The Value of the Non-Monopolist Specialist

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Abstract

We examine the Paris Bourse call auction, which closely resembles the market structure envisioned by theorists, to test several theoretical predictions regarding participation by the non-monopolist specialist. In contrast to the NYSE specialist, the non-monopolist has no information advantage over other market participants. We present direct evidence in support of the Garbade and Silber (1979) hypothesis that auctions clear more frequently in the presence of the specialist. Consistent with Grossman and Miller (1988), we also find that temporal imbalances in order flow are smaller when the specialist facilitates the trading process. Around the announcement of specialist introduction, stocks experience an average abnormal return of nearly five percent that is positively correlated with the increase in market clearing, which supports the Amihud and Mendelson (1986) proposition that liquidity is priced. Overall, these results suggest that the specialist can improve the terms of trade even in the absence of any market power by merely maintaining a regular market presence.

Key Words: Specialist; Market maker; Market quality; Electronic limit order book
1. Introduction

In a seminal paper, Demsetz (1968) identifies the lack of “predictable immediacy of exchange in financial markets” as a fundamental trading problem. The problem arises because the arrival of buyers and sellers is not perfectly synchronized; therefore, counterparties may not be available at the point in time when traders demand liquidity. Demsetz argues that such trading uncertainty can be mitigated by the presence of a designated market maker (henceforth, specialist) who fills gaps arising from asynchronous order arrival. Analytical papers by Garbade and Silber (1979) and Grossman and Miller (1988) provide formal treatment of this fundamental role of the specialist. Specifically, the models demonstrate that the specialist, by maintaining a regular market presence, will reduce temporal imbalances in order flow, increase market clearing, and thus reduce investors’ price risk. This paper provides direct tests of several theoretical models of specialist participation. In doing so, we attempt to shed light on a broader question: Does the presence of the specialist add value?

The laboratory for the investigation, the Paris Bourse, is well suited for testing theoretical predictions of specialist participation for several reasons. The Bourse is a pure limit order market that has introduced specialists to facilitate trading in a subset of its stocks. By comparing market quality across specialist and non-specialist trading regimes for the same stock while controlling for market wide effects using matched control stocks, we present relatively clean empirical tests that isolate the specialist’s impact. Further, the sample firms that we analyze trade via twice daily call auctions both before and after specialist introduction. This market structure closely resembles that envisioned by theorists (e.g., Garbade and Silber (1979)) and allows us to construct market quality measures akin to those described in the relevant models. Finally, the theoretical models we test propose that specialists enhance market quality by simply maintaining
a regular market presence. However, empirical studies in the literature have focused on the NYSE specialist, who has a privileged position vis-à-vis the market due to monopolistic access to order flow information. While this feature may enhance the appeal of the monopolist specialist at the NYSE, it interferes with clean tests of models that analyze the role of the specialist in resolving temporal imbalances in order flow. In contrast, the Paris specialist is a non-monopolist in the sense that he has no information advantage over any other public trader. Therefore, we test theories of specialist participation in a market structure that approximates the paradigm in which they were conceived.

Our empirical results strongly support theoretical predictions that specialists enhance market quality. The regular presence of the specialist reduces the order imbalance between buy and sell sides of market just prior to auction clearing, suggesting that the specialist participates by posting orders on the thin side of the market. In addition, the specialist significantly improves the likelihood of auction clearing, thus reducing price risk: the risk that equilibrium values may shift between order submission and execution. Thus, we present the first direct empirical evidence in support of the Garbade and Silber (1979) and Grossman and Miller (1988) predictions that the non-monopolist specialist increases market clearing by resolving temporal imbalances in order flow. We also find evidence consistent with the notion that investors prefer to trade in a specialist intermediated market. Around specialist introduction dates, the sample firms experience a statistically significant average abnormal return of 4.9%, which suggests that the specialist, by improving liquidity, lowers the risk-adjusted return required by investors, as predicted by Amihud and Mendelson (1986).

This paper is closely related to two lines of prior work. The first concerns the ability of the monopolist specialist to resolve information asymmetry and prevent market failure. The
active exercise of monopoly power allows the specialist to recoup losses sustained during times of high information asymmetry from profits in other periods [Glosten and Milgrom (1985)] or by cross-subsidizing losses to informed traders with rents earned on uninformed trades [Glosten (1989)]. Similarly, the monopolist specialist can compel traders to reveal hidden order flow [Benveniste et al. (1992)] and can set more efficient prices at the open [Madhavan and Panchapagesan (2000)]. Empirical evidence strongly supports the notion that the NYSE specialist can better discern the composition of order flow over time and thereby enhance market quality. This paper contributes to this line of research by documenting that the specialist can improve the terms of trade even in the absence of any market power by merely maintaining a regular market presence.

The second line of research concerns competition between specialists and public limit orders in providing liquidity. Glosten (1994) shows that competition for order flow from public liquidity providers in an open consolidated book will make this structure ‘inevitable’ in the sense that any alternative market structure, including the specialist structure, cannot successfully compete with it. In related work, Seppi (1997) shows that, for mid-size orders, a pure limit order market may offer better liquidity than a specialist market. Domowitz and Steil (2001, p.325) argue against the need for a specialist, saying “For those transactions which require intermediary liquidity provision for immediate execution, the supply of risk capital will emerge naturally from the profit incentive.” However, the crucial assumption in these arguments is the presence of a large number of public liquidity suppliers. As discussed by Glosten (1994), this assumption is unlikely to be met in reality, particularly so for less liquid stocks, which can help explain our finding that the specialist improves market quality in a pure limit order market.

