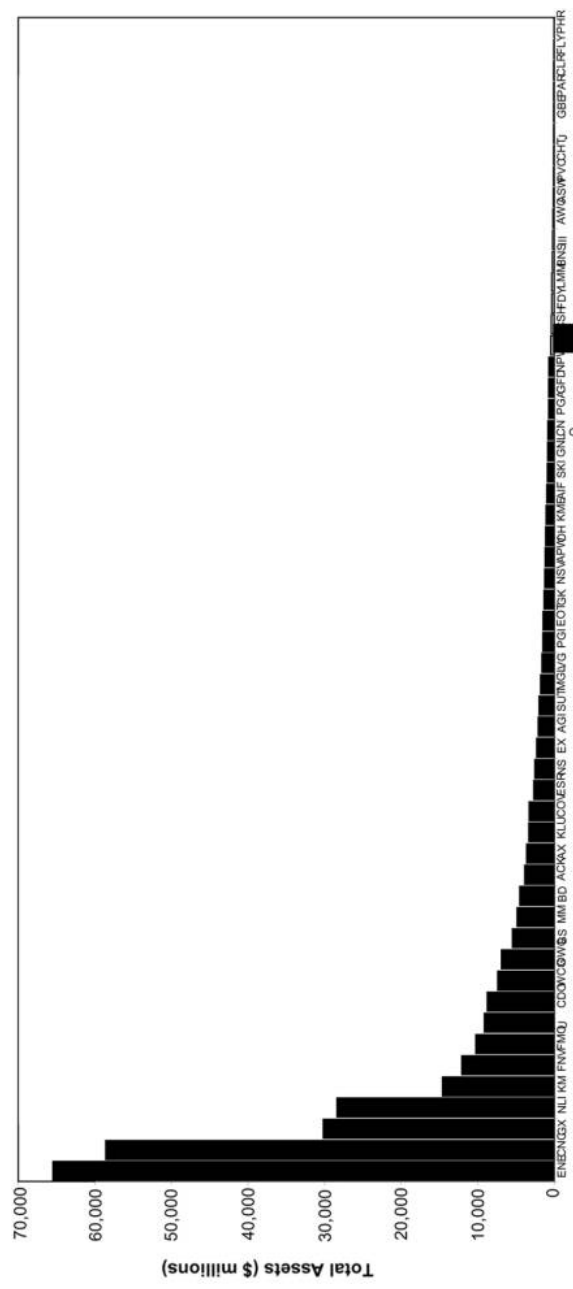


Figure 1. Total assets (as of January 1, 2001) for 55 stocks (identified by their ticker symbols) delisted from the New York Stock Exchange in 2002

Table 5
Companies Delisted by the New York Stock Exchange (NYSE) Because of Minimum Share Price: Number of Days Trading with Violation

Company	Violation of 30-Day Rule	Price Less Than \$1.00
Enron Corporation	3	25
Conseco	0	12
Global Crossing	14	32
NTL	49	59
Kmart Corp.	121	120
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

Note. Values are continuous trading days prior to the last day of trade on the NYSE that the company is in violation of the share price rules. 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 \$1.00; 39 stocks were cited by the NYSE for having violated the minimum price rule. Zeros indicate that the stock's 30-day average share price calculated on the date of last trade on NYSE was not less than \$1.00.

four of the 20 firms the NYSE delisted for bankruptcy never actually went bankrupt; these firms were delisted after they announced the possibility of a bankruptcy filing.

A complication in investigating the impact of delisting is that the timing between delisting and subsequent trading on the Pink Sheets varies across the sample firms.¹⁶ For example, for 20 firms, the NYSE delisting announcement 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 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 by 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 Sheets trading is comparable across firms, but some firms may have interim trade data between the announcement date and Pink Sheets trading date that are not analyzed.

3.2. *Pretty in Pink? Trading on the Pink Sheets*

Table 6 provides data on the first day of Pink Sheets trading for the stocks in our sample. Values for the full sample of 55 firms indicate 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 2.59 million shares, while the median volume equals 80,700 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. Another factor contributing to large volumes is the very low trading prices of the stocks. Fully 75 percent of our sample is trading at prices below 50 cents, while 25 percent of the sample is below 10 cents. As the data show, the day 1 trade value averages a little over \$600,000 dollars, with the largest volume stock involving only \$16 million in trading value. This value of trading actually rises over the first 5 days of trading and then gradually declines over the first 60 days of trading.

The table also provides data for the three subsets of our sample. Again, the data show large trading volumes, with the largest 12 stocks in the sample averaging 10.3 million shares trading on opening day and the next largest 20 stocks trading close to 900,000 shares.¹⁷ Median volumes are significantly lower, which suggests a wide disparity across sample stocks. Our data suggest that, at least for the largest stocks, significant trading activity occurs after delisting.

¹⁶ Shumway (1997) finds similar disparities in the delisting and subsequent trading of NYSE stocks. He also notes that while some stocks' delisting is preannounced by the company, this is not the case for approximately two-thirds of his sample.

¹⁷ These smaller firm volume results are comparable in magnitude to the findings of Angel et al. (2004), who report average trading volumes for 3 months following delisting of NASDAQ stocks of approximately 133,000 shares per day.

