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THE EVOLUTION OF THE PHILADELPHIA STOCK EXCHANGE: 1964-2002

John P. Caskey
Swarthmore College
Visiting Scholar, Federal Reserve Bank of Philadelphia

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FEDERAL RESERVE BANK OF PHILADELPHIA
Ten Independence Mall, Philadelphia, PA 19106-1574• (215) 574-6428• www.phil.frb.org

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John P. Caskey
Department of Economics
Swarthmore College
500 College Ave
Swarthmore, PA 19081
Jcaskey1@swarthmore.edu

Abstract: This paper analyzes the evolution of the Philadelphia Stock Exchange (PHLX), America's oldest stock exchange, from 1964 through 2002. The paper seeks to explain how the PHLX managed to attract a sufficient volume of trading orders to support its members and cover its operating costs during this period, and how it adapted to survive in an era with profound changes in the structure of securities markets.

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I. Introduction

This paper analyzes the evolution of the Philadelphia Stock Exchange (PHLX) from 1964 through 2002. In doing so, it addresses one central question. Over this time period, how did the PHLX manage to attract a sufficient volume of trading orders to support its members and cover its operating costs?

Answering this question provides a detailed analysis of how one small securities exchange adapted in the face of seismic shifts in its competitive environment. That is, the paper tells a rich story of the evolution of one exchange while profiling, in the background, major changes in the structure of U.S. securities markets over the past several decades. At the same time, the paper emphasizes the role that the largely overlooked regional exchanges have played in securities markets over the past few decades.

In examining the evolution of the PHLX from 1964 through 2002, I identify four distinct periods. The first runs from 1964 through 1974. I begin in 1964 because in 1963 the Securities and Exchange Commission issued a report providing a fairly comprehensive overview of the evolution of U.S. securities markets, including the regional exchanges, up to that time (SEC, 1963). I end the first period in 1974 because this is the last year that exchanges could, and did, require their members to charge nonmembers specified minimum commissions for trading equities. In addition, during this period, the PHLX only traded equities; not the options that became important to it in later years. The second period begins in 1975 and ends in 1983. This is an era

of great innovation for the PHLX as it introduced automated routing and execution of retail equity trades and began to trade equity options, equity index options, and foreign currency options. The third period runs from 1984 through 1999. During this era, the PHLX enjoyed the benefits of its earlier diversification into options. It is also a time when the exchange seriously considered merging with another exchange, and perhaps even closing its operations in Philadelphia. The last period begins in 2000 and runs through the end of 2002. During this time, a number of developing regulatory and technological threats to the most successful market niches of the PHLX came to fruition. The exchange has tried to find new products and business strategies to replace or supplement these niches, but it is too early to know whether these efforts will succeed.

Over several of the years covered in this paper, the PHLX experienced a variety of significant and insignificant scandals involving members of its top management and board of directors. These scandals, however, are largely irrelevant to the fundamental factors driving the evolution of the exchange, so I do not discuss them here. In addition, to keep the paper reasonably brief, I do not discuss in detail the business strategies of the securities exchanges that competed with the PHLX.

Before discussing the evolution of the PHLX, I should note that stock exchanges, and organized over-the-counter markets, fulfill a number of functions. By providing a centralized location for people to meet who are trying to buy or sell securities, they reduce search costs. In setting membership criteria, trading rules, and adjudication processes, they reduce contracting costs. Restrictions on direct access to an exchange and pricing and trading rules can also be used to limit competition to the advantage of exchange members and other securities market professionals.

In some cases, economic theory would predict that there would be only one exchange or OTC market, collectively called "market centers," to trade any particular security or group of securities. This is true because securities markets are subject to "network effects."[1] This simply means that people buying (or selling) a security will tend to go to the market center where there is the largest number of others selling (or buying) same security. This maximizes the likelihood that they will receive the best price possible or complete the transaction quickly. This point, which is often stated as "liquidity attracts liquidity," has important implications. If a market center, for example, gains a dominant market share in trading a particular security, all trading of the security may quickly move to that market. In other words, network effects can create natural monopolies for market centers. In determining which market center becomes the location for trading a particular security, there is a "first mover" advantage. Whichever market center first gains a dominant trading share, perhaps because it is the first center to trade the security, is more likely to become the monopoly center than later entrants.

