Anatomy of a Market Failure:
NYSE Trading Suspensions (1974-1988)

by

Utpal Bhattacharya

(College of Business Administration, University of Iowa, Iowa City, IA 52242)

and

Matthew Spiegel

(Haas School of Business, University of California, Berkeley, CA 94720)

ABSTRACT

A cross-sectional analysis of all trading suspensions that occurred during the period 1974-1988 in the New York Stock Exchange reveals that though the desire to maintain price continuity remains an important motivation to suspend trade, inventory imbalance fears are pronounced for large firms. Adverse selection concerns afflict all news related suspensions irrespective of firm size. Further, we find substitutability amongst the various dimensions of liquidity: while large cap stocks have lower bid-ask spreads, they halt more often. A time-series analysis shows that the resiliency of the exchange -- its ability to absorb severe volatility shocks -- has improved in this period.

KEY WORDS: Trading halts; Market resiliency; Liquidity; Inventory control; Adverse selection.

The New York Stock Exchange (NYSE) provides a forum where investors can buy and sell securities. In fact, to the casual observer, it appears that anyone can trade any listed share at any time during the business day. However, this is not quite true. On average, the exchange suspends the trading of four common stocks every day. During these periods, the specialist does not trade and the exchange ceases to provide liquidity in the affected stocks. Three related questions arise: what motivates the exchange to call a suspension, what is the relationship between the "resiliency" of the exchange - its ability to absorb severe volatility shocks - and other measures of liquidity, and has the "resiliency" of the exchange improved over time. The goal of this paper is to address these three questions.

Why is trade in an individual stock sometimes suspended? This is an important question because, unlike the closure of the whole market that is brought about if the index trips a "circuit breaker," suspensions in individual stocks are "discretion based" rather than "rule based." An analysis of all trading suspensions that occurred in the NYSE during the period 1974-1988 reveals that suspensions occur when either of the following two triggering mechanisms arises: the firm announces impending news (49.1% of all suspensions in our sample) or the market maker observes a severe order imbalance (48.5% of all suspensions in our sample). This leads us to postulate the following: these triggers make the market maker dramatically revise upwards his estimate of the stock's variance, and he may suspend trade because of his desire to maintain price continuity, or because of adverse selection fears caused by the increased likelihood of trading with an insider at this point in time, or because of inventory concerns.

To determine how price continuity, asymmetric information and inventory management issues affect the decision to suspend trading, this paper develops testable implications for each of the motivations. Suspensions that result from price continuity needs should produce a bimodal distribution for the realized returns. Inventory models such as those by Stoll (1978), and Ho and Stoll (1981, 1983) predict that returns during and after a suspension should have opposite signs. This results from having the price driven one way by the initial inventory shock, and then the other as the specialist tries to return to his targeted position. In contrast, if adverse selection problems induce specialists to suspend trade, the market failure models of Glosten

(1989) and Bhattacharya and Spiegel (1991) predict that after the suspension ends, stock returns will show persistence if the news has not completely been incorporated.

We find that the typical price change during a suspension is large (the mean of the absolute price change is 6.7%). Considering that the average standard deviation of a typical stock trading in the NYSE in the period 1974 through 1988 was 2.8%, this is a severe volatility shock. This is in tune with the results of Hopewell and Schwartz (1976, 1978), who showed that suspensions are associated with large price changes, an average of 7% in their 1974 sample. This may indicate that the exchange wants to ensure price continuity during the trading day, but when this becomes difficult to achieve, the NYSE calls a suspension to warn investors of the pending price jump. However, the pre and post suspension prices are very similar in a significant portion of the sample, implying that the other motivations may be important as well.

An analysis of the news pending and order imbalance sub-samples shows that there is significant difference between the two. The returns during suspensions that have been triggered by the firm are unimodal, whereas the returns during suspensions that are triggered by order imbalances are bimodal. This is to be expected, because knowledge of an order imbalance - unusual number of buy orders or sell orders - is likely to affect both the posterior mean and variance of the market maker, whereas impending firm news would only affect his posterior variance. We also document significant return persistence for the firm-triggered suspensions, and significant return reversals for the order-imbalance triggered suspensions. This contrasts with recent studies by George, Kaul, and Nimalendran (1991), Hasbrouck and Sofianos (1993), and Madhavan and Smidt (1993), who find that inventory concerns do not strongly influence the specialist's behavior. These contrasting conclusions may imply that inventory control plays such a subtle role that it only appears when stress levels become large enough to trigger a suspension.

What is the relationship between the "resiliency" of the exchange - its ability to absorb such high volatility shocks - and other measures of liquidity? The tests uncover a curious finding. We find that while large firms have lower bid-ask spreads at the reopen of trade, they tend to halt more often. As a matter of fact, the largest decile firm has a bid-ask spread at open that is one-seventh the smallest decile firm, but it has thrice the likelihood of a halt (from Table 3). This suggests that there is substitutability among the various dimensions of liquidity: while specialists offer low percentage bid-ask spreads for large stocks (documented, among others, by Wood, McInish and Ord (1985)), they suspend trade in them more often. This highlights the dangers of using unidimensional static proxies for liquidity like the bid-ask spread of a stock, or the size of a stock.

Has the resiliency of the NYSE improved in the period 1974-1988? If we recognize that the ability of a market to absorb unusual volatility shocks is an important, albeit ignored, dimension of its liquidity, this question deserves a serious consideration. Our results indicate that the NYSE has become more resilient in this time period. Table 6 shows that the market maker would need a 102 minute halt in a 10 billion-dollar firm on Jan 1, 1974 to absorb a 10% abnormal return (the return that cannot be explained by movement in the market). On Dec. 31, 1988, he could absorb it in 46 minutes. This is a reduction of about an hour. Our conclusion is that the ability of the NYSE to absorb unusually large shocks has improved in this time period.

While the above figures indicate improved resiliency of the NYSE, they do not necessarily suggest that institutional changes are responsible. In an effort to provide some light on this issue, additional tests normalize firm size by either the GNP deflator or the market value of the NYSE. If the specialist is simply reacting to changes in either the value of the currency or relative firm size, these normalizations should eliminate the time trend. However, the tests show that while these normalizations reduce the time trend, they do not eliminate it. Interestingly, the improvement in market resiliency can be attributed to the specialist triggered suspensions (the imbalance suspensions) rather than to the firm triggered suspensions (news suspensions). This appears to provide yet more evidence that institutional changes at the NYSE are responsible for its improved resiliency.

Some simple tests to corroborate the above time-trends are conducted. From a macro perspective, we observe that since 1979 the ability of market volatility to trigger suspensions, especially order imbalance suspensions, is declining. This is in line with the time trend observed in the other metrics for liquidity.

To the best of our knowledge, this paper is the first intertemporal examination of trading suspensions. However, a number of other papers have made significant inroads into our understanding of trading suspensions. Hopewell and Schwartz (1976, 1978), using a data base from February 1974 to June 1975, uncover interesting price movements during suspensions. More recent papers on the subject include King, Pownall and Waymire (1992) and Lee, Ready and Seguin (1994). Using data from 58 trading days in 1988, the former focus on the price discovery process as revealed by the price estimates quoted by the specialist before the stock's reopening. The latter look at trading volume and price volatility following suspensions in 1988, and conclude that volume and volatility are both higher after resumption of trade.

The paper is organized as follows. Section 1 describes the data. In section 2, we examine the implications of the various motivations for calling a suspension, and then do cross-sectional tests to provide evidence for or against each of the motivations. In section 3, we compare the resiliency of the NYSE to some popular liquidity measures. In section 4, we document that the NYSE has become more resilient in the time period 1974 to 1988. Section 5 concludes.