Table 6
Trading on the Pink Sheets

	Mean	Median	Min	Max
Full sample:				
Volume, day 1	2,593,724	80,700	100	53,341,600
Value of trade (\$), day 1	619,422	11,250	65	16,269,188
Mean daily value of trade, days [1, 5]	607,923	40,488	433	13,061,038
Mean daily value of trade, days [1, 20]	358,428	40,199	244	7,235,380
Mean daily value of trade, days [1, 60]	191,609	24,396	407	3,407,113
Percentage spread, day 1	39.32	23.53	.34	177.36
Mean percentage spread, days [1, 5]	25.62	13.92	.94	152.08
Mean percentage spread, days [1, 20]	18.29	12.23	.97	123.25
Mean percentage spread, days [1, 60]	15.31	11.25	.99	104.12
Largest 12 stocks:				
Volume, day 1	10,337,333	2,568,400	325,500	53,341,600
Value of trade (\$), day 1	2,646,220	929,403	119,214	16,269,188
Mean daily value of trade, days [1, 5]	2,498,654	1,567,600	171,258	13,061,038
Mean daily value of trade, days [1, 20]	1,447,900	994,125	127,274	7,235,380
Mean daily value of trade, days [1, 60]	744,584	507,956	98,784	3,407,113
Percentage spread, day 1	4.02	2.93	.34	14.29
Mean percentage spread, days [1, 5]	3.34	2.58	.94	6.96
Mean percentage spread, days [1, 20]	3.36	2.55	.97	7.25
Mean percentage spread, days [1, 60]	3.84	3.09	.99	6.96
Middle 20 stocks:				
Volume, day 1	868,445	220,850	100	6,131,800
Value of trade (\$), 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, day 1	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
Smallest 23 stocks:				
Volume, day 1	53,822	10,000	200	386,000
Value of trade (\$), 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, day 1	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

Note. Values are summary trading data from Pink Sheets for stocks that were delisted from the New York Stock Exchange in 2002 and subsequently traded on Pink Sheets. The full sample of 55 stocks is divided into three subsamples on the basis of total assets at fiscal year end 2000. Volume refers to the number of shares traded. 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 \times closing share price. Percentage spreads are calculated as (closing ask price - closing bid price)/(midpoint of closing ask and bid prices) \times 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 .

Trading costs are also very large, as evidenced by the average first-day percentage spread of almost 40 percent and the median spread of more than 23 percent. These first-day spreads appear to be quite volatile, which suggests that median first-week spreads might give a better indication of trading costs. Here we find a median spread of 13.92 percent for the overall sample. These median spreads remain relatively stable over the first 60 days of trading and decline to an average of 11.25 percent for the 3-month period. Regardless of the period considered, the data suggest that investors face substantial costs in trading stocks moving from the NYSE to the Pink Sheets.

Examination of the three subsamples, however, suggests that these costs are very different for traders of the largest stocks. For the 12 largest stocks, first-day median spreads are just 2.93 percent, and these spreads remain relatively constant (3.09 percent) when measured over the first 60 days of trading. By comparison, the 60-day median spread for the middle 20 stocks is 13.60 percent, and it is 15.80 percent for the smallest 23 stocks in the sample.

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 measures of cumulative abnormal return) unreliable.¹⁸ We calculated market adjusted returns for our entire portfolio of stocks using the midpoint of bid-and-ask prices over the first 60 days of trading on the Pink Sheets. Overall, the portfolio value was approximately 10.29 percent lower by the end of the period. Adjusting these returns for the large spreads that investors incur only underscores that investors do not fare well when stocks hit the Pink Sheets after delisting. Such a finding accords well with that of Campbell, Hilscher, and Szilagyi (2007), who find similarly dismal performance of distressed stocks.

3.3. *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 those 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. We gathered data for the 60-day prelisting period for each stock in our sample from the NYSE's Trade and Quote database and CRSP. Tables 7, 8, and 9 summarize these data for prices, volumes, spreads, and volatility.¹⁹

¹⁸ For example, with a stock price at \$.03 daily returns of 400 or even 600 percent arise, which causes our overall return figures to be largely driven by outliers. Bid-ask bounce is also a concern, because with a 40 percent spread, trades bouncing between the bid and ask will appear to generate a return of more than 25 percent, even with stable quotes. This problem can be ameliorated by measuring returns using quote midpoints instead of closing prices.

¹⁹ We report *t*-statistics to provide a measure of the statistical significance of our results. For the 120-day pre/postsample, there are clearly sufficient data to make these measures meaningful. For the 10-day pre/postsample, the validity of the *t*-statistics is less apparent. Thus we report nonparametric Kruskal-Wallis test statistics for the 10-day sample. The results using the Kruskal-Wallis tests are the same as those using *t*-statistics, which suggests that the effects are sufficiently large and robust.

Table 7
Average Share Price (\$) on the New York Stock Exchange (NYSE)
before and after Delisting

Sample	Last Trading Day on the NYSE	First Trading Day on the Pink Sheets
Full sample ($N = 55$)	.94	.48
Largest 12 stocks	.62	.28
Stocks of bankrupt firms ($N = 20$)	.69	.27
Stocks of nonbankrupt firms ($N = 35$)	1.09	.59
Stocks of firms violating price rules ($N = 29$)	.41	.25
Stocks of firms not violating price rules ($N = 26$)	1.53	.74

Note. Values are for the day before the NYSE delisting announcement date and on the first day of trade on Pink Sheets. Firms violating price rules had a stock price below \$1.00 for a continuous period of more than 30 days prior to being delisted from the NYSE. Average share price is calculated as an equally weighted average of the share prices in the sample.

