

## OFF-FLOOR TRADING, MARKET DISINTEGRATION AND PRICE VOLATILITY IN BID/ASK MARKETS

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### 1. The Problem

This study was commissioned by a futures market Exchange firm plagued by members' trading off-floor in strict violation of the Exchange's rules requiring transactions to be made on the Exchange floor during trading hours in the assigned trading areas. Any violation of these rules is a major offense, and penalties have been and are levied on violators. (See [Campbell et al., 1991](#) for a complete report.) Although violators are often discovered and penalized, the prohibition itself assures that there exists no systematic field data from the Exchange that can help inform the circumstances that produce off-floor trading. Hence, experimental evidence is the only feasible source of relevant observations.

Why do Exchange members engage in bilateral trades that bypass the public trading pits? Such trades are not guaranteed by the Exchange, and therefore run the risk of failure due to contract non-compliance by one party or the other. Exchange officials conjectured that the bid/ask spread in pit trading was sufficiently wide to provide an incentive for both parties to trade inside the spread at savings to each that justified this risk. This would be especially applicable to traders who knew each other well, and each was comfortable with the trustworthiness of their trading partner.

### 2. The Environment

To examine this hypothesis it was necessary to first find treatments that would affect the size of the bid/ask spread. In experimental double auction trading with static induced supply and demand schedules, the bid/ask spread converges to near one cent – the minimum quotation increment. Accordingly, we conducted three baseline experiments in an environment in which individuals were randomly reassigned values (or costs) from period to period but the aggregate supply and demand schedules were constant, and two experiments in which a random shift occurred each period in addition to reassignment ([Campbell et al., 1991](#), pp. 500–502, 507–508; see also Smith and Van Boening, “Exogenous Uncertainty Increases the Bid/Ask Spread in Double Auction Markets,” this volume, for a summary of this data). These experiments established that an increase in exogenous uncertainty in a double auction market causes an increase in the average bid/ask spread. This provided an appropriate environment to see if subjects would trade “off-floor” in bilateral direct exchanges as an alternative to the electronic double auction

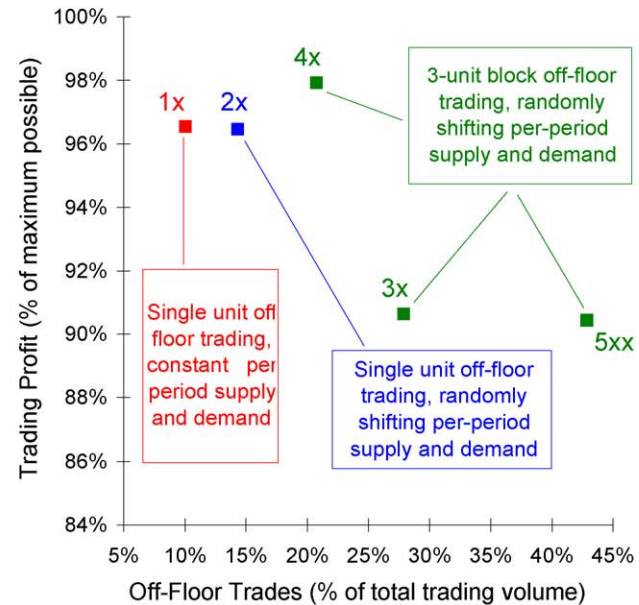
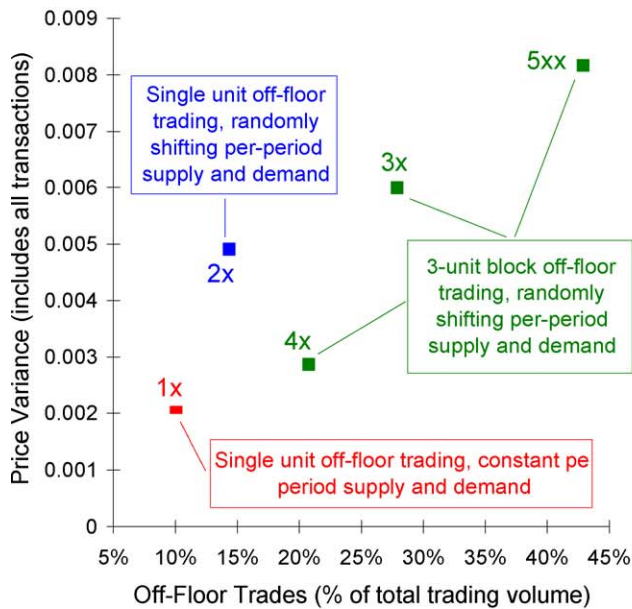
market (which used a double auction software program written in the tutor language for the PLATO operating system by Arlington Williams; this program, written originally in 1976 and modified many times thereafter, was the first electronic double auction).