1. THE DATA

The NYSE gave us copies of the original logs on which they recorded trading suspensions in the period January 1, 1974 through December 31, 1988. These records include the date and a list of each suspension either called during the day or continued from a previous day. For each suspended trade, the data contains the security's ticker symbol and often the firm's name. The closing time is noted along with whether it was a "delay" or a "halt." A delay occurs when the stock opens late on the exchange. In contrast, a halt is recorded when a stock opens and then ceases to trade sometime before the closing bell. The reason for the suspension - almost always a news release or an order imbalance - is then recorded. After the reason for the suspension, the logs contain the price of the last sale, the opening time, the opening price, the opening shares traded and the opening bid and ask quotes. If no trades occur when trading resumes, then the NYSE records

"OOAQ" (Open on a Quote) in place of the opening price. While the data includes both the common and preferred stock suspensions, this paper only examines the common stock trading suspensions. Further, a common stock is assumed to undergo a single continuous suspension from the time it first closes to the time it reopens, even if this covers a period of several days. Our final data set contains a total of 15,188 common stock trading suspensions.

To this data set we added day-end price, the size, and the absolute abnormal return (AAR) of each stock that was suspended. This additional data was computed from the 1991 research tape provided by the University of Chicago's Center for Research in Security Prices (CRSP). The size was the market capitalization of the stock, in thousands of dollars, at the beginning of the year the stock was suspended. We regressed monthly stock returns against monthly market returns in the sixty-month window that ended at the beginning of the year the stock was suspended. The absolute abnormal return (AAR) equals the absolute value of the return on the stock during its suspension period that cannot be explained by movement in the market.

(INSERT TABLE 1 HERE)

Descriptive statistics are provided in Table 1. Panel A documents seasonality or the lack thereof. It reports the average number of suspensions per calendar month. The suspensions seem to be spread evenly across all months except, perhaps, October. This table includes October 1987 (900 suspensions occurred in this month) but, in spite of that, the null of the equality of means across the months cannot be rejected. This uniform distribution of suspensions across the months seems to exist for both the news related and the imbalance related suspensions. This fact suggests that cross-sectional tests of this sample would not be plagued by a "clustering bias."

Panel B in Table 1 tests for interday differences. The number of suspensions in a typical trading day is four, and it is almost equally divided into the news related and the imbalance related suspensions. One cannot reject the null hypothesis that the mean number of suspensions per day caused by either reason is equal. Checking for a "day of the week" effect, we notice that a "Monday effect" exists for news related suspensions.

The null of the equality of means across the weekdays can be rejected, and so can the difference between Mondays and Thursdays. Though statistically significant, the differences in means for the news related suspensions seem economically insignificant. Imbalance suspensions, on the other hand, tend to be distributed evenly.

Panel C in Table 1 checks for intra day differences. Most suspensions are found to occur in the first hour of trade, especially, imbalance related suspensions. This indicates that specialists may have unusual order imbalances at the start of trade and, hence, may delay reopening, but once trade begins, an order imbalance suspension is rare. Apparently, once trading starts, the specialist is willing to absorb almost any order flow. Suspensions called because of a news pending release, on the other hand, occur throughout the trading day, though most occur in the first hour of trade. A plausible explanation for this phenomenon is given in Watts (1991). She documents that extreme earnings news announcements are usually disseminated during non-trading hours, though we do observe releases during trading hours as well. Since disclosures associated with suspensions are usually non-routine like takeover announcements or extreme earnings announcements (see King, Pownall and Waymire (1992)), it is likely that most of these announcements occur during non-trading hours, especially during weekends (this, perhaps, explains the "Monday effect" documented in Panel B).concludes.

2. MOTIVATIONS FOR SUSPENDING TRADE

2.1 Price Continuity

To ensure that traders can accurately gauge the prices at which they will trade, the NYSE may wish to assure that price changes from trade to trade are not too large. However, when significant news is pending or there is a large order imbalance, price continuity may become impractical. For example, imagine a news announcement that increases the value of a stock by $3 per share. If the specialist must raise the price an eighth at a time, he will obviously face a large set of buy orders, resulting in tremendous losses if executed.

On the other hand, the NYSE may be reluctant to allow trade to continue if the specialist must dramatically alter the quoted prices. An investor who submits a market purchase order after seeing a price of $100 will not be pleasantly surprised to find that his order was in fact executed at $103 per share. Trading suspensions allow the NYSE to reduce the likelihood that investors will have their orders executed at prices far from the last quote, while simultaneously allowing the specialist to maintain price continuity when trading takes place.

A "price continuity" suspension implies that the NYSE has received information that will require the specialist to change the quoted price by a large amount. Thus, if price continuity triggers a suspension, the pre

and post suspension price should differ. Since price continuity concerns affect stock prices in both the upward and downward directions, these suspensions should force the sample as a whole to display a bimodal distribution. Further, the “peaks” of the distribution should exceed the usual tick size by several orders of magnitude.

(INSERT FIGURE 1 HERE)

Figure 1 displays the percentage of the suspension sample associated with various fractional price changes. As one can see, while the typical price change is large (the mean of the absolute price jump is 6.7%), the pre and post suspension price is within 1% for more than 10% of the observations in our sample of 15,188 suspensions. Further, the overall sample displays a relatively symmetric pattern. It appears that the NYSE and its specialists are equally concerned by sudden price moves in either direction.

(INSERT FIGURE 2 HERE)

Figure 2 redoes the analysis in Figure 1 with the data divided into news pending and order imbalance suspensions. The graph shows that the different suspension types have different return characteristics. Compared to the imbalance suspensions, news pending suspensions produce a unimodal return distribution with greater clustering around zero. However, news pending suspensions also have a greater percentage of their returns out in the distant tails. Order imbalance suspensions, on the other hand, are bimodal. It therefore appears that while price continuity concerns may play a role in the imbalance suspensions, such concerns are of only minor importance for news pending suspensions. Though the imbalance returns appear bimodal, there still remain a very large number of returns around zero. Thus, while price continuity may cause some of these suspensions, other causes must also play a role. Note also that the peaks in this bimodal distribution occur at about -2.5% and +3%. This indicates that if the order flow leads a specialist to conclude that he must change prices by roughly 3% or more, he will shut down the market.

The "price continuity" hypothesis is not the only hypothesis that can explain the bimodal return distribution of the order imbalance suspensions. With an imbalance suspension, the specialist knows the direction of the order flow, and thus the direction in which he needs to alter prices. In contrast, a news pending announcement is likely to cause a significant price change, but this is a statement about the variance and not the expected value.

An examination of the moments of the returns in the two sub-samples is revealing. For the 6932 news pending suspension returns for which we have sufficient data, the mean, variance, and third moment for the demeaned data equal .0413, .2452, and 3.394 respectively. Similarly, for the 7332 order imbalance suspension returns, the above statistics are .0034, .0263, and .1302 respectively. The median return during a news pending suspension equals .0035, and for an order imbalance suspension it is .0054. This tells us that the order imbalance suspension returns are quite symmetric, whereas the news pending returns have a positive skewness. This could be because managers are more reluctant to announce bad news.

2.2 Inventory Concerns and Asymmetric Information

Stock markets exist primarily for the provision of intertemporal liquidity. Without the NYSE's specialist (or a similar entity), an investor who wishes to sell shares of a company must wait around the exchange for a potential buyer to arrive. The specialist intervenes to help eliminate the matching problem. Instead of having the seller of a stock wait for a buyer that will take his entire order, he sells his shares to the specialist. The specialist then holds the stock in his inventory, until buyers for the other side arrive at the exchange. This intermediation obviously provides investors with a tremendous reduction in their transactions costs. However, it does require the specialist to hold positions in the stock that may vary dramatically during any particular time interval (see Stoll (1978), and Ho and Stoll (1981)).

Since the NYSE logs record approximately 48.5% of all trading suspensions as arising from order imbalances, it seems clear that inventory control problems play a role in at least some suspension decisions. In fact, one can make the plausible argument that the 163 suspensions during the crash of October 19, 1987, resulted from specialists that were unwilling or unable to take on the tremendous inventory required to handle public demands.

The NYSE may also call some trading suspensions in order to protect both the uninformed traders and/or the specialists from excessive levels of asymmetric information. Papers by Glosten and Milgrom (1985), and Kyle (1985) show that asymmetric information can lead to significant transactions costs. More recent work by Glosten (1989), and Bhattacharya and Spiegel (1991) show that, under some conditions, trade will collapse altogether.