Perhaps the most immediate impact of the delisting announcement is on price. As Table 7 shows, on the last day of NYSE trading, the average stock in our sample closed at a price of \$.94; on the first day of Pink Sheets trading, the average stock closed at \$.48. For large stocks, the divergence is even higher, with prices dropping from \$.62 to \$.28. Focusing only on stocks not delisted for bankruptcy, we find a decrease in price from \$1.09 to \$.59.²⁰ The size and magnitude of these effects suggest that delisting was a traumatic event for the stock and its investors.

An interesting question is how much of this price decrease is due to being removed from the NYSE and how much is due to the bad news regarding the firm's future prospects that is causing the firm's delisting? One way to sort out these effects is to consider the price behavior of firms delisted only after they had visibly failed the delisting criteria for a substantial time. For such stocks, the economic impact of the bad news was likely impounded into the price before the delisting event. We formed a subsample of 29 stocks that were delisted 30 or more days after their stock prices had traded continuously below \$1.00. For these stocks, prices fell from \$.41 to \$.25, or approximately 40 percent. Conversely, the price decrease for the 26 stocks delisted for other reasons was approximately 52 percent (prices fell from \$1.53 to \$.74), which suggests that a large part of the decline in price is indeed due to the loss of trading venue.

The deleterious effects of delisting are even more evident from spread data given in Figure 2. For the entire sample, average percentage spreads increased from 5.84 percent in the preperiod to 15.31 percent in the postperiod. This increase is far greater than the 51 percent increase in spreads reported by Angel et al. (2004) for NASDAQ stocks, a consequence perhaps of the lower spreads on the NYSE prior to delisting. These data suggest that delisting from the NYSE

²⁰ For the sample of bankrupt firms, the decline is from .70 to .28. Recall that the average firm in this sample filed for bankruptcy more than 100 days before its delisting.

Table 8
Trading 60 Days before and 60 Days after Delisting

	NYSE Days [-60, -1]	Pink Sheets Days [1, 60]	<i>t</i> -Statistic	<i>p</i> -Value
Full sample (<i>N</i> = 55):				
Mean dollar spread	.0542	.0706	-5.226	.0001
Mean percentage spread	5.84	15.31	-17.452	.0001
Mean daily volume	2,038,849	1,064,695	4.992	.0001
Mean volatility, closing prices	.1026	.1940	-4.731	.0001
Mean volatility, bid prices	.1057	.1532	-2.913	.0048
Largest 12 stocks:				
Mean dollar spread	.0240	.0074	26.670	.0001
Mean percentage spread	2.97	3.84	-5.752	.0001
Mean daily volume	8,479,348	4,142,160	4.993	.0001
Stocks of bankrupt firms (<i>N</i> = 20):				
Mean dollar spread	.0335	.0168	12.010	.0001
Mean percentage spread	3.50	8.50	-15.570	.0001
Mean daily volume	5,205,142	2,442,864	5.298	.0001
Stocks of nonbankrupt firms (<i>N</i> = 35):				
Mean dollar spread	.0660	.1013	-7.937	.0001
Mean percentage spread	7.18	19.21	-16.65	.0001
Mean daily volume	229,540	277,170	-1.701	.0930

Note. 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 55 stocks in the sample. Volume refers to the number of shares traded. Difference-of-means tests are two-sided tests and assume unequal variances. NYSE = New York Stock Exchange.

may have greater consequences for transactions costs than delisting from NASDAQ. Focusing on 5-day windows before and after delisting, we find that spreads widen from 7.36 percent to a stunning 25.62 percent.

Intriguingly, the percentage spread for the 12 largest stocks has a different pattern. While spreads rise in the 60-day pre- and postwindow (from 2.97 to 3.84 percent), they decline when measured in the 5-day pre- and postdelisting period, decreasing from 4.947 percent during the last week of trading on the NYSE to 3.33 percent during the first week of Pink Sheets trading, a statistically significant drop. Figure 3 provides the corresponding average dollar spread data for the sample. For the sample as a whole, the average dollar spread increases from .054 to .070 in the 60-day intervals and from .049 to .1047 in the 5-day intervals. For large stocks, however, this spread declines from .0254 to .0074 when measured across the combined 120-day interval, and it drops from .0258 to .010 when measured across the combined 10-day interval. That average dollar spreads are lower on 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 average stock price over the 120 trading days for the large-firm sample. The figure shows the dramatic price decline preceding the stock's delisting and the large increase in dollar spreads in the week before NYSE delisting. What

Table 9
Trading 5 Days before and 5 Days after Delisting

	NYSE Days [-5, -1]	Pink Sheets Days [1, 5]	Kruskal-Wallis Test Statistic	p-Value
Full sample (N = 55):				
Mean dollar spread	.0490	.1047	6.8182	.009
Mean percentage spread	7.36	25.62	6.8182	.009
Mean daily volume	1,844,747	2,888,402	5.7709	.0163
Mean volatility, closing prices	.1231	.3844	6.8182	.009
Mean volatility, bid prices	.1237	.3525	6.8182	.009
Largest 12 stocks:				
Mean dollar spread	.0258	.0100	6.8182	.009
Mean percentage spread	4.947	3.3391	6.8182	.009
Mean daily volume	7,581,085	11,336,115	3.1527	.0758

Note. 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 55 stocks in the sample. Volume refers to the number of shares traded. Kruskal-Wallis test statistics and their associated p-values are based on a χ^2 distribution with 1 degree of freedom. NYSE = New York Stock Exchange.

remains a puzzle are the spreads on the NYSE in the overall predelisting period. Here we find that despite the large decline in price, spreads remain virtually constant at around .02 per share and decrease only when trading begins on the Pink Sheets.