One would not expect to find a unique market center for each security. Market centers are likely to become trading locations for numerous securities. This is partly due to economies of scale. Once a market center develops the infrastructure (trading floor, computers, management structure, etc) to facilitate trading in one security, many of these expenses will not grow proportionally as the center begins to trade more securities. If the economies of scale are large enough, a market center could become a natural monopoly for the trading of all securities. More modest economies of scale could result in numerous centers, each of which trades a group of securities. Another factor that explains why a market center may become trading points for multiple securities is economies of scope. If investors or market makers who trade security X also

[1] Larry Harris (2003) provides an especially clear discussion of network efforts in trading sys-

tend to trade security Y, they may reduce their transaction costs by trading X and Y in the same market center. Thus, if a market center gains a dominant market share in trading one security, it may become the main or only trading center for complementary securities.

Over the period that I examine in this paper, the Philadelphia stock exchange managed to survive, and sometimes thrive, while capturing only a relatively minor share of total national trading of exchange-listed stocks and options. If network effects, economies of scale, and economies of scope are significant, one would have expected it to have folded as trading migrated to far larger market centers, such as the New York Stock Exchange (NYSE) for exchange-listed equities and the Chicago Board Options Exchange for exchange-traded options. Why didn't it?

The rest of the paper seeks to answer this question. Before plunging into the details, however, it is useful to consider at an abstract level several factors than can allow a small market center to compete with a much larger center.

When a market, such as the NYSE, obtains significant power from its dominant position as a trading center, this can create conditions that lead to niches for competing small market centers. It is natural, for example for the dominant market to use its power to raise prices for accessing the market. It can use the resulting revenue to benefit its shareholders, managers, or members in the case of a not-for-profit exchange. Government may also seek to share in the monopoly profits by imposing special taxes on the dominant market center. A market center, with significant monopoly power, may tend to provide poor service to outsiders and, perhaps, may be slow to introduce service-enhancing or cost-reducing innovations. The tendency for a dominant market center to try to extract economic rents and to become operationally inefficient can offset

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tems and factors affecting competition among markets.

the advantages that the market center gains from network effects and economics of scale and scope. This creates an opening for other market centers to attract trading orders (Huang and Stoll, 1996).

Regulatory barriers can also prevent a large market center from extinguishing a smaller center. Until recently, for example, the Securities and Exchange Commission gave different options exchanges the exclusive right to trade particular option contracts. Under such a system, a dominant options exchange could not take business away from a smaller exchange since it did not have the right to trade the same contracts as the smaller exchange.

Principal/agent issues are a third factor that can enable a small market center to coexist with a dominant center. Specifically, it may be in the interest of an investor to direct his trading orders to the dominant market because he will get the best price or execution there. But it may be in his broker's interest, through whom he must place his orders, to direct the orders to the smaller market, perhaps because the broker receives a payment for doing so. If the investor does not recognize that he should monitor the broker or cannot monitor the broker, then the orders may be directed to the smaller market center, enabling it to survive despite the competitive advantages of the dominant market center.

A fourth factor than can explain the persistence of competing market centers is heterogeneity in market structure preferences among traders. Some traders, for example, may be willing to accept slower execution of trades in order to obtain a more favorable price. Others may be willing to accept a less favorable price in exchange for faster executions. Competing markets may persist because they have different structures which better meet the needs of different traders.

Finally, a small market center can compete with a dominant center if network effects, economies of scale, or economies of scope are relatively weak. People who trade or make markets in options on equities, for example, may only very rarely trade foreign currency options. If so, it may be possible for a small market center to trade foreign currency options in competition with a large center that attracts nearly all trades in equity options.

II. Evolution of the PHLX

This section attempts to answer the question: Why were trading orders directed to the PHLX at different points in time? As noted earlier, in answering the question, I focus on four eras: 1964 through 1974, 1975 through 1983, 1984 through 1999, and 2000 through 2002. Before doing so, however, I briefly review the pre-1964 evolution of the PHLX.

A. Brief pre-1964 history

The Philadelphia Stock Exchange dates its founding to the 1790 licensing of the Philadelphia Board of Brokers, making it the oldest stock exchange in the country.[2] Between its founding and the mid-19th century, the Philadelphia exchange mainly traded government debt and the securities of local banks, insurance companies, and bridge and turnpike companies.[3]

[2] Over the years, the Philadelphia Stock Exchange has had a variety of names and office locations. But it has always been located in Center City Philadelphia with one exception. In December 1968, in response to a fiscal crisis, Philadelphia imposed a $0.05 per share stock transfer tax for all transactions on the PHLX. On January 2, 1969, the PHLX moved its trading floor to an office building just across the street from the city boundaries to avoid the tax. In February, a Court ruled that the tax was illegal, and the PHLX moved its trading floor back to its headquarters in the City.