We can partially disentangle the information and inventory effects by observing price changes during and after a suspension. In an inventory control model, the dealer rebalances his position by quoting prices that encourage investors to purchase or sell as necessary. Thus, a string of purchases by the dealer should generally be followed by a string of sells. Following this argument, if a suspension occurs for inventory related reasons then, after trade resumes, the stock's price will head back toward the pre-suspension price as the dealer's inventory returns to its desired level. Hence, the inventory control hypothesis predicts return reversals. On the other hand, the asymmetric information hypothesis predicts that the price will remain depressed or inflated because new information about the firm's value played a role in the suspension. So, if the entire information is not incorporated in prices by the time trade is resumed, the asymmetric information hypothesis predicts return persistence.

(INSERT TABLE 2 HERE)

Table 2 provides a non-parametric test -- Spearman's Correlation Coefficient -- to check whether there is a return reversal or a return persistence among the returns during and after a suspension. Given the unusual distribution of returns observed in Figures 1 and 2, a non-parametric test seems appropriate. Table 2 shows that, overall, a positive price change is likely to be followed by a negative price change, while negative price changes tend to be followed by positive price changes.

The most striking aspect of this table is the sharp delineation among the two suspension categories. Order imbalance suspensions have significant return reversals, whereas the news pending suspensions have significant return persistence. This implies that inventory concerns are paramount in the former category, whereas asymmetric information concerns are paramount in the latter category. It therefore appears that the criteria used by the NYSE to classify suspensions -- order imbalance suspensions versus news pending suspensions -- is not arbitrary.

Additionally, this may be the first evidence that inventory concerns can affect the specialist's short term behavior. Previous studies have found only long term inventory influences that can take over a week to resolve themselves. The difference between the previous empirical findings and those shown here can be attributed to the samples under study. For example, Hasbrouck and Sofianos (1993) and Madhavan and Smidt (1993) examine data from normal periods of operation. It may be that only when inventory stresses rise to levels large enough to close the market, they are also strong enough to have a statistically significant short run impact.

3. RESILIENCY OF THE NYSE VERSUS OTHER LIQUIDITY MEASURES

The liquidity of a market for a particular stock is a measure of how "easy" it is to trade that stock. There exist many metrics for liquidity, the popular ones being spreads, depths, volume, and price impact per unit order flow. It can be argued that resiliency, the ability of a market to absorb unusual volatility (arising from any trigger -- order imbalance or impending news announcement) without closing down, should also be regarded as a legitimate metric for liquidity. In this section, we examine how this metric performs.

(INSERT TABLE 3 HERE)

Table 3 documents the relationship between firm size and suspension frequency, and between firm size and bid-ask spreads. Every year, all stocks that traded in that year, irrespective of whether they had a suspension or not, are grouped into size decile portfolios based on their beginning of year market capitalization. The first three columns give the average number of suspensions per year that occurred in that portfolio. The next three columns record the average percentage bid-ask spread when trade reopens for the suspended stocks in that portfolio.

This table shows that larger capitalization stocks have trade in them suspended *more* often. If the number of suspensions per year is used as a metric for liquidity, it seems that large firms are less liquid than small firms. Further classification into news related suspensions and order imbalance related suspensions suggests that this size effect is solely due to imbalance related suspensions. Suspensions are uniformly distributed across deciles for the news pending suspensions, but the order imbalance suspensions are substantially greater in number for large caps. So we must conclude that inventory control problems are a major cause of suspensions for large cap stocks, whereas adverse selection due to asymmetric information afflicts all news suspensions irrespective of firm size. Why does this happen? One reason could be that a specialist has a finite amount of risk capital and, therefore, he finds it more difficult to absorb the higher volume swings associated with large caps. A second possible reason could be that large firms have a larger number of limit orders and small firms have a smaller number of limit orders, and specialists use suspensions to protect the limit orders.

Table 3 also shows that size and the percentage bid-ask spread at the reopening of trade are negatively correlated. If bid-ask spread is used as a metric for liquidity, it seems that large firms are more liquid than small firms. This seems true for both the news related suspensions and the imbalance related suspensions. The bid-ask spreads at the reopen of trade is significantly higher for the news related suspensions (2.1%) than it is for the imbalance related suspensions (1.4%).

In other studies, size shows a positive association with liquidity. Papers by Edmister and James (1983) report that firm size is correlated with average trading volume; Roll (1984) finds a strong negative correlation between implicit spreads and firm size; Wood, McInish and Ord (1985), among many others, document that size and percentage bid-ask spreads are negatively related. While these studies show that the specialist offers a lower bid-ask spread for large firms, the findings presented in Table 3 indicate that larger stocks have trade suspended in them more often. As a matter of fact, the largest decile firm has a bid-ask spread at open that is one-seventh the smallest decile firm, but it has thrice the likelihood of a halt.

This trade-off between spreads and suspensions is a novel result. We offer the following explanation for this result: since specialists are allowed to close down trade more often in large caps, they can afford to set a smaller spread. This line of reasoning is akin to Brennan (1986); he argues that price limits in futures markets economize on required margins. This suggests that there exist multiple dimensions of liquidity, and that the specialist can trade off amongst them. Interestingly, we find no trade off among the bid-ask spread and the length of the suspension.

(INSERT TABLE 4 HERE)

Table 4 provides data on several liquidity measures. The observed trends in these measures differ prior to 1980. In this period all of the conventional measures improve from 1974 to 1979 or so, whereupon a sharp deterioration occurs everywhere except for share volume. However, since 1980, all measures indicate that market liquidity has improved over time. Thus, while the “resilience”metric is generally consistent with the other measures, it still seems to provide some independent information.

4. RESILIENCY OF THE NYSE IN THE PERIOD 1974-1988

Of considerable public policy interest is whether the NYSE has improved its ability to absorb shocks, whether they arise from inventory imbalances or adverse selection concerns. This section addresses this issue.

(INSERT FIGURE 3 HERE)

Figure 3 plots two lines. The dashed line shows the number of suspensions per year in the period

1974-1988. From 1977 to 1980 the market experiences a sharp increase in the number of suspensions per year. This increase is more than reversed in the 1980-1985 period, and thereafter the numbers again increase. However, one must be careful when interpreting this data. Changes in the number of suspensions may be caused by institutional changes at the NYSE or changes in market volatility. To control for market volatility, the solid line in the graph plots the number of suspensions per unit daily percentage volatility. This line shows that there has been a secular decline since 1979. The large number of suspensions in 1987 can be explained almost entirely by the unusual market volatility that year. In keeping with the possibility that institutional changes may influence suspension behavior, the bottom of the figure presents some important events taken from the 1992 NYSE Fact Book. We do not propose a causal relationship here, but simply note the correspondence in time.

Why has liquidity improved? It could be that either the specialist is better able to absorb high return variances (because he has more capital, as more NYSE member firms are incorporated as corporations) or the specialist is simply passing off a greater fraction of the volatility risk to other traders. (Notice that the last two columns in Table 4 indicate that the specialist is participating less and the proportion of block trades are increasing). The issue of whether the specialist’s capability has improved or merely been replaced is an important question in its own right. Absent detailed data on the splitting of the trades, this paper cannot answer that question. What we can say, however, is that from the point of view of the individual investor, it really does not matter who handles his trade; his only concern is speedy execution at the best price. From this perspective, liquidity in terms of the likelihood of execution has improved since 1979.

(INSERT TABLE 5 HERE)

Table 5 analyzes the time series behavior of suspensions in greater detail. The first few columns tell us that suspensions are equally split between news related suspensions and imbalance related suspensions (the blip in 1987 occurs because of the 900 imbalance related suspensions in October 1987). Further, large firms halt more often than small firms in nearly all the years. This reinforces the conclusions drawn from Table 3.

The next few columns in Table 5 chronicle the mean duration of suspensions over the years. Suspension durations seem to be declining and this holds true for both the news and imbalance related suspensions (Table 6 provides a formal test for this). Table 5 also indicates that news related suspensions (mean duration is 108 minutes) last significantly longer than imbalance related suspensions (mean duration is 90 minutes). However, as subsequent results will show, this observation is due entirely to the fact that imbalance suspensions tend to involve larger firms which are suspended for shorter durations.