The issues addressed here are of more than academic importance. Recent allegations of
trading abuses by NYSE specialist firms have fostered a climate of growing dissatisfaction with the specialist system within the investment community. Among the most vociferous critics of the NYSE specialists are institutional traders. According to Scott DeSano, head of equity trading for Fidelity Investments, “Our gripe isn’t with the specialists themselves but with the monopoly privileges that allow them to operate to the detriment of all investors”.

At the same time, we observe a global trend among stock exchanges towards pure limit order markets that operate without specialist participation, thus casting further doubt on the need for intermediation. This paper therefore provides valuable insights by studying an alternative form of market intermediation – a non-monopolist specialist, who stands ready to trade should an order arrive, but who has no information privileges and hence no market power. To the extent that the market power of the specialist is successfully curtailed, either via direct regulatory oversight (the intended NYSE model) or via full disclosure of the trading process to all market participants (the Paris Bourse model), the results in this paper suggest that there is a role for the non-monopolist specialist in the landscape of the modern financial market.

The paper is organized as follows. The next section outlines the specific theoretical hypotheses that we will investigate. Section 3 describes the market structure of the Paris Bourse and the experimental design. Section 4 presents the results, and the final section concludes.

2. Background and Testable Predictions

2.1 Background

Theoretical analyses of specialist participation focus on the specialist’s role in resolving two types of market frictions - information asymmetry and asynchronous order arrival. Glosten

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(1989) shows that competitive market makers may rationally stay away during periods of high information asymmetry and cause market failure. In contrast, a monopolist specialist (e.g., at the NYSE) with privileged access to information about the trading process can average profits across trades or over time and keep markets open.³ Other studies argue that the monopolist specialist helps improve market quality through enhanced price discovery [see Madhavan and Panchapagesan (2000)]. On the other hand, an important strand of related literature considers the implicit costs to the specialist’s market power. For example, Rock (1997) and Ready (1999) contend that limit orders on the book are more likely to execute against informed traders in the presence of the monopolist specialist. Several studies empirically examine the role of the monopolist specialist and find support for the theoretical predictions.⁴

A second branch of research considers the role of the non-monopolist specialist in resolving imperfect synchronization of order arrivals. Demsetz (1968) observes that buyers and sellers generally will not arrive at the market simultaneously. As a result, the provision of liquidity can be enhanced by the specialist who maintains a market presence and resolves idiosyncratic order arrival. While several studies model the value of a non-monopolist specialist, there has been little, if any, empirical work directly testing the implications of these theories.⁵ In this section, we review the relevant literature and present testable predictions from theoretical models.

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² Several academic studies have argued that the discretion granted to the NYSE specialist has the potential to adversely affect market quality [see, for example, Rock (1997), Stoll and Whaley (1990), and Ready (1999)].
³ See Glosten and Milgrom (1985) and Easley and O’Hara (1987). Along similar lines, the monopolist specialist in Benveniste et. al. (1992) uses the privileged position to elicit truth-telling from floor participants on hidden order flow information and improves the overall terms of trade.
⁵ Nimalendran and Petrella (2003), a notable exception, provide indirect evidence that is consistent with but does not directly test the predictions of the relevant theoretical models.
2.2 Testable Predictions

The role of the non-monopolist specialist is formalized in Garbade and Silber (1979), henceforth GS, and Grossman and Miller (1988), henceforth GM, who analytically show that the specialist resolves transient imbalances in public order flow by standing ready to transact should an order happen to arrive. They predict that the specialist will reduce the wait time for traders who demand liquidity and, thereby, mitigate the price risk that the equilibrium value may shift in the interim. These arguments suggest the following testable hypotheses:

*Hypothesis 1:* Specialist introduction resolves temporary imbalances in order flow.

*Hypothesis 2:* Specialist introduction increases market clearing frequency.

GS emphasize a second dimension of price risk that is an artifact of immediacy provision - the uncertainty in transaction prices relative to the value of the underlying security. They argue that when auctions clear more frequently, the volume of order flow consolidated through time at each auction diminishes. As a result, prices determined by thinner supply and demand schedules may provide a less accurate estimate of security value. One implication of this argument is that the volatility of prices from one auction to the next will increase in the presence of a specialist who facilitates trade on a more regular basis. Another possibility, however, is that by reducing imbalances on the book, transactions that would have occurred in the absence of a specialist are now likely to do so at prices that deviate less from security value. These opposing effects lead to our third testable hypothesis:

*Hypothesis 3:* Specialist introduction affects return volatility.

The arguments in Demsetz (1968), GS, and GM suggest that the specialist’s ability to provide liquidity will lead investors to prefer a specialist intermediated market over a purely public market. To gauge investor preference, we rely on Amihud and Mendelson (1986), who
argue that liquidity is priced. If investors value the services of the non-monopolist specialist, and if liquidity is priced, then the announcement of the specialist’s introduction will be perceived by the market as good news. We test this joint hypothesis:

Hypothesis 4: The announcement of specialist introduction is associated with positive abnormal returns.

While a strong theoretical foundation exists for the notion that the non-monopolist specialist can improve trading conditions, it remains unclear why any public trader could not fulfill this role by simply posting limit orders when the imbalance is high. Glosten (1994) argues that an order driven market in which public limit order traders supply liquidity is competition proof. Under these conditions, the introduction of a specialist is unlikely to offer any marginal benefit. The critical underlying assumption to this model is, of course, that the supply of limit orders is sufficiently large. This may not be true, especially in the case of less actively traded securities for which the demand for immediacy is small and, therefore, the cost to de facto market makers of maintaining a regular market presence is large. Nevertheless, Glosten’s (1994) proposition serves as a foundation for the null hypothesis against which we test all of the above: the introduction of a specialist has no effect.