One conjecture for this behavior is that the spreads reflect a higher fixed cost of market making on the NYSE. A basic insight in market microstructure models (see O’Hara 1995) is that bid-ask spreads generally decrease as trading volume increases and increase as price volatility increases. Figure 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. (The first volatility estimate for Pink Sheets trading in Figure 6 is on day 2.) 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 suggest two things about the NYSE trading environment. First, the data show the important role played by the penny pricing increment at the NYSE. The NYSE does not permit price quotes at the subpenny level, dictating that spreads also cannot be less than 1 cent. The Pink Sheets allows subpenny pricing, and the dramatic drop in spreads for the largest stocks to approximately one-half cent reflects this greater price flexibility.²¹ Second, the data suggest that the NYSE specialist’s “affirmative obligation” to maintain a high-quality, continuous two-sided market for listed stocks actually does cause specialists to behave

²¹ Taking Enron as an example, in the 60-day period before its delisting, there is never a subpenny quote and spreads fluctuate between 1 and 2 cents. On moving to the Pink Sheets, spreads in the first week are approximately one-half of a cent.

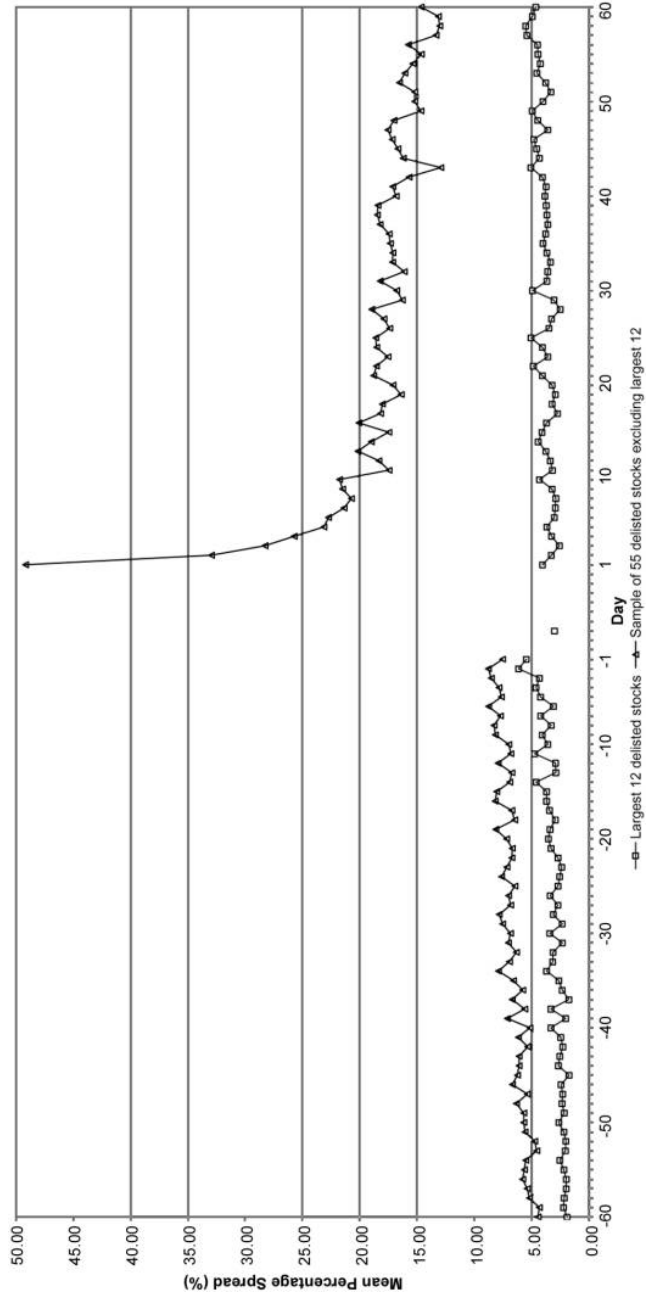


Figure 2. Percentage spreads on the New York Stock Exchange (days [-60, -1]) and Pink Sheets (days [1, 60]) around the delisting announcement