We next check to find out whether the seeming declines in the duration of suspensions results from lower volatility shocks in the later years. The next few columns in Table 5 chronicle the average absolute percent change in prices during a suspension. The average absolute price movement in a typical suspension in a typical year is 6.7%. This average absolute price movement does not seem to be declining over the years, and this holds true for both the news related suspensions and the imbalance related suspensions.

(INSERT FIGURE 4 HERE)

Figure 4 graphically displays the mean duration and absolute percentage price change data of Table 5. Notice that after 1982, while the price moves during suspensions become larger and larger, the durations of the suspensions actually become smaller and smaller. Further, the improvement appears more dramatic and steadier for those suspensions over which the NYSE has direct control -- the imbalance suspensions. This suggests that over time the NYSE has improved its ability to absorb more extreme news and now does so with shorter suspensions. Moreover, since the reduction in the number of suspensions per unit volatility from Figure 3 predates the changes in Figure 4 by about three years, a macroeconomic regime change is unlikely to be the cause of these separate patterns.

(INSERT TABLE 6 HERE)

Table 6 confirms that the duration of a suspension has become shorter over time. To help isolate the time trend, the regressions control for the absolute abnormal return during the suspension and various measures of firm size. Row 2 in the table deflates firm size by the market value of the NYSE on the day of the suspension, while row 3 uses firm size divided by the GNP price deflator. Deflating by the NYSE's market value is appropriate if, for example, the specialist's primary concern lies with the performance of the stock relative to the whole market. Conversely, deflating by the GNP deflator corresponds to a model in which specialists or traders have a fixed degree of risk aversion and concern themselves with a stock's potential impact on their consumption of real goods. These models also multiply the size variable by the average sample value of the NYSE market value or GNP price deflator; this makes it possible to form direct comparisons of the regression coefficients across the different models.

Notice that the time trend parameter is significant and negative for all the models. This confirms that the duration of a suspension has decreased in this period. We also observe that the time trend parameter is much more negative for the imbalance suspensions than for the news related suspensions. This suggests that much of the improvement in market resiliency occurred in suspensions that were initially triggered by the specialist (the imbalance suspensions) than in suspensions that were initially triggered by the firm (news suspensions). This is the same conclusion we drew from Figure 4.

Many other results emerge. We find, not surprisingly, that it takes a longer time to absorb bigger news. However, the magnitude of the shock has a greater impact on the duration of news suspensions than on the duration of imbalance suspensions. As for the size parameter, notice that the regression coefficients are very similar for all the measures of size, suggesting that the results are robust. Further, since the size coefficients are significant and negative, it implies that larger firms have shorter suspensions.

We then divide the data into news and imbalance suspensions, and then test the model with firm size normalized by the GNP deflator. In both subsamples, the size parameter has a similar magnitude. What changes dramatically are the parameters for the constant, the time trend, and the impact of the absolute return during the suspension. The estimated constant for the imbalance suspension data is significantly larger than the estimated constant for the news suspension data. This is particularly interesting since the raw numbers indicate that news suspensions last longer on average. One can reconcile these apparently contradictory results by examining the size of the firms involved in each type of suspension. The average news pending suspension involves a firm whose market value puts it in the 3.8 size decile while the same figure for imbalance suspensions rises to 5.4. Since larger firms have shorter suspensions, the average imbalance suspension resolves itself in less time. However, for a firm of a given size, imbalance suspensions actually last longer. This could be because the NYSE faces less uncertainty as to the resolution of news shocks when forewarned by the firm than when the specialist has to infer that something has occurred via unusual order flows.

Since firm size appears to play a large role in the duration of a suspension, the data was further divided into size deciles and the model run on each decile. While the time trend parameter is negative, significant and similar across deciles, the constant (α_0) declines as one moves from smaller to larger firms. However, the decline in the constant seems fairly modest until one reaches the top four deciles, where it falls dramatically. This may reflect the notion that the NYSE allows only its "best" specialists to handle the very large stocks, and these specialists suspend trade only for very short durations. However, we lack direct evidence to test this hypothesis.

While the NYSE's resiliency has apparently increased, it is conceivable that this has come at the expense of the reopening bid-ask spread. We tested for this by running regression specifications similar to those found in Table 6. The results are not reported in a separate table since, in all cases, firm size turns out to be the only influential variable. In particular, neither time, suspension duration nor suspension type has any influence on the reopening bid-ask spread. It appears that once a suspension begins, trade does not resume until after the specialist can offer a "standard" bid-ask spread. For whatever reason, the NYSE does not appear to trade off among the bid-ask spread and the length of the suspension.

(INSERT TABLE 7 HERE)

Table 7 redoes Table 2 by year instead of by size decile. The figures in Table 7 provide some confirmation that the increased resiliency of the NYSE to shocks derives from an improved ability to handle large inventory shocks. A nonparametric trend test provides weak evidence (t-statistic of 1.02) that the correlation between the returns during and after an order imbalance suspension is becoming increasingly negative. More specifically, it appears that there was a fundamental change in 1978 that caused the correlation to become very negative. Since then, it has remained negative with some year to year variation. In 1978, the only significant institutional change listed in the NYSE fact book is the institution of an intermarket trading system. While this single change was probably too minor to trigger the changes observed in the data, it may have signaled to the specialist firms that they would need to improve their order flow handling capacity or face increased competition. Thus, the intermarket system may have both helped the NYSE specialists to take on larger inventory swings as well as prodded them to do so. In contrast to the imbalance data, the news pending suspensions display a relatively constant correlation between the suspension and post suspension returns.

To summarize, we can conclude from Figure 3 and Figure 4, and from Tables 4 through 7, that the ability of market volatility to trigger a suspension has declined since 1979, that the average duration of a suspension has declined in the period 1974 through 1988, and that most of this improvement in resiliency has come from an improved ability to handle large order imbalances.

5. CONCLUSION

The New York Stock Exchange was established to provide a forum where investors can buy and sell securities on demand. Asking how well the exchange has achieved its primary objective is, therefore, an important question. This paper looks at the NYSE's ability to maintain an open trading environment. We construct a new data set -- all recorded trading suspensions in the NYSE from the years 1974 through 1988 -- and explore three issues. First, why do trade suspensions occur? Second, how does market resiliency - the ability of a market to absorb unusually large volatility shocks - compare with the other metrics for liquidity? Third, has the resiliency of the NYSE increased in the period 1974-1988?

Our answer to the first question is that the goal of maintaining price continuity is not the only reason for suspending trade. Adverse selection fears caused by asymmetric information seems to be an important cause for suspensions that are triggered by firms announcing impending news. Inventory concerns are important for large cap stocks. Our answer to the second question opens up an issue for further research: large stocks, if they are traded, offer lower bid-ask percentage spreads, but also have the highest propensity of suspensions. Why? Are various aspects of liquidity, as the above two are, substitutes or complements? Our answer to the last question is generally in the affirmative.