[3] Robert E. Wright (2002) provides data on the volume of trading prior to the 1850s, the types of securities traded, and the typical brokerage commissions.

Although the New York Stock Exchange was founded about two years after the PHLX, it soon surpassed the PHLX in trading volume. As Walter Werner and Stephen Smith (1991, p. 184) write, "Reliable comparisons for the trading years 1837-1840 reveal that reported share volume in Philadelphia was on average 13.9 percent of the volume in New York…" The prominence of the NYSE was due to New York's preeminent position in commerce generally. New York, unlike Philadelphia, was linked to the Great Lakes region as a result of the 1817 construction of the Erie Canal, and its ports were better positioned for shipping back and forth to Europe. By the 1850s, the U.S. was actively developing a national telegraph network. This facilitated the creation of large national corporations that sought to list their securities on the NYSE because of the deep pools of capital in the city.[4] The development and deployment of the ticker tape over the 1870s further reinforced the tendency to trade in New York since brokers located anywhere in the country could follow nearly contemporaneous stock prices on the NYSE. Regional exchanges, including the PHLX, responded to the success of the NYSE by listing and trading the securities of firms that could not meet the listing requirements of the NYSE. These tended to be younger and smaller firms than those traded on the NYSE.

Reflecting the strength of Philadelphia's industrial base and its financial district, the PHLX remained the nation's second largest exchange for much of the 19th century. In the latter half of the century, trading emphasized the securities of rail systems, mining companies, insurance firms, and banks with headquarters in the Philadelphia region.

The major regional exchanges, including the PHLX, boomed in the 1920s.[5] This was due partly to the overall boom in stock markets. In addition, prior to the Securities and Exchange

[4] Richard DuBoff (1983) provides a rich account of how the telegraph influenced U.S. financial markets.

Act of 1934, listing requirements were quite lax on most of the regional exchanges. Since many states exempted any company listed on an exchange, whether regional or national, from their "Blue Sky" laws, this created a strong incentive for weak firms seeking to raise funds from the public to list on these exchanges. In the boom of the 1920s, listings and trading on the regional exchanges increased rapidly. In 1923, for example, 2.3 million shares were traded on the PHLX, about 1 percent of the volume of the NYSE. By 1929, 35.5 million shares were traded on the PHLX, about 3.1 percent of NYSE volume. In the subsequent stock market crash and economic depression, many of the firms listed on the regional exchanges failed or were absorbed in mergers, and trading volume fell precipitously. In 1932, for example, only 6.6 million shares traded on the PHLX. In addition, states changed their Blue Sky laws to limit exemptions for securities listed on regional exchanges, and the newly created Securities and Exchange Commission (SEC) required the exchanges to impose stricter listing requirements. These developments greatly decreased listings and trading volume on the regional exchanges.[6] Gradually the over-the-counter market replaced the regional exchanges as the location where newly issued equities would trade and become "seasoned" before the issuing firm might seek a listing on the NYSE or the American Stock Exchange (AMEX).

As the regional exchanges lost listings and trading volume, they responded by starting to trade widely held securities listed on the NYSE and the AMEX. In 1931, for example, the

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[5] The data in this paragraph come from the 1963 study by the Securities and Exchange Commission (SEC, 1963, pp. 916-7).

[6] In its 1963 Special Study, the SEC explained that "…since the disclosure standards of the new statute exceeded the equivalent standards of the principal exchanges, companies meeting these standards might well seek the greater publicity and prestige of a listing on the New York exchanges in preference to a regional listing…The new statutory requirements …also tended to shift the trading of securities from the regional exchanges to the over-the-counter market…[S]ecurities traded over the counter were free of the requirements now attached to securities traded on an exchange." (SEC, 1963, p. 918)