3. Institutional background and experimental design

3.1 Institutional background

The Paris Bourse is an open electronic limit order market. Limit orders supply liquidity

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7 The time period analyzed in our study predates the September 2000 merger of the Paris Bourse, the Amsterdam Stock Exchange, and the Brussels Stock Exchange to form Euronext. The institutional details described in this section apply to the Paris Bourse during the analysis period. See Biais et al. (1995,1999), Harris (1996), Demarchi
to immediacy demanding market orders, both of which are submitted, processed, and displayed through a transparent electronic limit order book. Orders are executed automatically according to strict price, exposure and time priority rules. Trading takes place continuously for the more liquid securities. Less active stocks trade via twice-daily call auctions at 11:30 a.m. and 4:00 p.m. Executions in the call auction are based on the single price that maximizes trading volume.

According to exchange officials, the public order driven market mechanism was not entirely successful as some stocks experienced wide bid-ask spreads during continuous trading or infrequent clearing during the call auction. In 1992, the Paris Bourse initiated a program to allow specialists (known as animateurs) to facilitate trade in certain less liquid securities. In 1994, the program was extended such that more actively traded issues were also eligible. The exchange does not mandate that any stock trade under the auspices of the specialist, nor is it involved in the process of selecting the intermediary. Both decisions are made by the listed firm. The exchange merely acts as an agent by providing firms with a list of eligible specialists and their prior performance rankings.

The specialist in Paris is required by the Bourse to merely maintain a regular market presence, i.e., quote a maximum bid-ask spread and a minimum depth and execute, to a certain extent, orders partially or totally unmatched during the call auction. Unlike the NYSE specialist, the Bourse specialist is not obliged to maintain price continuity or to trade in a stabilizing manner. A surveillance team monitors and ranks the specialist and may terminate his service for poor performance. In return for providing liquidity, the specialist pays no exchange fees on market making related trades; he is recognized as an exclusive dealer for the security and as a

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8 Hasbrouck and Sofianos (1993) and Cao, Choe, Hatheway (1997) offer detailed discussions of the NYSE specialist performance criteria. The stabilization role of the specialist is analyzed in Goldstein and Kavacejz (2003).
focal point for block trades. In contrast with his NYSE counterpart, the Paris specialist is not granted privileged access to the limit order book, nor does he have the opportunity to condition his price schedule on the arriving order flow. As such, he is a non-monopolist specialist.

In the absence of any monopoly power, it is unclear whether professional liquidity provision is a profitable enterprise, especially for less liquid stocks. So, why become a specialist in Paris? First, the specialist and the listing firm typically negotiate a private liquidity agreement wherein the intermediary is paid an annual fee for his services. Second, and more importantly, the specialist is often the executor of the listed firm’s investment banking ventures, which indirectly subsidize the market making business. Thus, a high performance rating from the Paris Bourse provides the specialist firm with a powerful marketing tool for additional investment banking business and is a major incentive to perform well as a liquidity provider (see Madhavan et al. (2003) for related discussions on relationship markets).

3.2 Data and sample selection

Trade, order and quote data are obtained from the Paris Bourse’s Base de Données de Marche (BDM) database. The sample period covers four years from January 1995 to December 1998. The theoretical models we test were envisioned largely in the framework of a call auction, and several measures of market quality that we examine are most easily understood in this context. Therefore, we restrict our analysis to (61) French common stocks in the BDM database that trade in twice-daily call auctions and for which the specialist is introduced for the first time during the sample period. The data on specialist introductions was provided by the Bourse and cross-checked on Avis, the official publication of the exchange. Specialists are sometimes introduced shortly after a security first appears in the BDM database. We therefore exclude from the analysis ten trade days following each stock’s initial appearance to control for the potential
confounding effect of security listing. We denote the announcement day of the specialist introduction, obtained from Avis, by ‘A’ and the specialist introduction day by ‘I’. The pre-specialist period is defined as A-34 through A-5, and the post-specialist period extends from I+5 through I+34. We screen the sample for sufficient activity by deleting any stock with less than 20 trades in the pre- or post-specialist periods. The final sample consists of 36 securities.

To control for time series variations in liquidity unrelated to specialist introduction, we analyze a matched sample of control stocks that are selected following the approach outlined by Huang and Stoll (1996). For each sample stock, the control stocks are selected from the pool of all French common stocks that trade without a specialist in the call market on the specialist introduction day. After screening control stocks for trading activity, we compute the following score for each pair of sample and control stocks:

$$\sum_{i=1}^{s} \left( \frac{x_i^c - x_i^s}{(x_i^c + x_i^s)/2} \right)^2,$$

where the superscripts c and s refer to control stocks and sample stocks, respectively, and $x_i$ is either average price in French Francs (FF), average daily share volume or the market capitalization during the pre-specialist period. We then match (without replacement) each control stock to the sample stock that yields the lowest score.

Summary statistics for the pre-specialist period are presented in Table 1. The distribution of stock price is very similar across sample and control stocks. The average stock price is FF 213 for sample stocks and FF 228 for control stocks. The sample stocks however have higher average daily trading volume (FF 222,500 vs. FF 154,900) and lower average market capitalization (FF 242 million vs. FF 327 million) than control stocks. On average, specialists are introduced less than two trading days after their pending introductions are announced. The median number of stocks per introduction is 1.0, suggesting that specialists are typically introduced on a stock-by-
One potential concern with this experiment is that, since firms choose for themselves to introduce a specialist, the results may reflect a self-selection bias. That is, managers of firms that are more likely to benefit from specialist participation may be more inclined to assign a designated liquidity provider. Comparison of the sample and control stocks suggests that firms introducing specialists tend to be less volatile and more actively traded than similar firms that do not. The median volume for sample firms is FF 115,200 versus FF 81,400 for the controls. Similarly, the volatility for the median sample stock is nearly 20% less than that of the median control. Thus, we find little evidence to suggest that less liquid firms that are more likely to benefit from specialist participation tend to self-select this market structure. This likely reflects the prohibitive risk of market making in less liquid and more volatile securities.