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TABLES

Table 1. Number of Trading Suspensions Per Period, 1974-1988

Period	All Suspensions	News Suspensions	Imbalance Suspensions
	Panel A: Intermonth		
January	94.4 (61.1)	43.3 (20.6)	49.2 (55.0)
February	74.8 (30.6)	41.8 (17.8)	31.5 (21.6)
March	82.6 (23.3)	39.4 (13.7)	41.1 (23.2)
April	77.9 (22.7)	42.1 (12.9)	34.5 (15.3)
May	65.7 (23.6)	40.1 (15.2)	24.7 (12.8)
June	72.0 (33.1)	39.8 (16.1)	30.6 (18.3)
July	70.4 (20.5)	41.3 (17.7)	27.1 (12.7)
August	78.7 (41.7)	43.5 (21.6)	33.7 (29.0)
September	78.7 (39.5)	41.8 (15.6)	34.9 (26.6)
October	157.1 (214.2)	45.3 (13.7)	107.8 (209.3)
November	91.0 (70.8)	39.7 (14.6)	48.6 (64.7)
December	69.3 (40.9)	38.8 (16.8)	27.5 (30.1)
Typical Month	84.4 (74.4)	41.4 (16.1)	40.9 (69.2)
F-Value	1.68	0.21	1.64
t-value		0.09	
	Panel B: Interday		
Monday	4.5 (8.2)	2.2 (1.9)	2.1 (7.4)
Tuesday	3.6 (8.9)	1.8 (1.6)	1.7 (8.7)
Wednesday	4.0 (8.6)	1.9 (1.7)	2.1 (8.1)
Thursday	4.2 (7.8)	2.0 (1.7)	2.1 (7.4)
Friday	3.7 (3.5)	1.9 (1.7)	1.7 (2.8)
Typical Day	4.0 (7.7)	2.0 (1.7)	1.9 (7.2)
F-value	1.7017	5.7554^{***}	0.6809
t-value		0.83	
	Panel C: Intraday		
First Hour of Trade	2.8 (6.4)	1.1 (1.3)	1.7 (6.2)
Rest of Day	1.1 (2.6)	0.9 (1.1)	0.2 (2.3)
F-value	228.5151^{***}	72.9552^{***}	186.4988^{***}

Note:

1) The F-value is under the null that the means across the periods are the same.
2) The t-value is under the null that the means for both the news and imbalance suspensions are the same in the typical month/typical day. The t-value for the null that the Monday mean is the same as the Thursday mean for news related suspensions is 2.15^{**}.
3) Standard deviations are in parenthesis
4) * implies significance at the 10% level, ** implies significance at the 5% level, *** implies significance at the 1% level.

Table 2. Spearman's Correlation Coefficient Between Returns During the Suspension and Returns from Suspension End Until the Close of Trade that Day

Size Decile	All Observations	News Pending Suspensions	Order Imbalance Suspensions
	-0.0227**	0.1639**	-0.1590**
All	4.5632	105.6160	125.1923
	8887.0000	3935.0000	4952.0000
	0.0883*	0.1911**	-0.1886*
Smallest	4.7975	17.4211	4.9093
	617.0000	478.0000	139.0000
	0.0377	0.2168**	-0.2027**
2	1.0250	22.1361	10.3094
	724.0000	472.0000	252.0000
	-0.0105	0.1585**	-0.2280**
3	0.0826	10.7961	16.3260
	746.0000	431.0000	315.0000
	-0.0037	0.1302**	-0.1242*
4	0.0104	6.6661	5.6463
	761.0000	394.0000	367.0000
	-0.0670*	0.0741	-0.1838**
5	3.8724	2.2893	15.0287
	864.0000	418.0000	446.0000
	-0.0507	0.1880**	-0.1897**
6	2.1980	12.4470	18.0997
	857.0000	353.0000	504.0000
	-0.0708*	0.1240*	-0.1673**
7	5.0864	6.2311	17.0768
	1017.0000	406.0000	611.0000
	-0.0837**	0.1161*	-0.1621**
8	7.1985	4.5303	18.1476
	1029.0000	337.0000	692.0000
	-0.0392	0.2140**	-0.1177**
9	1.7099	15.1999	10.7884
	1113.0000	333.0000	780.0000
	-0.0543	0.1871**	-0.1266**
Largest	3.4109	10.9228	13.5407
	1159.0000	313.0000	846.0000

Note: * = Significant at the 5% level, ** = Significant at the 1% level. Top row: Spearman 's Correlation Coefficient; Middle Row: Chi Square Statistic; Bottom Row: Number of Observations.

Table 3. Summary Characteristics for each of Ten NYSE Size Portfolios, 1974-1988

Sizes	Average Number of Suspensions Per Year			Average Percentage Bid-Ask Spread at Reopen of Trade		
	All Suspensions	News Suspensions	Imbalance Suspensions	All Suspensions	News Suspensions	Imbalance Suspensions
Smallest	53.9 (17.6)	44.8 (15.4)	7.9 (5.7)	7.0 (45.2)	6.2 (34.4)	11.0 (80.5)
2	61.2 (27.2)	46.5 (19.2)	13.5 (10.8)	3.6 (31.4)	4.0 (36.4)	1.9 (1.2)
3	74.6 (27.8)	51.4 (21.2)	21.7 (10.4)	2.1 (1.9)	2.1 (2.0)	2.0 (1.4)
4	85.0 (34.6)	54.2 (21.1)	28.9 (17.0)	1.7 (1.7)	1.7 (1.7)	1.7 (1.6)
5	84.7 (37.0)	48.4 (19.5)	34.0 (22.8)	1.9 (9.9)	2.0 (13.0)	1.7 (2.8)
6	96.2 (49.3)	49.6 (21.5)	43.9 (35.0)	1.5 (3.6)	1.5 (3.8)	1.5 (3.6)
7	107.2 (46.1)	51.4 (18.0)	53.7 (37.9)	1.3 (2.4)	1.1 (0.8)	1.4 (3.2)
8	107.1 (47.1)	41.3 (17.4)	63.3 (41.1)	1.4 (8.4)	1.2 (3.8)	1.2 (2.0)
9	117.3 (66.0)	37.1 (13.4)	77.4 (63.1)	1.0 (3.3)	0.9 (0.8)	1.1 (4.0)
Largest	167.5 (95.5)	40.1 (17.6)	122.7 (92.1)	0.8 (2.3)	0.8 (1.7)	0.8 (2.5)
All Sizes	1012.5 (381.0)	496.8 (163.8)	491.1 (320.7)	1.8 (13.6)	2.1 (15.8)	1.4 (10.8)
F-value	6.85***	1.38	10.92***	15.85***	6.89***	11.34***
t-value		0.06			3.04***	

Note:

1) Percentage bid-ask spread is defined as 200(Ask Price-Bid Price)/(Ask Price+Bid Price)
2) Every year, all stocks that traded in that year, irrespective of whether they had a suspension or not, are grouped into size decile portfolios based on their beginning of year market capitalization. The first three columns give the average number of suspensions per year that occurred in that portfolio.
3) The F-value is under the null that the means across the size deciles are the same.
4) The t-value is under the null that the means for both the news and imbalance suspensions are the same.
5) Standard deviations are in parenthesis
6) * implies significance at the 10% level, ** implies significance at the 5% level, *** implies significance at the 1% level.

Table 4. Time Trend of Liquidity Measures, 1974-1988

Year	Liquidity Measures								Specialist Participation	
	Number of Suspensions	Number of Suspensions per 1% Daily Standard Deviation	Conventional Liquidity Measures							
			Price Continuity (%)a1	Quotation Spreads (%)a2	Market Depth (%)a3	Turnover (%)a4	Share Volume per year (Billions of shares)a	Commission per share (cents/share) b	Percentage of trades specialist participates (%)a	Percent Block Trades (%)a
1974	750	578	84.3	44.9	-	16	3.5	-	13.4	15.6
1975	696	753	88.1	59.9	-	21	4.7	-	12.6	16.6
1976	716	1101	90.3	71.0	-	23	5.4	-	12.4	18.7
1977	755	1437	92.5	75.9	86.0	21	5.3	13.6	11.2	22.4
1978	1280	1681	90.8	72.9	84.4	27	7.2	13.4	11.8	22.9
1979	1345	1984	90.6	71.1	84.9	28	8.2	13.1	11.6	26.5
1980	1826	1784	86.4	60.6	80.4	36	11.4	13.8	12.4	29.2
1981	1134	1379	87.2	60.4	81.6	33	11.9	13.1	11.6	31.8
1982	1367	1314	89.5	65.1	85.2	42	16.5	12.9	10.8	41.0
1983	1126	1477	88.7	60.7	86.2	51	21.6	12.3	11.0	45.6
1984	685	958	91.1	64.7	88.0	49	23.1	11.3	10.7	49.8
1985	525	936	92.3	70.6	89.8	54	27.5	10.6	10.6	51.7
1986	598	753	90.2	69.8	89.2	64	35.7	10.1	11.6	49.9
1987	1448	825	89.0	67.5	87.2	73	47.8	9.6	12.1	51.2
1988	937	1061	94.1	78.7	92.1	55	40.8	9.1	9.2	54.5

Notes:

1) Source of data: the "a's" come from the *NYSE Fact Book: 1992*, "b" is from Greenwich Associates.