Bilateral off-floor trading was implemented by providing each subject with copies of a standard contract form, referred to as a buyer bid (seller offer) ticket. Subjects were seated at terminals so that buyers and sellers alternated. If a buyer (seller) wished to initiate an off-floor trade the bid (offer) price and quantity were written into the blanks on the ticket form and handed to his or her left or right (or over the partition for subjects seated at an end terminal). One of the experimenters placed it on the table of the adjacent subject who was required to accept or reject it immediately, and the ticket was then returned to the initiator of the bid (offer). Off-floor trades and profits were recorded manually in tables supplied to each subject. In one previously twice-experienced group, each subject recorded the standing clock time at the moment a bid (offer) was initiated and when it was accepted or rejected. This allowed a determination of whether the bid (offer) was inside or outside the bid/ask spread when it was initiated, and, shortly thereafter, when it was accepted or rejected.

### 3. Results

Figure 1 provides an overall summary of the results across five experiments using experienced ( $\times$ ) or twice-experienced ( $\times\times$ ) subjects. In two experiments, off-floor trading was restricted to single units (experiment  $1\times$  with constant per period supply and demand, experiment  $2\times$  with random per period supply and demand); and in three experiments off-floor trading was in blocks of three units ( $3\times$ ,  $4\times$ , and  $5\times\times$  all with randomly shifting supply and demand). (In Campbell et al., 1991, the corresponding experiments are labeled,  $5\times$ ,  $6\times$  and  $9\times$ ,  $10\times$ , and  $11\times\times$ .) The left panel plots the overall variance in transaction prices (on and off-floor combined) by experiment against the volume of off-floor trades as a percentage of total trading volume. Note that in both single and block off-floor trading price volatility increases with the percentage of off-floor trading, which in turn increases with experience. The right panel plots trading profit as a percent of the maximum possible (i.e., efficiency) against off-floor trades as a percentage of total volume. We observe a tendency for efficiency to decline with block trading and experience level.

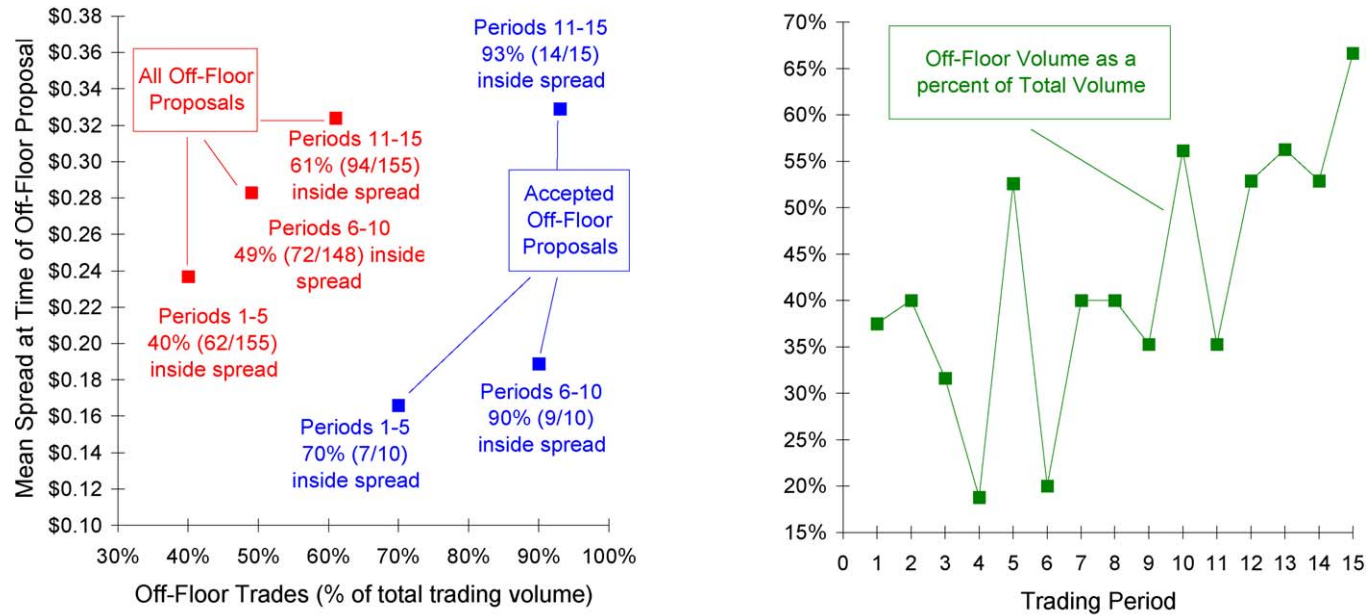
Figure 2 plots data from our session with twice-experienced subjects (experiment  $5\times\times$ ), where the standing clock time was recorded for each off-floor trade. The left panel plots off-floor activity in five-period intervals relative to the mean bid/ask spread at the time the off-floor proposals were initiated. It is apparent that as off-floor activity inside the spread increases, the spread widens, both in absolute number and as a percent. (Also note that wider mean spreads are observed later in the experiment, whereas the spread normally narrows with experienced subjects in a double auction.) The right panel plots period-by-period off-floor trading volume as a percent of total trading volume. Thus the phenomenon of off-floor trading does not diminish with experience and in fact