3.3 Methodology

The theoretical models discussed in section 2 (hypotheses 1 through 3) predict the specialist’s impact on order imbalance, market clearing, and return volatility. To test these theories, we construct corresponding measures of market quality. \( Imbalance_{i,t} \) is defined as the absolute difference between the number of shares posted on the buy and sell sides of the limit order book for stock \( i \) just prior to auction \( t \), where the limit order book is constructed following Bessembinder and Venkataraman (2003). \( \text{Clear}_{i,t} \) equals one if auction \( t \) for stock \( i \) clears and zero otherwise. \( \text{AbsRtn}_{i,t} \) is the absolute percentage price change for stock \( i \) from one auction clearing to the next. We employ a pooled time-series, cross-sectional regression approach to

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9 We implement a two-stage estimation procedure to formally test for selection bias. In the first stage, the decision to introduce the specialist is modeled as a structured probit. In the second stage, the market quality measures for sample firms are estimated while controlling for selection bias. The coefficient on the selectivity bias adjustment variable is statistically insignificant, suggesting that selection bias is not a concern for this study. Results are not reported to conserve space.
examine differences in market quality before and after specialist introduction. Specifically, for each market quality measure, $y_{i,t}$, we estimate the following regression model:

$$y_{i,t} = \beta_0 + \beta_1 \text{Control}_i + \beta_2 \text{Post}_{i,t} + \beta_3 (\text{Post}_{i,t} \ast \text{Control}_i) + \varepsilon_{i,t}$$

where $\text{Control}_i$ equals 1 if stock $i$ is a control stock and zero otherwise, and $\text{Post}_{i,t}$ equals 1 if auction $t$ occurs in the period after specialist introduction, and zero otherwise. A significantly positive $\beta_2$ coefficient indicates that, all else equal, the market quality measure increases for the sample stocks following specialist introduction. A significantly negative $\beta_3$ coefficient indicates that the market quality measure increases for the sample stocks relative to the control stocks.

We incorporate firm specific effects into this model in two ways. We estimate a firm-pair fixed effects model where a dummy variable is included in the regressions for each sample/control pair. Alternatively, we include post-period firm characteristics, $\text{Price}_i$, $\text{Log(Volume)}_i$, $\text{Volatility}_i$, and $\text{Log(Size)}_i$ as control variables. The models are estimated using ordinary least squares regressions for $\text{Imbalance}$ and $\text{AbsRtn}$ measures and using logistical regressions for the $\text{Clear}$ measure.

To test our fourth hypothesis, we conduct an event study that analyzes the extent to which the market values the participation of the non-monopolist specialist. Daily returns are computed using continuous compounding based on closing trade prices. The event window extends from A-5 to I+22. The days between announcement and introduction, which varied by stock, were combined. The market model is estimated from I+23 through I+154 employing Scholes-Williams betas to adjust for infrequent trading and using the value-weighted SBF120 Index as a

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10 The order data required to construct the limit order book is only available for 24 stocks. The analysis of the $\text{Imbalance}$ measure is therefore restricted to this subsample. Also, the database does not allow us to identify whether the specialist submitted an order or participated in a trade.
proxy for the market portfolio. Since specialists may be announced for multiple securities on a single calendar date, cross-sectional correlation in returns could bias the results. Therefore, we form equally weighted portfolios of securities that have identical announcement dates and treat the portfolio returns as those of a single security. Test statistics are computed following Brown and Warner (1985).

4. Results

4.1 Imbalance

This section investigates the impact of specialist introduction on various measures of market quality. In models 1, 2 and 3 of Table 2, we test whether the specialist helps reduce the temporal imbalance in order flow, as predicted by GS and GM. In model 1, the average order book imbalance declines significantly ($\beta_2=-2,267$ shares) for sample stocks following specialist introduction. Imbalance for control stocks also declines during this period ($\beta_2+\beta_3=-1,099$ shares, F-stat=14.46); however, the reduction for sample stocks is significantly larger than those for control stocks ($\beta_3=1,168$ shares). From models 2 and 3, we observe that the results continue to hold after including firm pair fixed effects and firm characteristics as additional control variables. Overall, the results support the prediction that specialists resolve temporal asynchronies in order flow (hypothesis 1).11

4.2 Clearing frequency

Next, in models 4, 5 and 6 of Table 2, we estimate logistical regressions to test hypothesis 2 that the market will clear more frequently in the presence of a specialist. In support, we observe an increase in the likelihood that auctions clear following specialist introduction. The
Post coefficient estimate in model 4 is positive and significant at the one percent level. Further, the difference in clearing frequency does not simply reflect secular improvements in market quality. The likelihood of auction clearing for control stocks \((\beta_2 + \beta_3)\) remains statistically unchanged. Moreover, \(\beta_3 = -0.30\) (significant at the one percent level) indicates that the improved auction clearing for sample stocks exceeds any change in auction clearing for control stocks. The results are not substantively affected by the inclusion of firm effects in models 5 and 6; however, statistical significance drops from the one percent to the five percent level. Overall, these findings support theoretical predictions that the presence of the non-monopolist specialist can reduce investors’ price risk by increasing the frequency with which they are able to transact \([\text{Garbade and Silber (1979); Grossman and Miller (1988)}]\).