2) a_1: "Price Continuity" - the percentage of transactions which occurred with less than or equal to a 1/8 point price variation from the previous trade

a_2: "Quotation Spreads" - the percentage of quotes where the bid-ask spread was 1/4 point or less

a_3: "Market Depth" - For every 1000 shares traded, the percentage of trades where prices changed subsequently by 1/8 point or less

a_4: "Turnover" - share volume traded per year divided by number of shares outstanding

Table 5. Time Trend of Suspension Characteristics, 1974-1988

Year	Number of Suspensions					Mean Duration of Suspensions (Hours)			Average Absolute Percent Change in Prices		
	All	News	Imbalance	Smallest Decile	Largest Decile	All	News	Imbalance	All	News	Imbalance
1974	750	357	365	47	182	1.6 (1.0)	1.8 (1.2)	1.4 (0.8)	7.2 (7.8)	6.9 (8.8)	7.2 (6.8)
1975	696	447	238	48	123	1.7 (1.1)	1.7 (1.2)	1.6 (1.0)	5.6 (7.7)	4.9 (7.4)	6.2 (6.9)
1976	716	523	182	56	89	1.6 (1.1)	1.7 (1.2)	1.5 (0.9)	4.8 (6.3)	4.1 (6.2)	5.9 (5.2)
1977	755	591	156	67	60	1.7 (1.1)	1.8 (1.2)	1.6 (0.8)	5.3 (8.9)	4.7 (7.6)	6.1 (5.2)
1978	1280	677	548	64	139	1.9 (1.2)	2.0 (1.3)	2.0 (1.2)	5.7 (7.2)	5.3 (9.3)	5.9 (4.9)
1979	1345	815	511	90	139	1.8 (1.1)	1.8 (1.1)	1.9 (1.0)	7.3 (37.8)	7.2 (33.3)	7.6 (4.4)
1980	1826	651	1165	63	356	1.7 (1.0)	1.9 (1.1)	1.7 (0.9)	5.3 (6.6)	4.5 (7.8)	5.6 (6.0)
1981	1134	634	460	75	188	1.9 (1.0)	2.0 (1.1)	1.7 (0.9)	5.2 (7.2)	5.1 (8.4)	5.4 (6.0)
1982	1367	504	802	53	277	1.9 (1.0)	2.1 (1.3)	1.8 (0.9)	5.2 (6.7)	5.7 (10.2)	5.0 (4.7)
1983	1126	466	623	48	205	1.5 (0.8)	1.7 (1.0)	1.4 (0.6)	5.2 (7.4)	3.5 (6.2)	6.2 (8.0)
1984	685	382	291	30	114	1.6 (1.1)	2.1 (1.3)	1.2 (0.5)	8.4 (44.0)	9.7 (62.4)	7.2 (7.0)
1985	525	263	246	35	90	1.5 (1.1)	2.1 (1.3)	1.0 (0.5)	7.0 (7.7)	5.6 (8.4)	8.3 (7.1)
1986	598	288	299	33	81	1.1 (0.8)	1.5 (0.8)	0.8 (0.5)	8.3 (12.2)	7.1 (14.6)	9.1 (9.9)
1987	1448	276	1139	31	360	1.2 (0.9)	1.5 (1.0)	1.2 (0.9)	10.3 (9.3)	8.6 (12.3)	10.7 (8.7)
1988	937	578	342	69	110	1.0 (0.8)	1.3 (0.9)	0.7 (0.4)	10.0 (40.9)	10.5 (53.6)	9.4 (10.6)
Typical Year	1012.5 (381.0)	496.8 (163.8)	491.1 (320.7)	53.9 (17.6)	167.5 (95.5)	1.6 (1.0)	1.8 (1.2)	1.5 (0.9)	6.7 (19.2)	6.1 (25.1)	7.1 (13.3)
t-value		0.06_a		4.53_b^{***}			16.04_c^{***}			2.86_d^{**}	

Note:

1) The duration and the average absolute percent change in prices are computed only for suspensions that last less than one day.
2) Every year, <u>all</u> stocks that traded in that year, irrespective of whether they had a suspension or not, are grouped into size decile portfolios based on their beginning of year market capitalization. The fourth and fifth columns give the average number of suspensions per year that occurred in that portfolio.
3) The t-value is under the null that the mean returns during suspensions in the typical year are the same (a: news vs. imbalance; b: largest decile vs. smallest decile; c: news vs. imbalance; d: news vs. imbalance).
4) Standard deviations are in parenthesis
5) * implies significance at the 10% level, ** implies significance at the 5% level, *** implies significance at the 1% level.

Table 6. Time Trend of Duration of Suspensions (lasting less than one day), 1974-1988

Model: $D_i = \alpha_0 + \alpha_1 * ABSRET_i + \alpha_2 * \ln(SIZE_i) + \alpha_3 T_i$

where

D_i = duration of suspension i in hours
$ABSRET_i$ = the stock's absolute abnormal return during suspension i
$SIZE_i$ = firm's market capitalization in the beginning of the year suspension i occurred. This is measured in either nominal dollars, or divided by the market value of the NYSE, or divided by the GNP deflator. When using either the market value of the NYSE or the GNP deflator, the size is also multiplied by a normalizing constant equal to the average value of the respective deflator in the sample.
T_i = a time trend parameter denoting the trading day of suspension i (Jan 02, 1974 is 1, Jan 03, 1974 is 2, and so on)

MODELS	Parameter (Independent Variable)				
	α_0	α_1 (ABSRET)	α_2 (ln(SIZE))	α_3 (T, Time trend)	Regression Statistics
All Suspensions: Size in Nominal Dollars	2.8003	0.2659	-0.0704	-0.000172	R^2 = 0.072
	(0.0399)	(0.0509)	(0.0065)	(0.000008)	N = 10880
All Suspensions: Size Deflated by NYSE Total Market Value	2.8256	0.2710	-0.0645	-0.000192	R^2 = 0.071
	(0.0446)	(0.0509)	(0.0065)	(0.000007)	N = 10880
All Suspensions: Size Deflated by the GNP Deflator	2.8681	0.2616	-0.0767	-0.000182	R^2 = 0.074
	(0.0425)	(0.0508)	(0.0065)	(0.000007)	N = 10880
News Suspensions: Size Deflated by the GNP Deflator	2.6050	0.3156	-0.0684	-0.000090	R^2 = 0.026
	(0.0665)	(0.0678)	(0.0113)	(0.000012)	N = 5008
Imbalance Suspensions: Size Deflated by the GNP Deflator	3.1396	0.0824	-0.0793	-0.000278	R^2 = 0.167
	(0.0569)	(0.0843)†	(0.0081)	(0.000009)	N = 5872
Sizedecile 1 Suspensions (The smallest size)	2.5471	-0.0100		-0.000133	R^2 = 0.022
	(0.0919)	(0.0785)†		(0.000029)	N = 913
Sizedecile 2 Suspensions	2.4560	1.8339		-0.000219	R^2 = 0.081
	(0.0812)	(0.3705)		(0.000025)	N = 1047
Sizedecile 3 Suspensions	2.4932	2.1096		-0.000244	R^2 = 0.110
	(0.0795)	(0.3339)		(0.000025)	N = 1034
Sizedecile 4 Suspensions	2.4442	1.8216		-0.000209	R^2 = 0.068
	(0.0803)	(0.4197)		(0.000026)	N = 1033
Sizedecile 5 Suspensions	2.4481	1.8005		-0.000208	R^2 = 0.076
	(0.0782)	(0.3566)		(0.000025)	N = 1094
Sizedecile 6 Suspensions	2.4283	0.1145		-0.000193	R^2 = 0.062
	(0.0693)	(0.1319)†		(0.000023)	N = 1090
Sizedecile 7 Suspensions	2.3080	2.6230		-0.000184	R^2 = 0.072
	(0.0709)	(0.5356)		(0.000022)	N = 1169
Sizedecile 8 Suspensions	2.3245	2.9522		-0.000207	R^2 = 0.107
	(0.0668)	(0.4720)		(0.000021)	N = 1142
Sizedecile 9 Suspensions	2.2936	4.1553		-0.000236	R^2 = 0.141
	(0.0614)	(0.5663)		(0.000019)	N = 1166
Sizedecile 10 Suspensions (The largest size)	2.1677	0.0721		-0.000185	R^2 = 0.084
	(0.0530)	(0.0899)†		(0.000018)	N = 1191