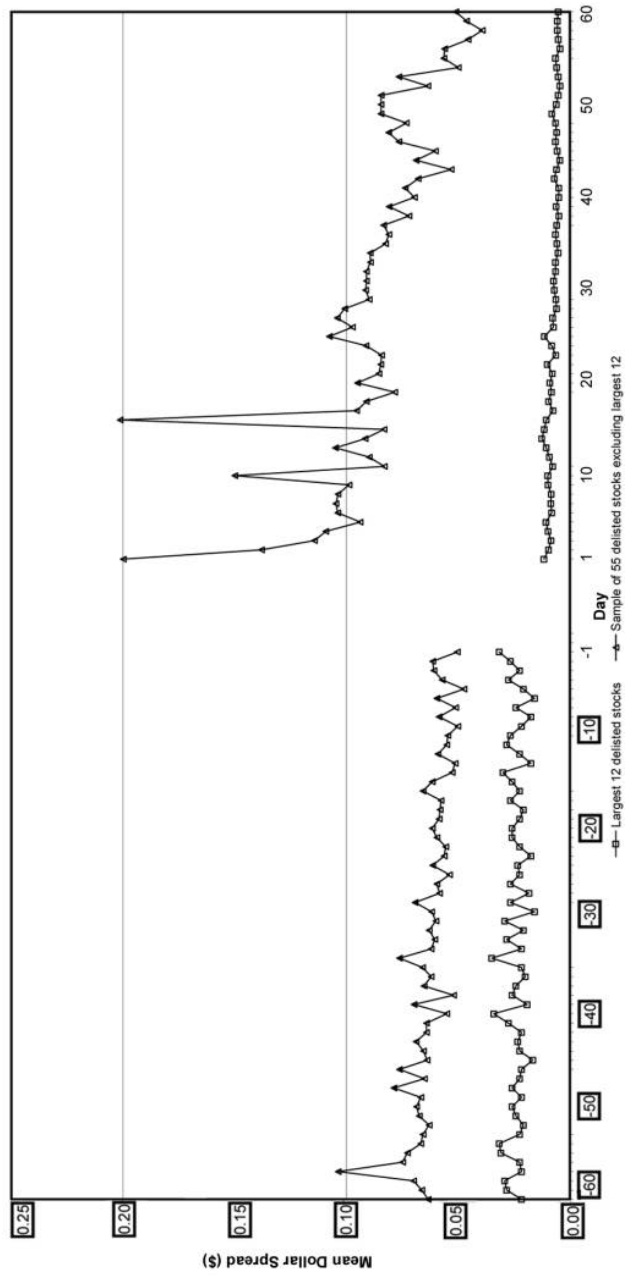


Figure 3. Dollar spreads on the New York Stock Exchange (days [-60, -1]) and Pink Sheets (days [1, 60]) around the delisting announcement

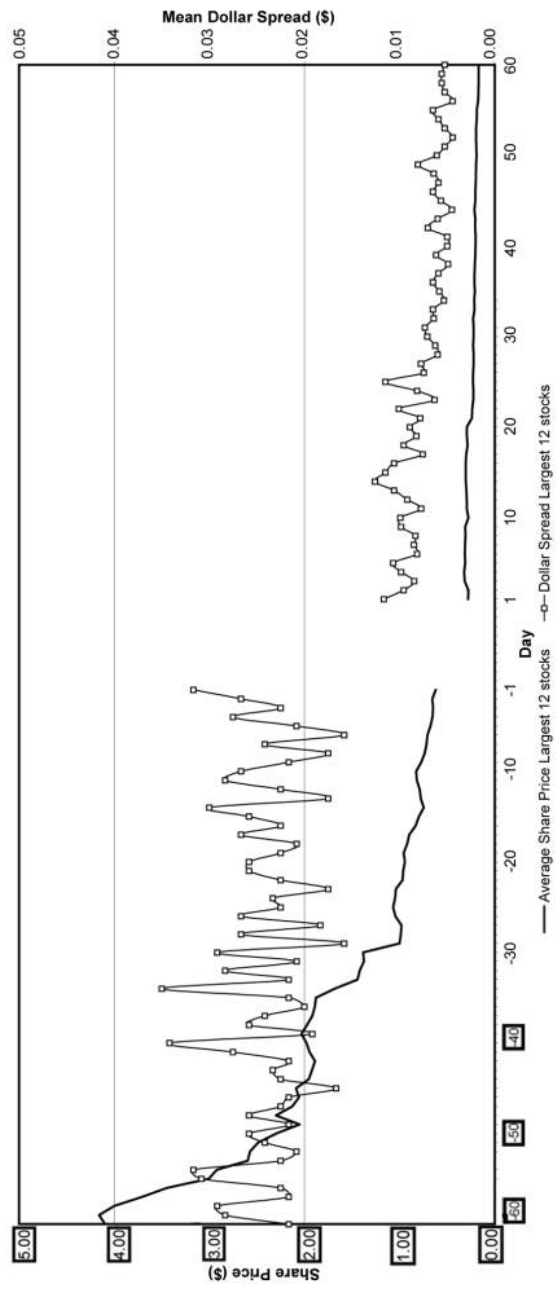


Figure 4. Mean dollar spread and average closing share price of the largest 12 stocks on the New York Stock Exchange (days [-60, -1]) and Pink Sheets (days [1, 60]) around the delisting announcement.