One potential implication of more frequent trading opportunities is that trading volume will increase with specialist introduction. Models 7, 8 and 9 in Table 2 report statistical tests of changes in log trading volume.\(^{12}\) From model 7, we observe that the sample firms experience a statistically significant increase in trading volume \((\beta_2 = 0.39)\). In contrast, trading volume does not increase for control firms \((\beta_2 + \beta_3)\), and the difference between the two groups \((\beta_3 = -0.51)\) is statistically significant at the one percent level. Model 9 with firm effects yields similar results.

### 4.3 Volatility

More frequent market clearing after specialist introduction may adversely affect price discovery if the order flow that accumulates between auctions is not sufficiently consolidated to produce accurate estimates of value (hypothesis 3). In models 10, 11 and 12 in Table 2, we study the changes in the auction to auction return volatility, a proxy for noise in transaction prices. We

\(^{11}\) In results not reported in the paper, we find no change in the cumulative book depth after specialist introduction for sample stocks relative to control stocks. This supports the conjecture that the specialist does not uniformly add size to both sides of the book; rather, the specialist selectively provides liquidity where public supply is insufficient.

\(^{12}\) We add one to trading volume in order to compute log transformations of zero volume auctions.
find weak evidence to support the notion that specialists adversely affect price discovery. The seven basis point (bp) increase in $AbsRtn$ experienced by sample stocks in the post period is not statistically different from zero; however, it is approximately 20 bp larger than that experienced by control stocks, and the difference between the two groups is statistically significant at the ten percent level (five percent for models with firm effects). Thus, although the specialist facilitates more frequent trading, he also increases noise in transaction prices relative to prices set by public traders in similar stocks. This result contrasts sharply with those of Madhavan and Panchapagesan (2000) and Kehr et al. (2001), who find that specialists enhance price discovery in the call auction in the NYSE and the Frankfurt Stock Exchange, respectively. A possible explanation is that these papers investigate market structures in which the specialist has some latitude in setting the auction clearing price, while the specialist in Paris does not.

In summary, the presence of a specialist reduces average book imbalance (hypothesis 1) and significantly increases market clearing frequency (hypothesis 2) and trading volume. There is some evidence that relative to other similar stocks, specialist participation is associated with more volatile prices (hypothesis 3), but, in absolute terms, volatility changes little. In the next section, we analyze the extent to which these improvements are valued by market participants.

4.4 Event Study

Table 3 reports the event study results. For the sample stocks, the announcement of specialist introduction yields an immediate and positive average cumulative abnormal return (CAR) of 3.33 percent that is statistically significant at the one percent level. The announcement day price increase reflects, in large part, the average abnormal returns of 1.30 percent and 1.11 percent (both significant at the one percent level) on the days immediately prior to the announcement, suggesting that there was some information leakage. The effect persists over the
next trading month during which time prices drift upward by approximately 1.6 percent, and at
day I+22, the CAR of 4.93 percent continues to be statistically significant at the five percent
level.  In contrast, the announcement appears to have little effect for the control stocks.  Average
CARs of 0.21 percent just prior to announcement and 0.63 percent on the announcement day are
not significantly different from zero.  Although there is a slight upward drift over the next month,
the CAR continues to remain insignificant throughout the event period (with the exception of
I+5, when the CAR is significant at the 10 percent level).  The results indicate the existence of a
positive price reaction to specialist introduction that is permanent and economically meaningful.
They offer strong support for the joint hypothesis that liquidity is priced [Amihud and
Mendelson (1986)] and that investors prefer the specialist intermediated market over one in
which liquidity is supplied strictly by public limit order traders [Garbade and Silber (1979)].

The results thus far suggest that specialist introduction enhances several dimensions of
market quality and increases firm value by reducing investors’ required rate of return.  Yet, it
remains unclear which liquidity improvements are priced by the market.  Moreover, we cannot
discount the possibility that the observed value effects reflect other important non-liquidity-
based benefits associated with the presence of the specialist.  For instance, the market reaction
may reflect the view that the specialist introduction signals a higher likelihood of capital raising
in the future to fund real investments.  Therefore, we directly investigate whether the specialist
creates firm value by improving liquidity.  To do so, we estimate cross-sectional regressions of
[A-5, I+22] cumulative abnormal returns (CAR) on changes in market quality (Change).

The analysis is executed in two stages.  First, we estimate Change as the slope coefficient
from stock-by-stock regressions of market quality on the Post dummy.  Next, using first-stage
estimates, we run the following cross-sectional regression model for the sample stocks:
\[ CAR_i = \gamma_0 + \gamma_1 \text{Change}_i + \eta_i \]

If the market values the improvements in liquidity offered by the specialist, we expect firms that experience greater improvements in market quality to exhibit larger cumulative abnormal returns \((\gamma_1 > 0)\). Alternatively, if the abnormal returns capture non-liquidity-based benefits associated with specialist participation then we should observe no clear relationship \((\gamma_1 = 0)\).

Table 4 presents the results. The coefficient of the change in order imbalance is statistically insignificant suggesting that the abnormal returns are not related to changes in order imbalance (model 1). One explanation is that the improvements in order imbalance per se are not valued by market participants unless they enhance other dimensions of market quality. In support, we find that trading volume (model 2) and auction clearing (model 3) measures explain the cross-sectional variation in abnormal returns. The adjusted \(R^2\) for trading volume is 18% and \(\gamma_1\) is positive and statistically significant. Most notably, changes in market clearing explain 30% of the cross-sectional variation in abnormal returns. The positive coefficient, \(\gamma_1\), suggests that stocks for which auctions clear more frequently after specialist introduction generally experience larger abnormal returns around the announcement, implying that the market participants value improvements in auction clearing due to specialist introduction.

5. Conclusions

This paper studies the role of the non-monopolist specialist. We examine Paris Bourse specialists who, in contrast to their NYSE counterparts, possess no information advantages. Consistent with the predictions of economic theory, the specialist resolves temporal imbalances in order flow and reduces investor price risk by increasing the frequency with which the market clears. These results suggest that the specialist adds value by simply maintaining a regular
market presence.