Observe that greater off-floor trading is associated with greater price variance (left panel), and with lower trading profit (right panel). Also observe that block trading and experience level increase off-floor volume.

Source: Campbell et al. (1991). Data based on off-floor experiments 5x (single, constant), 6x (single, random), and 9x, 10x and 11xx (block, random). See Table 2, p. 509.

Figure 1. Price variance, trading profit and off-floor trading volume per experimental session.



Observe that as off-floor activity inside the bid/ask spread increases the spread widens (left panel), and that off-floor volume accounts for an increasing portion of total volume in later periods (right panel).

Source: Campbell et al. (1991). Data based on off-floor experiment 11xx. See Figure 7, p. 514 and Table 3, p. 515.

Figure 2. Mean bid-ask spreads, off-floor activity and off-floor trading volume in experimental session 5 × ×.

increases as subjects become more skilled at executing such contracts. These results are consistent with the Exchange officials conjecture that a sufficiently wide bid/ask spread facilitates off-floor activity, especially where traders are familiar with the practice.

#### 4. Discussion: Implications for, and Barriers to, Institutional Redesign

The reported experiments demonstrate that bid/ask institutions on an Exchange can be invaded by the ancient tradition of bilateral bargaining. Yet historically we know that Exchange trading can invade and displace more informal over-the-counter trading in dealer markets. For example, prior to the 1970s, stock options (puts and calls) were traded over-the-counter (by such well known firms as Filor and Schmidt). After the Chicago Board of Trade started listing and trading options in 1973 (Schwartz, 1988, p. 77), followed soon thereafter by listing on other Exchanges, over-the-counter options trading declined rapidly. But trading on centralized Exchanges cannot resist invasion by block traders who can utilize public price information to efficiently negotiate private deals inside the bid/ask spread and share the savings. Hence, the long history of Exchange firm prohibitions on off-floor trading backed up by severe penalties for violations by Exchange members.

The Exchange solution is that of the typical centralized hierarchy – one that consumes monitoring and enforcement resources. Is there a decentralized institutional design solution to this problem, a change in the rules that gives traders an incentive to do the right thing (trade on floor) without anyone having to force them to do so? Experimental research suggests that the answer is yes: use a uniform price double auction (UPDA) call market (McCabe, Rassenti, and Smith, 1991). The incentive to trade inside the bid/ask spread is eliminated by doing away with the bid/ask spread. This is an academic proposal that engineers an incentive solution that would (i) reduce price volatility, and (ii) eliminate the monitoring and enforcement cost of rules prohibiting off-floor trading, and appears to yield a Pareto improvement. Why is it not acceptable to any existing exchange? Because it is the bid/ask spread in member–dealer markets that is the source of their livelihood. For such traders, reduced volatility is not necessarily welcome if it causes a reduction in trading (and re trading) volume. A revolutionary change from a continuous bid–ask auction to a uniform price call auction creates new uncertainties for Exchange members, and they cannot be expected to support it.

If such an institutional change is to occur, it would have to involve entry by a new Exchange whose advantages allow it to invade and displace existing Exchanges, much as occurred in the 1970s in the options market. We know precious little about the conditions under which one trading institution can invade and displace another.

#### References

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