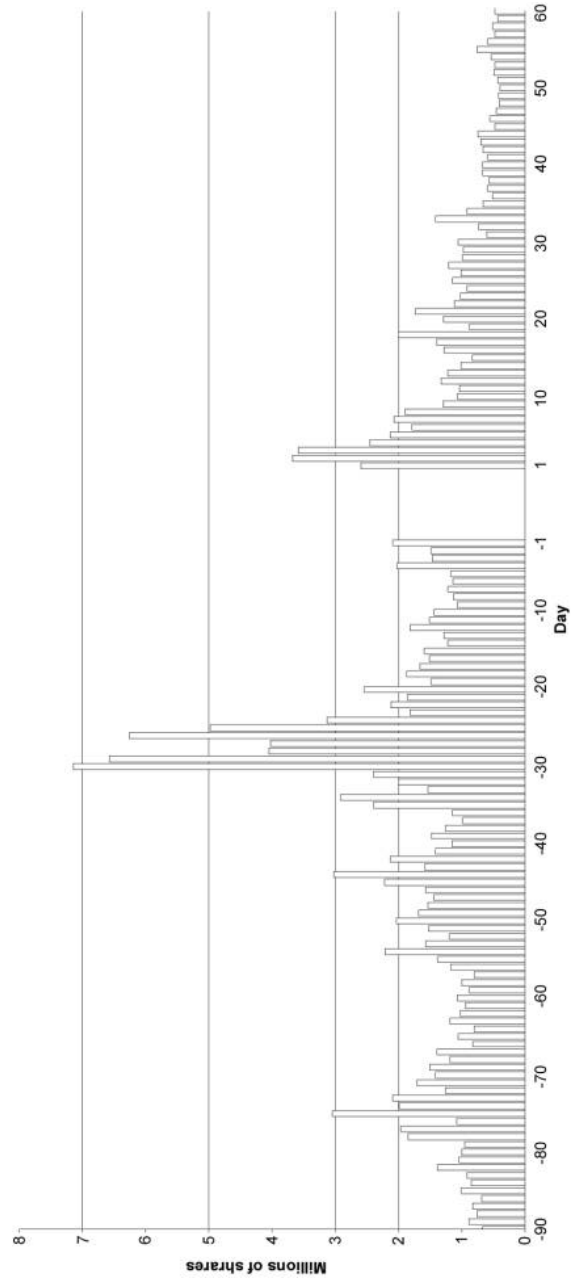


Figure 5. Mean volume per day of 55 stocks on the New York Stock Exchange (days [-90, -1]) and Pink Sheets (days [1, 60]) around the delisting announcement.

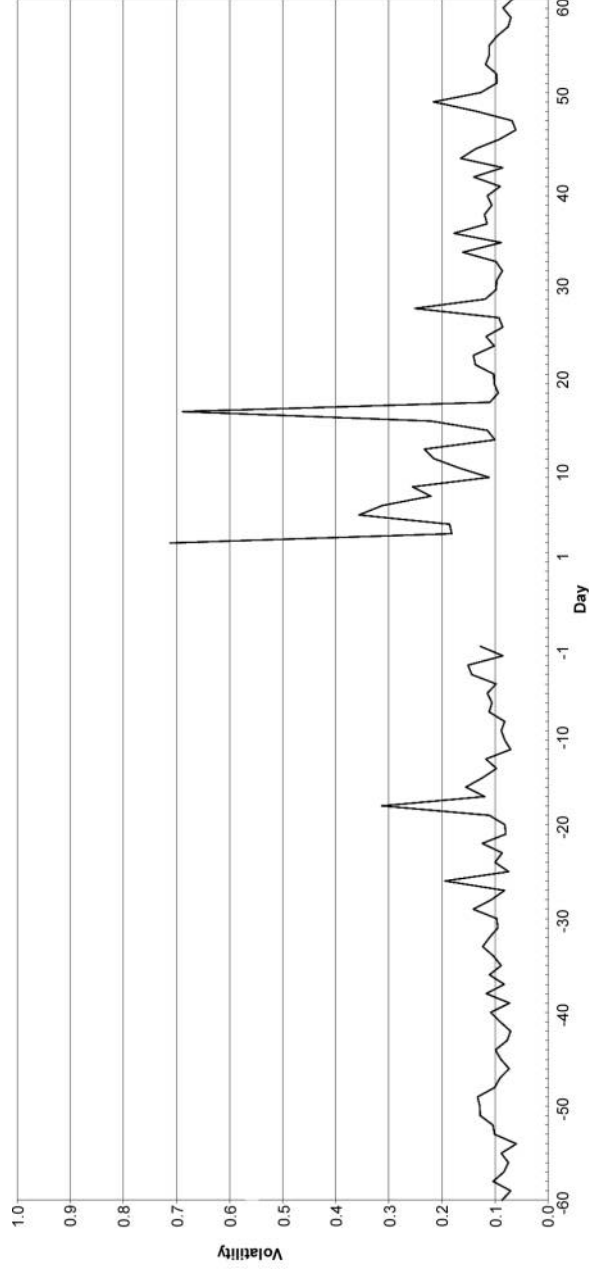


Figure 6. Volatility over time of 55 stocks on the New York Stock Exchange (days [-90, -1]) and Pink Sheets (days [1, 60]) around the delisting announcement.

differently than they would in the absence of such obligations.²² The dramatic deterioration of liquidity for the smaller, less traded stocks in our sample is consistent with a cross-subsidization effect in which stocks with higher trading volumes subsidize stocks that trade relatively infrequently. Huang and Liu (2003) demonstrate similar subsidization behavior using data from individual specialist firms.

Turning to the volume and volatility data, we find that 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 because of 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 percent higher (.1063 to .1540).²³

One final issue we consider is the differential behavior of firms delisted because of bankruptcy. Table 8 gives the relevant data for 60 days pre- and postdelisting for the stocks of 20 delisted bankrupt firms and the 35 delisted nonbankrupt firms. 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 nonbankrupt stocks deteriorate no matter how they are measured. We can strongly reject the hypothesis (t -statistic = 2.543, p = .0155) that the two populations are the same.

Perhaps more intriguing are the volume effects, with trade executions for stocks of the bankrupt firms declining 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 nonbankrupt firms, with no statistically significant difference in trading before and after delisting. 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 Tables 7, 8, and 9 reveals very similar behavior.

4. The Delisting Dilemmas: Why, When, and by Whom?

Overall, the data provide compelling evidence that involuntary delisting from the NYSE is detrimental for firms and their investors. What is less easily deter-

²² Specialists are expected to stabilize stock price movements by buying for and selling from their dealer accounts against the prevailing trend of the market, that is, to purchase on minus and zero minus ticks and sell on plus and zero plus ticks. The NYSE 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 unit's stocks, (2) the so-called near-neighbor approach, which compares the performance in a stock over rolling 3-month periods with the performance of stocks with similar trading characteristics, and (3) the standards of acceptable performance specified in Rule 103A.

²³ Closing trade prices are subject to bid-ask bounce. Measuring volatility by spread midpoints results in an increase from .1010 to .1445.

mined are the benefits that arise from delisting companies or even to whom such benefits would accrue. In this section, we turn to the economic policy issues surrounding delisting by considering the features of an optimal delisting regime and how it could be implemented. Our goal is to suggest how delisting policies should change to reflect the realities of both modern markets and the new world of corporate exchange incentives.