Notes:

1) Suspensions lasting more than one day are excluded
2) The abnormal return during a suspension is the actual return minus the return that can be explained by the market movement. The latter is computed using parameters from a market model estimated in a sixty month window.
3) Every year, all stocks that traded in that year, irrespective of whether they had a suspension or not, are grouped into size decile portfolios based on their beginning of year market capitalization. The observations in the sizedecile regressions refer to the suspensions that occurred for stocks in this sizedecile portfolio.
4) Standard errors are in parenthesis. All parameter estimates are significant at the 1% level *except* as noted. † not significant at the 1% level..

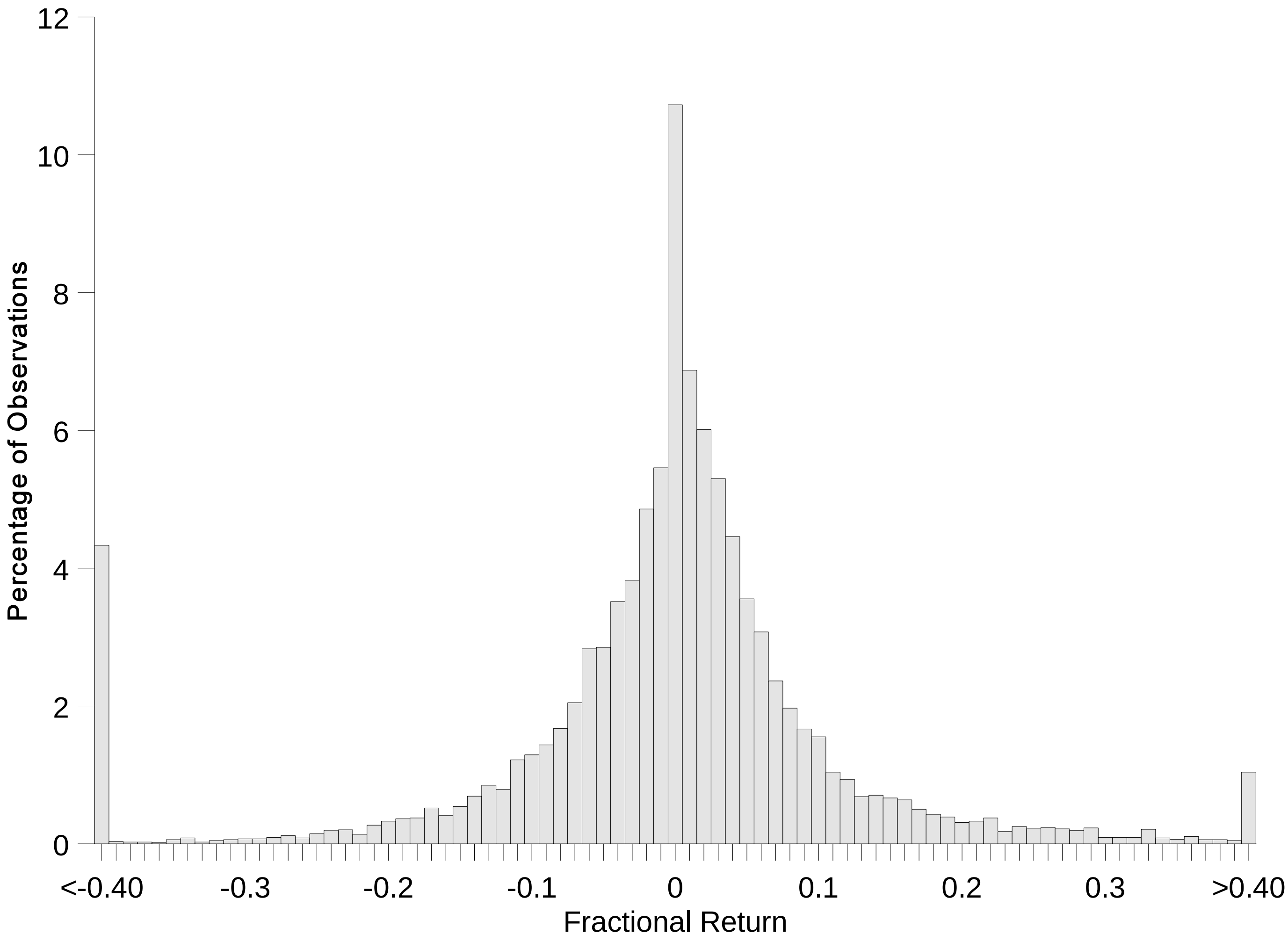
Table 7. Spearman's Correlation Coefficient Between Returns During the Suspension and Returns from Suspension End Until the Close of Trade that Day