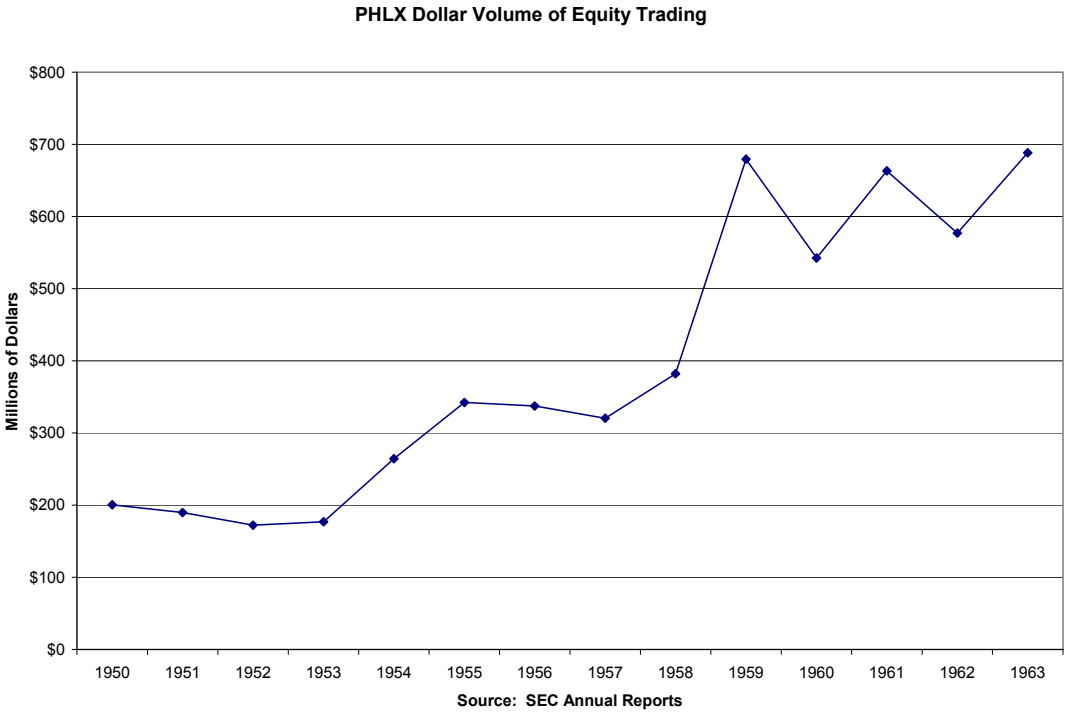
PHLX allowed trading to begin in any security listed on the NYSE, the AMEX, and some regional exchanges. Since these securities were generally not listed on the PHLX, this was called "unlisted" trading. Not surprisingly, the NYSE challenged the move by the regional exchanges to trade securities listed on the NYSE, but in a series of decisions over the 1930s the SEC decided in favor of the regional exchanges (SEC, 1963, pp. 919-24). Subsequently, the regional exchanges began to trade mainly securities listed on one of the New York exchanges. The PHLX was no exception to this trend. By 1961, only 1.2 percent of the dollar volume of stock trading on the PHLX came from the 88 stocks that had sole listings on that exchange (SEC, 1963, Table VIII-76). The vast majority of stocks traded on the PHLX were in stocks listed on the NYSE.

Even with this shift toward the trading of securities listed on the NYSE and AMEX, most of the regional exchanges saw a fairly consistently decline in their market share of total exchange-listed trading between 1930 and 1960. Many of the regional exchanges closed or merged with other regional exchanges during this period.[7] The PHLX was no exception. In 1949 it merged with the Baltimore exchange, and in 1953 it merged with the Washington DC exchange. In both cases, the PHLX was the far larger exchange in the merger and the surviving exchange maintained its headquarters in Philadelphia. Despite these mergers, as shown in Graph 1, the dollar volume of equity trading on the PHLX was quite low in the early 1950.[8] It picked up in the latter half of the 1950s, but this was largely due to a general increase in the volume of trading overall. As shown in Graph 2, over the 1950s, the market share that the PHLX had in exchange-traded equities hovered fairly consistently around 1 percent. It is no wonder that the 1963 SEC