The specialist also creates value in a literal sense by reducing the rate of return required by investors. We find that the announcement of specialist introduction elicits a permanent and positive price reaction that is statistically significant and economically meaningful. The value effects are positively correlated with increases in the likelihood of market clearing, providing strong support for theoretical predictions that the resolution of price risk is an important contribution of the non-monopolist specialist.

This study has several policy implications for regulators, corporations, and stock exchanges. First, the provision of liquidity will likely not evolve endogenously in the market place from a pure profit motive at all times. Stock exchanges therefore have to address the fundamental trading problem of asynchronous order flow, especially for less liquid stocks, as they continue to move towards a model of electronic trading with no intermediation. The results here suggest that the non-monopolist specialist can resolve the problem of temporal order flow imbalance and thereby enhance market quality.

Second, it may be advantageous for corporations to employ the services of the specialist to provided liquidity in their stocks. Because the provision of liquidity without monopoly rents is not likely to be a profitable business in itself, the corporation must provide the specialist with alternative inducements to make markets, such as annual fees and investment banking business. Although we do not explicitly analyze the value of these side payments, the decision of firms to bear such costs in Paris suggests that investments by the corporation in liquidity are positive net present value projects.

Third, we assert that the call auction mechanism with the non-monopolist specialist offers several advantages for trading less liquid stocks. By temporally consolidating order flow to
specific points in time, the call market increases liquidity and thereby reduces the inventory risk faced by the specialist (see Economides and Schwartz (1996)). The opportunity cost to the specialist of maintaining a continuous market presence is also significantly reduced because the specialist’s presence is only required just before the call auction. Further, the call market lowers the adverse selection risk faced by the specialist by allowing no price discrimination and by providing no free trading options. For all of these reasons, the call market with specialist is a viable market structure for trading less liquid stocks in an electronic trading system.

This paper distinguishes between the role of the specialist as an information monopolist and the role of the specialist as a liquidity provider. While we find that the specialist improves liquidity without privileged access to order flow data, the analysis has little to say with regard to how he might employ such information to affect market outcomes. In particular, the question remains open as to whether the expected benefits of increased specialist market power outweigh the expected agency costs. The value of the non-monopolist specialist for the most widely held and actively traded securities is also not addressed by this study. We believe that these questions are interesting avenues for future research.
REFERENCES


Kalay, Avner, Li Wei, and Avi Wohl, 2002, Continuous trading or call auctions: Revealed preferences of investors at the Tel Aviv Stock Exchange, *Journal of Finance* 57, 523-542.


Table 1: Summary Statistics of Sample and Control Firms

Summary statistics are reported for 36 stocks that introduced specialists between 1995 and 1998 and for the matched sample of controls stocks that did not introduce specialists. Stocks per introduction is the total number of stocks introduced on each specialist introduction day (I). Days is the number of trading days between the specialist announcement day (A) and the specialist introduction day. Size is the average market capitalization (in FF millions) based on the number of shares outstanding as of the specialist introduction day. Volume is the average daily trading volume (in 000's of FF). Volatility is the standard deviation of continuously compounded daily returns computed from closing trade prices. Price is the average transaction price (in FF). All statistics are computed over the pre-specialist period, A-34 through A-5.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocks per introduction</td>
<td>1.3</td>
<td>1.0</td>
<td>0.9</td>
<td>1.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Days [A,I]</td>
<td>1.6</td>
<td>2.0</td>
<td>0.5</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Size (in FF millions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>242.2</td>
<td>183.1</td>
<td>235.8</td>
<td>70.0</td>
<td>1,499.1</td>
</tr>
<tr>
<td>Control</td>
<td>327.1</td>
<td>217.7</td>
<td>413.4</td>
<td>50.0</td>
<td>2,357.1</td>
</tr>
<tr>
<td>Volume (in FF thousands)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>222.5</td>
<td>115.2</td>
<td>261.1</td>
<td>5.0</td>
<td>1,238.1</td>
</tr>
<tr>
<td>Control</td>
<td>154.9</td>
<td>81.4</td>
<td>191.1</td>
<td>5.9</td>
<td>879.7</td>
</tr>
<tr>
<td>Volatility (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>2.1</td>
<td>1.8</td>
<td>0.9</td>
<td>0.6</td>
<td>4.4</td>
</tr>
<tr>
<td>Control</td>
<td>2.4</td>
<td>2.2</td>
<td>1.1</td>
<td>0.7</td>
<td>6.0</td>
</tr>
<tr>
<td>Price (in FF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>213.0</td>
<td>202.6</td>
<td>110.2</td>
<td>72.9</td>
<td>581.1</td>
</tr>
<tr>
<td>Control</td>
<td>228.1</td>
<td>202.8</td>
<td>149.3</td>
<td>64.2</td>
<td>763.9</td>
</tr>
</tbody>
</table>
Table 2: Changes in Market Quality around Specialist Introduction