As a starting point, consider the parties affected by any delisting policy. As noted earlier, exchanges are affected through revenue effects (positive because small, infrequently traded issues are expensive to trade and negative because of lost trading and revenue opportunities) as well as reputation effects that may attach to trading errant companies. Issuers are affected because delisting reduces the liquidity of their stock and thereby influences their cost of capital. Current investors are affected because delisting affects the liquidity of their investment and influences the information environment surrounding the stock. Prospective investors are affected because delisting may provide protection from fraud and assure investors of firm quality.

An optimal delisting policy, therefore, should provide optimal liquidity for a stock consistent with the exchange's interest of making, or at least not losing, money while protecting both current and future investors in the company.²⁴ Such a policy would allow an omniscient social planner to balance the complex costs and benefits attaching to delisting. Unfortunately, implementing this optimal policy in actual markets is problematic, requiring us to consider not only the "why" of delisting, but also the "when" and "by whom" dimensions as well.

Certainly, the simplest approach is never to delist any company. This has the advantages of providing liquidity to firms and their investors and allowing exchanges to continue to earn trading revenues, but it could also adversely affect both exchanges and investors. Allowing the continued trading of companies that are engaging in fraud, for example, harms potential investors and exchange reputation (as well as the broader reputation of the U.S. capital markets). Trading faltering firms can have similar negative effects on investors. Campbell, Hilscher, and Szilagyi (2007) argue that since 1981, financially distressed stocks have delivered anomalously low returns, with investors apparently underestimating the risk attaching to such stocks. Removing the current policy of delisting bankrupt and near-bankrupt companies could only add to this difficulty.

Alternatively, the delisting decision could be left to the discretion of the exchanges, which essentially transfers the delisting problem to the market to solve. This approach protects the exchanges' interests, but it has several major drawbacks. One problem is that because exchanges make money from volume, they may be loathe to delist large firms, even in the presence of egregious behavior. Certainly, the exchange's failure to delist any of the more notorious corporate

²⁴ Note that an exchange's interest in long-term profits may depend on its reputation, so this policy includes both the revenue and reputation considerations discussed above. One might also include considerations such as protecting the long-run integrity of the U.S. capital markets.

miscreants (Enron, WorldComm, and so on) before their problems became public is not encouraging. And various exchanges (the Hong Kong Stock Exchange in particular) have been accused of perpetuating a race to the bottom in regulatory standards by lowering both listing and delisting standards. Fama and French (2004) argue that the lowering of listing standards is one explanation for the recent sharp increase 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 exchanges’ poor decision making to investors.

Moreover, the unwillingness of exchanges to enforce even their own delisting rules raises concerns about the incentives of these now-corporate entities. Such a situation arose in the summer of 2002 following the collapse of the dot-com bubble, when as many as 10 percent of all NASDAQ stocks were failing the minimum \$1.00 share price requirement (Lucchetti 2003). NASDAQ’s reluctance to delist these stocks is understandable given the revenue impact, but it does raise questions as to whether exchange delisting policies are sustainable in a competitive environment. A recent case in point is NYSE’s continued trading of Fannie Mae.²⁵ Fannie Mae did not file financial statements in 2004 and 2005 and, indeed, declared that its financial statements since 2001 “should no longer be relied upon” (Beller 2005), meaning that there were no reliable data for Fannie Mae for a 6-year period.²⁶ New York Stock Exchange rules are clear that a company cannot be listed on the NYSE without current financial statements. However, Fannie Mae has not been delisted, and the NYSE has indicated on its Web site that it will continue to allow Fannie Mae stock to trade indefinitely. This forbearance policy has elicited intense criticism of the NYSE from the U.S. Congress.

A third alternative for handling delisting is to transfer responsibility to a regulatory body. Such an approach has been adopted in London, where the Financial Services Authority has taken over the listing and delisting functions from the London Stock Exchange. A similar situation is found in Germany and Sweden, where delisting on the Deutsche Bourse and OM Exchange, respectively, is handled by the regulator. However, in the United States the SEC has not expressed a desire to expand its regulatory purview, which reflects perhaps a general reluctance in the United States to transfer to government that which can be, or at least has been, done by the private sector.²⁷

How then to change the delisting process in the United States? We suggest two precepts to guide the process. First, delisting is necessary in some cases. Firms engaging in fraud or illegal activity must be removed from the capital markets. Investors also rely on exchanges to remove firms that are of dubious

²⁵ We thank Peter Wallison for suggesting this example to us.

²⁶ For more details, see *Wall Street Journal* (2006). Fannie Mae did release its 2005 annual report on May 2, 2007, but it does not expect to release 2006 numbers until possibly 2008. It has yet to file required quarterly SEC reports.

²⁷ See Macey and O’Hara (2005) for a discussion of self-regulation with profit-seeking exchanges.

value, particularly when those firms are small and have little other publicly available information. Agreeing to these two principles would provide a basic framework as to why firms must be delisted. Second, the delisting decision cannot simply be left to the discretion of exchanges. The incentives of exchanges are not congruent with those of all the constituencies affected by delisting. The SEC would seem to be in the best position to determine when firms are in violation, but this could also be done via a shared responsibility between the SEC and the exchanges.