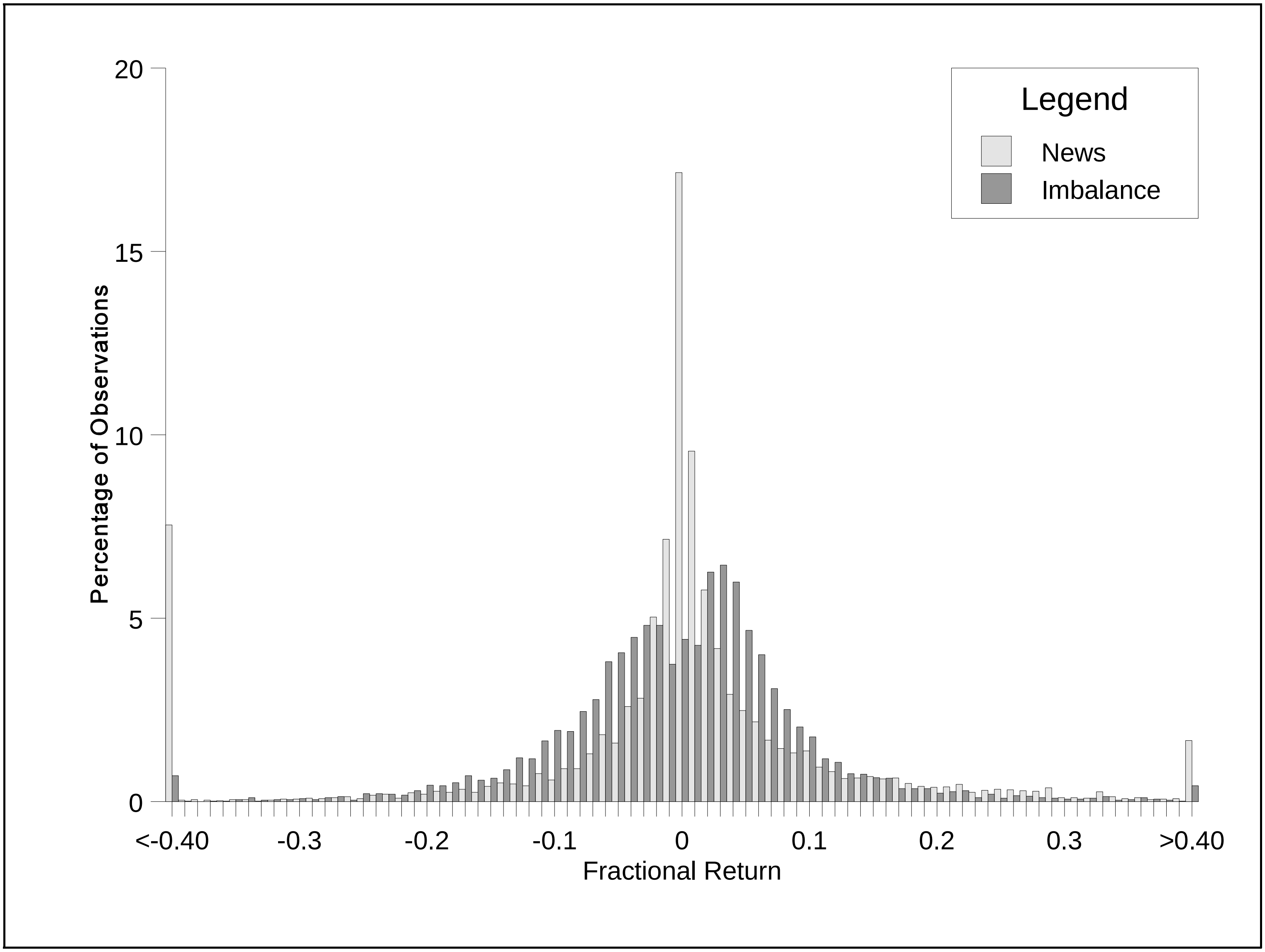
Year	All Observations	News Pending Suspensions	Order Imbalance Suspensions
	0.0944	0.1863*	0.0235
1974	3.5853	5.2432	0.1380
	403.0000	152.0000	251.0000
	0.1529**	0.3223**	-0.0678
1975	9.3729	22.7503	0.8314
	402.0000	220.0000	182.0000
	0.1937**	0.2987**	0.0332
1976	15.2684	24.6185	0.1430
	408.0000	277.0000	131.0000
	0.1860**	0.2432**	0.0473
1977	13.8689	17.4465	0.2346
	402.0000	296.0000	106.0000
	-0.1302**	0.1858**	-0.3561**
1978	12.9893	12.3598	51.5973
	767.0000	359.0000	408.0000
	-0.0788*	0.1055*	-0.2831**
1979	4.9057	4.8670	28.2860
	792.0000	438.0000	354.0000
	-0.1469**	0.1202*	-0.2326**
1980	27.0278	5.0239	48.8998
	1254.0000	349.0000	905.0000
	0.0264	0.0997	-0.0466
1981	0.4670	3.3705	0.7165
	671.0000	340.0000	331.0000
	-0.0668*	0.0255	-0.1116**
1982	3.7234	0.1518	7.4791
	836.0000	235.0000	601.0000
	-0.0845*	0.1028	-0.1701**
1983	5.3816	2.5810	14.6906
	754.0000	245.0000	509.0000
	-0.0007	0.1256	-0.1275
1984	0.0002	3.4258	3.8362
	455.0000	218.0000	237.0000
	-0.0593	0.0242	-0.0987
1985	1.2505	0.0948	1.8800
	357.0000	163.0000	194.0000
	0.0070	0.1943*	-0.1238
1986	0.0203	6.4965	3.6963
	415.0000	173.0000	242.0000
	-0.0419	0.2555**	-0.2067**
1987	0.6721	9.4684	10.0816
	383.0000	146.0000	237.0000
	0.0727	0.1780**	-0.0286
1988	3.1063	10.2622	0.2147
	589.0000	325.0000	264.0000

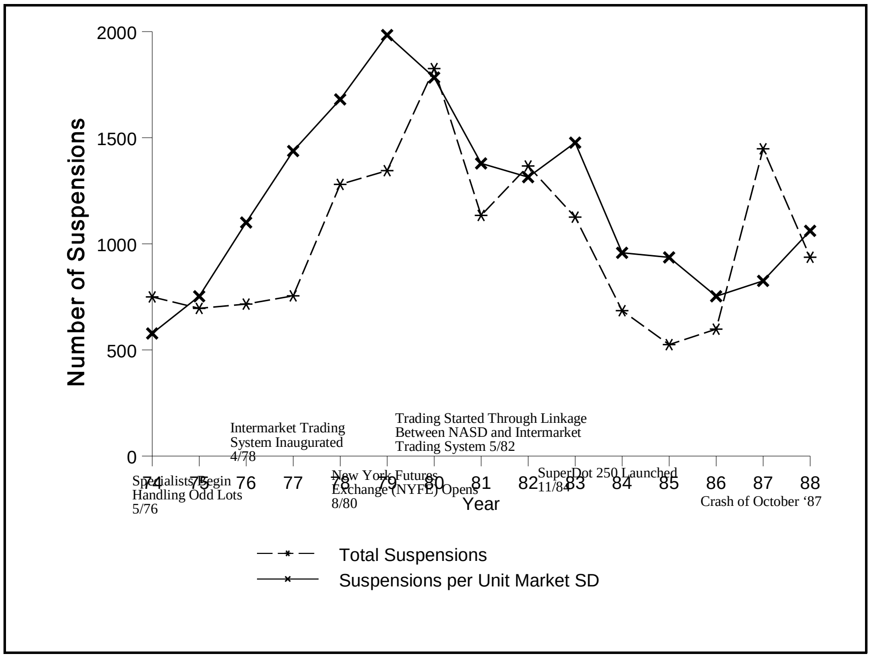
Notes: * = Significant at the 5% level, ** = Significant at the 1% level. Top row: Spearman 's Correlation Coefficient, Middle Row: Chi Square Statistic, Bottom Row: Number of Observations.

FIGURE TITLES

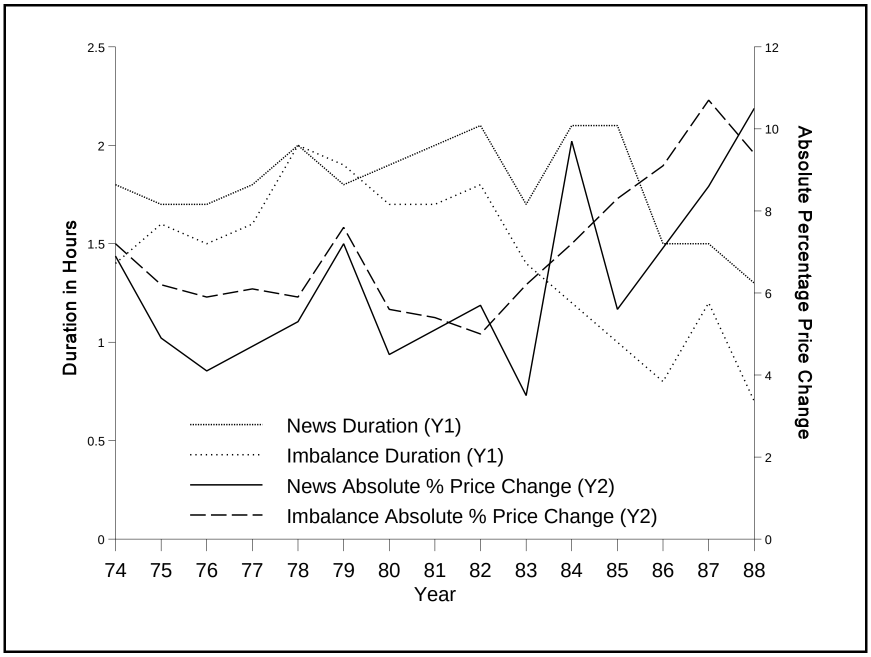
FIGURE ARTWORK




Legend
News
Imbalance
Percentage of Observations
20
15
10
5
0
<-0.40
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
>0.40
Fractional Return



Number of Suspensions
2000
1500
1000
500
0
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
Year
Intermarket Trading
System Inaugurated
4/78
Trading Started Through Linkage
Between NASD and Intermarket
Trading System 5/82
Specialists Begin
Handling Odd Lots
5/76
New York Futures
Exchange (NYFE) Opens
8/80
SuperDot 250 Launched
11/84
Crash of October '87
Total Suspensions
Suspensions per Unit Market SD



Duration in Hours
Absolute Percentage Price Change
News Duration (Y1)
Imbalance Duration (Y1)
News Absolute % Price Change (Y2)
Imbalance Absolute % Price Change (Y2)
Year
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
0
0.5
1
1.5
2
2.5
0
2
4
6
8
10
12