Regression coefficients (with standard errors in parentheses) are reported for the following pooled time-series, cross-sectional regression model: $y_{i,t} = \beta_0 + \beta_1 \text{Control}_i + \beta_2 \text{Post}_{i,t} + \beta_3 \text{Post}_{i,t} \ast \text{Control}_i + \epsilon_{i,t}$, where $y_{i,t}$ is either $\text{Imbalance}_{i,t}$, $\text{Clear}_{i,t}$, $\text{Volume}_{i,t}$, or $\text{AbsRtn}_{i,t}$. $\text{Imbalance}_{i,t}$ is the absolute difference between the number of shares posted on the buy and sell sides of the limit order book for stock $i$ just prior to auction $t$. $\text{Clear}_{i,t}$ equals one if auction $t$ for stock $i$ clears and zero otherwise. $\text{Volume}_{i,t}$ is the natural logarithm of one plus the number of FF that clear in auction $t$ for stock $i$. $\text{AbsRtn}_{i,t}$ is the magnitude of the percentage price change for stock $i$ from one auction to the next. $\text{Control}_i$ equals 1 if stock $i$ is a control and zero otherwise, and $\text{Post}_{i,t}$ equals 1 if auction $t$ occurs in the post-specialist period (I+5 through I+34) and zero otherwise. Models 2, 5, 8, and 11 incorporate firm-pair fixed effects by including a dummy variable for each sample/control pair. Models 3, 6, 9, and 12 incorporate firm specific effects by including post-period firm characteristics: $\text{Price}_i$, $\text{Log(Volume)}_i$, $\text{Volatility}_i$, and $\text{Log(Size)}_i$. Log(.) is the natural logarithm. $\text{Price}_i$ is the average transaction price (in FF). $\text{Volume}_i$ is the average daily trading volume (in 000’s of FF). $\text{Volatility}_i$ is the standard deviation of continuously compounded daily returns (%) computed from closing trade prices. $\text{Size}_i$ is the average market size (in FF millions) based on shares outstanding on the specialist introduction day. The models are estimated using OLS regressions for $\text{Imbalance}$, $\text{Volume}$, and $\text{AbsRtn}$ measures and using logistical regressions for the $\text{Clear}$ measure. The sample consists of 36 stocks that introduced specialists between 1995 and 1998 and 36 matched control stocks that did not.

<table>
<thead>
<tr>
<th>Control</th>
<th>Order Imbalance (Imbalance)</th>
<th>Likelihood of Auction Clearing (Clear)</th>
<th>Trading Volume (Volume)</th>
<th>Volatility of Auction Prices (AbsRtn)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Intercept</td>
<td>6664</td>
<td>-4305</td>
<td>1.55</td>
<td>-4.93</td>
</tr>
<tr>
<td></td>
<td>(224)</td>
<td>(4201)</td>
<td>(0.06)</td>
<td>(0.79)</td>
</tr>
<tr>
<td>Control dummy</td>
<td>-1997</td>
<td>-1617</td>
<td>-0.63</td>
<td>-0.39</td>
</tr>
<tr>
<td></td>
<td>(303)</td>
<td>(315)</td>
<td>(0.08)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Post Dummy</td>
<td>-2267</td>
<td>-2345</td>
<td>0.24</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(302)</td>
<td>(300)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Control*Post</td>
<td>1168</td>
<td>1229</td>
<td>-0.30</td>
<td>-0.28</td>
</tr>
<tr>
<td></td>
<td>(418)</td>
<td>(415)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Control</td>
<td>Price (x1000)</td>
<td>-7882</td>
<td>-0.29</td>
<td>-0.57</td>
</tr>
<tr>
<td></td>
<td>(1112)</td>
<td>(0.24)</td>
<td>(0.43)</td>
<td>(0.43)</td>
</tr>
<tr>
<td></td>
<td>Log(Volume)</td>
<td>675</td>
<td>0.49</td>
<td>-0.10</td>
</tr>
<tr>
<td></td>
<td>(18)</td>
<td>(0.03)</td>
<td></td>
<td>(0.07)</td>
</tr>
<tr>
<td></td>
<td>Volatility</td>
<td>683</td>
<td>-0.18</td>
<td>-0.10</td>
</tr>
<tr>
<td></td>
<td>(156)</td>
<td>(0.04)</td>
<td></td>
<td>(0.07)</td>
</tr>
<tr>
<td></td>
<td>Log(Size)</td>
<td>164</td>
<td>0.07</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>(259)</td>
<td>(0.08)</td>
<td></td>
<td>(0.08)</td>
</tr>
<tr>
<td>Firm dummies</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>$\beta_2+\beta_3=0$</td>
<td>20.56</td>
<td>15.21</td>
<td>0.83</td>
<td>0.94</td>
</tr>
<tr>
<td>Model $\chi^2$</td>
<td>222.80</td>
<td>925.00</td>
<td>793.93</td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.02</td>
<td>0.14</td>
<td>0.04</td>
<td></td>
</tr>
</tbody>
</table>

***, **, and *: Significant at the one, five, and ten percent levels, respectively
Table 3: Cumulative Abnormal Returns around Specialist Introduction

Average abnormal returns (AR) and cumulative average abnormal returns (CAR) are reported for 36 stocks that announced the introduction of specialists between 1995 and 1998 and for 36 matched control stocks that did not. The event window extends from five days before the announcement day (A) to 22 days after the specialist introduction day (I). Event day I aggregates the period from A through I (the number of days in this period varies). The market model is estimated over a 132 day period that begins 23 days after the introduction day. Scholes-Williams betas are computed using the value-weighted SBF120 Index as a proxy for the market. Continuously compounded daily returns are calculated from closing prices (adjusted for dividends, splits, and other corporate actions). Stocks with identical introduction days are formed into equally weighted portfolios. Test statistics are computed following Brown and Warner (1985).