The Canadian market illustrates how such an approach would work. The Canadian regulatory body, Market Regulatory Services, has adopted the Universal Market Integrity Rules, which apply to the trading of all Canadian stocks. These rules include antifraud provisions as well as requirements to provide sufficient information to allow investors to make informed decisions. Firms violating these rules must be immediately delisted. Exchanges are free to apply additional rules beyond these if they desire.

Applying such a framework here would suggest some immediate changes. Delisting stocks for falling below some arbitrary price level, for example, would no longer be required. The \$1.00 price rule seems to us both outdated and ineffective, but unfortunately it is not harmless, and change here seems long overdue.²⁸ Similarly, market capitalization requirements would also no longer be grounds for delisting, although exchanges could adopt continuing listing fee schedules based on market capitalization to recoup the higher costs of providing markets for very small firms. Arguably, market competition between exchanges would keep such fee schedules from being exploitative.

Some bankrupt and faltering firms would face delisting, but only those for whom there is insufficient information available for investors to gauge their potential viability. In practice, this would translate into large bankrupt firms continuing to trade, while small bankrupt firms would be delisted. This principle of having sufficient sources of information to evaluate the firm, for example, would allow firms such as Fannie Mae to continue trading even though delinquent in SEC filings.

Delisting is a traumatic event for both firms and shareholders alike. As we have shown, current delisting practices are questionable, but the deleterious effects are not. The SEC is currently considering a number of trading practices in the U.S. 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.

²⁸ The regulatory odds are stacked heavily against firms as their share price drops below the thresholds of \$5.00 and \$1.00 per share. The SEC has especially strict suitability rules designed to discourage inexperienced investors from buying so-called penny stocks, whose price is below \$1.00 per share. Brokerage firms typically do not follow penny stocks. For example, at Merrill Lynch, brokers are prohibited from recommending shares that are not rated by the firm's research analysts, and analysts generally do not 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.

References

- Angel, James J., Jeffrey H. Harris, Venkatesh Panchapagesan, and Ingrid M. Werner. 2004. From Pink Slips to Pink Sheets: Market Quality around Delisting from Nasdaq. Working paper. Washington University in St. Louis, Olin Business School.
- Baglolle, Joel. 2004. Lowering the Bar. *Far Eastern Economic Review* 167:38–40.
- Beller, Alan L. 2005. Testimony Concerning the Application of Federal Securities Law Disclosure and Reporting Requirements to Fannie Mae, Freddie Mac and the Federal Home Loan Banks. Committee on Banking, Housing, and Urban Affairs, April 21. <http://www.sec.gov/news/testimony/ts042105alb.htm>.
- Bushee, Brian J., and Christian Leuz. 2003. Economic Consequences of SEC Disclosure Regulation. Working paper. University of Pennsylvania, Wharton School, Philadelphia.
- Campbell, John Y., Jens Hilscher, and Jan Silagyi. 2007. In Search of Distress Risk. Working paper. Harvard University, Department of Economics, Cambridge, Mass.
- Elstein, Aaron. 2001. Reverse Splits Rarely Revive Stock of Troubled Companies. *Investors.hub*, June 20. http://investorshub.adfn.com/boards/read_msg.aspx?message_id=131327.
- Fama, Eugene F., and Kenneth R. French. 2004. New Lists: Fundamentals and Survival Rates. *Journal of Financial Economics* 72:229–74.
- Wall Street Journal*. 2006. The Fannie Exception. May 10.
- Huang, Roger D., and Jerry W. Liu. 2003. Do Individual NYSE Specialists Subsidize Illiquid Stocks? Working paper. University of Notre Dame, Mendoza College of Business, South Bend, Ind.
- Lang, Robert Todd, Brandon C. Becker, Roger D. Blanc, Peter C. Clapman, Roberta S. Karmel, John M. Liftin, Jonathan R. Macey, Hugh H. Makens, and John F. Olson. 2002. Special Study on Market Structure, Listing Standards and Corporate Behavior. *Business Lawyer* 57:1487–1567.
- Hwang, C. Y. 1995. Microstructure and Reverse Splits. *Review of Quantitative Finance and Accounting* 5:169–77.
- Lie, Erik, Heidi J. Lie, and John J. McConnell. 2001. Debt-Reducing Exchange Offers. *Journal of Corporate Finance* 7:179–207.
- Lucchetti, Aaron. 2003. Tough Rules, Bear Market Throw Stocks off Nasdaq. *Wall Street Journal*, October 12, p. C1.
- Macey, Jonathan R., and Maureen O'Hara. 2002. The Economics of Stock Exchange Listing Fees and Listing Requirements. *Journal of Financial Intermediation* 11:297–319.
- . 2005. From Markets to Venues: Securities Regulation in an Evolving World. *Stanford Law Review* 58:563–99.
- O'Hara, Maureen. 1995. *Market Microstructure Theory*. Cambridge, Mass.: Blackwell.
- Sanger, Gary C., and James D. Peterson. 1990. An Empirical Analysis of Common Stock Delistings. *Journal of Financial and Quantitative Analysis* 25:261–72.
- Shumway, Tyler. 1997. The Delisting Bias in CRSP Data. *Journal of Finance* 52:327–40.
- Shumway, Tyler, and Vincent A. Warther. 1999. The Delisting Bias in CRSP's Nasdaq Data and Its Implications for the Size Effect. *Journal of Finance* 54:2351–79.
- Simon, Ruth. 2001. More Companies Are Learning Harsh Lessons on Delistings. *Wall Street Journal*, March 20, p. C1.
- Woolridge, Randall J., and Donald R. Chambers. 1983. Reverse Splits and Shareholder Wealth. *Financial Management* 12:5–15.