<table>
<thead>
<tr>
<th>Day</th>
<th>Sample Firms</th>
<th></th>
<th>Control Firms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AR</td>
<td>CAR</td>
<td>AR</td>
<td>CAR</td>
</tr>
<tr>
<td>-5</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.67 *</td>
<td>-0.67 *</td>
</tr>
<tr>
<td>-4</td>
<td>0.32</td>
<td>0.31</td>
<td>0.82 **</td>
<td>0.09</td>
</tr>
<tr>
<td>-3</td>
<td>0.59</td>
<td>0.87</td>
<td>-0.19</td>
<td>-0.08</td>
</tr>
<tr>
<td>-2</td>
<td>1.30 ***</td>
<td>2.07 **</td>
<td>0.35</td>
<td>0.20</td>
</tr>
<tr>
<td>-1</td>
<td>1.11 ***</td>
<td>3.11 ***</td>
<td>0.21</td>
<td>0.36</td>
</tr>
<tr>
<td>A</td>
<td>0.24</td>
<td>3.33 ***</td>
<td>0.63</td>
<td>0.90</td>
</tr>
<tr>
<td>I</td>
<td>-0.46</td>
<td>2.90 ***</td>
<td>-0.21</td>
<td>0.73</td>
</tr>
<tr>
<td>1</td>
<td>-0.75 *</td>
<td>2.23 **</td>
<td>0.79 *</td>
<td>1.38</td>
</tr>
<tr>
<td>2</td>
<td>-0.29</td>
<td>1.96 *</td>
<td>-0.10</td>
<td>1.28</td>
</tr>
<tr>
<td>3</td>
<td>0.63 *</td>
<td>2.59 **</td>
<td>0.18</td>
<td>1.43</td>
</tr>
<tr>
<td>4</td>
<td>0.19</td>
<td>2.78 **</td>
<td>-0.10</td>
<td>1.36</td>
</tr>
<tr>
<td>5</td>
<td>0.28</td>
<td>3.05 **</td>
<td>1.05 **</td>
<td>2.22 *</td>
</tr>
<tr>
<td>6</td>
<td>-0.03</td>
<td>3.02 **</td>
<td>0.05</td>
<td>2.26</td>
</tr>
<tr>
<td>7</td>
<td>1.05 **</td>
<td>4.07 **</td>
<td>-0.59</td>
<td>1.75</td>
</tr>
<tr>
<td>8</td>
<td>0.52</td>
<td>4.59 ***</td>
<td>0.01</td>
<td>1.76</td>
</tr>
<tr>
<td>9</td>
<td>0.27</td>
<td>4.86 ***</td>
<td>0.00</td>
<td>1.76</td>
</tr>
<tr>
<td>10</td>
<td>-0.60</td>
<td>4.28 **</td>
<td>-0.34</td>
<td>1.48</td>
</tr>
<tr>
<td>11</td>
<td>-0.28</td>
<td>4.01 **</td>
<td>0.21</td>
<td>1.66</td>
</tr>
<tr>
<td>12</td>
<td>-0.71 *</td>
<td>3.33 *</td>
<td>-0.65 *</td>
<td>1.10</td>
</tr>
<tr>
<td>13</td>
<td>-0.12</td>
<td>3.21 *</td>
<td>-0.34</td>
<td>0.81</td>
</tr>
<tr>
<td>14</td>
<td>0.45</td>
<td>3.63 **</td>
<td>0.37</td>
<td>1.13</td>
</tr>
<tr>
<td>15</td>
<td>0.39</td>
<td>3.99 **</td>
<td>0.41</td>
<td>1.49</td>
</tr>
<tr>
<td>16</td>
<td>0.10</td>
<td>4.08 **</td>
<td>-0.68 *</td>
<td>0.88</td>
</tr>
<tr>
<td>17</td>
<td>0.26</td>
<td>4.33 **</td>
<td>0.23</td>
<td>1.07</td>
</tr>
<tr>
<td>18</td>
<td>0.14</td>
<td>4.47 **</td>
<td>0.84 **</td>
<td>1.73</td>
</tr>
<tr>
<td>19</td>
<td>0.08</td>
<td>4.55 **</td>
<td>-0.06</td>
<td>1.68</td>
</tr>
<tr>
<td>20</td>
<td>0.33</td>
<td>4.87 **</td>
<td>0.10</td>
<td>1.76</td>
</tr>
<tr>
<td>21</td>
<td>0.22</td>
<td>5.09 **</td>
<td>0.28</td>
<td>2.01</td>
</tr>
<tr>
<td>22</td>
<td>-0.16</td>
<td>4.93 **</td>
<td>-0.49</td>
<td>1.57</td>
</tr>
</tbody>
</table>

***, **, and *: Significant at the one, five, and ten percent levels, respectively (one-tailed)
Table 4: Cross-sectional Regressions of CAR on Changes in Market Quality

Coefficient estimates (with standard errors in parentheses) are reported for cross-sectional regressions of event period (I+22) cumulative abnormal returns (CAR) on changes in market quality (Change). Change is the slope coefficient from a stock-by-stock regression of Imbalancei,t, Cleari,t, or Volumei,t, on an indicator variable that equals 1 in the post period and zero otherwise. Imbalancei,t, is the absolute difference between the number of shares posted on the buy and sell sides of the limit order book for stock i just prior to auction t. Cleari,t, equals one if auction t for stock i clears and zero otherwise, and Volumei,t, is the natural logarithm of one plus the number of FF that clear in auction t for stock i. The sample consists of 36 stocks that introduced specialists between 1995 and 1998.

<table>
<thead>
<tr>
<th>CAR Regressions</th>
<th>Imbalance (1)</th>
<th>Volume (2)</th>
<th>Clearing (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>6.50 **</td>
<td>4.51 **</td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td>(2.74)</td>
<td>(2.02)</td>
<td>(2.09)</td>
</tr>
<tr>
<td>Change</td>
<td>0.00</td>
<td>3.26 ***</td>
<td>7.84 ***</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(1.11)</td>
<td>(2.13)</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>-0.03</td>
<td>0.18</td>
<td>0.30</td>
</tr>
</tbody>
</table>

***, **, and *: Significant at the one, five, and ten percent levels, respectively