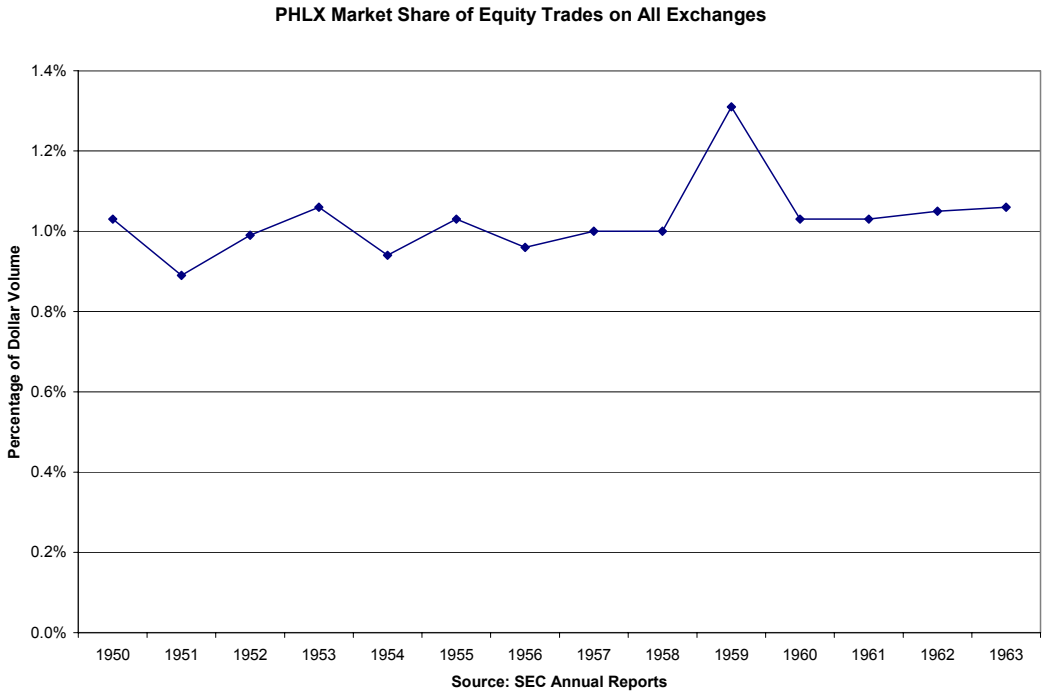
[7] The paper by Tom Arnold et al (1999) contains a thoughtful analysis of the economic forces behind the mergers of the regional exchanges between 1940 and 1960.
[8] The data from 1950-53 of graphs 1 and 2 combine the volume of the PHLX and the Washington DC exchanges. As noted in the text. The two exchanges merged in 1953. At the time of the merger, volume on the PHLX was 50 times as great as that on the DC exchange.

study discussed the general decline in the role of the regional exchanges and questioned their prospects for survival.

Graph 1



Graph 2



As the PHLX evolved into an exchange that mainly traded equities listed on the NYSE, it also evolved to resemble more closely a dealer market rather than an auction market. This was also true of the other regional exchanges. In most cases, the only person buying or selling a particular stock on the floor of the exchange was the designated specialist. There were no competing market makers on the floor and it was very rare for brokers representing buy and sell orders to interact directly.[9] The counterparty to almost all trades was the specialist.[10] The specialist's

[9] In some cases, brokers on the floor would execute large orders with each other, but they generally negotiated these trades off the floor of the exchange. Brokers would execute the prearranged trade, known as a "cross," on the PHLX or another regional exchange rather than the NYSE because there were far fewer limit orders on the books of the regional exchanges that would have to participate in the trade based on time or price priority. Such block transactions could therefore execute more smoothly on a regional exchange than on the NYSE.

[10] Although the SEC did not provide data for the PHLX in particular, in discussing the trading of securities traded on the NYSE or the AMEX and a regional exchange, it explained that, "The specialist participates as a dealer in approximately 90 percent of all multiple trading on the regional exchanges" (SEC, 1963, p. 932).

profits depended on the spread between his bid and ask price, multiplied times the volume of his trades. Because the specialists on the PHLX were small, poorly capitalized operators compared to those on the NYSE, the PHLX specialists typically sought to execute a steady flow of small retail orders.

While the specialists on the PHLX rarely faced competition for orders from the floor of the exchange, they did compete to attract trades in equities that were traded on other exchanges. To help attract this order flow, the specialists would generally guarantee that their prices would be as good, or nearly as good, as those quoted on the NYSE. This practice was common on the regional exchanges. As the SEC (1963, pp. 914-5) explained in its 1963 study, the regional exchanges sought "… to assure investors as good an execution on the regional exchange as they might receive of the principal market. This led to the development of systems to gear prices on the local exchange to those reported on the NYSE ticker tape." In discussing how this system operated on the PHLX, the SEC noted that a specialist would sometimes transact at price that was $1/8^{th}$ ($0.125) inferior to the last printed transaction price on the NYSE. Brokers who directed orders to these specialists did not consider this to be a breach of fiduciary responsibilities to their customers. They reasoned that, "…had the order been sent to New York, there is no certainty that the quote is the market in which the customer would have dealt since there might have been orders ahead of his or the market might have changed by the time his order arrived." (SEC, 1963, p. 934). In a limited set of cases, a specialist on the PHLX would match the price quoted on the NYSE. As the SEC (1963, p. 934) reported:

> If there are a great many 'prints' of GM at 56 on the NYSE tape the [PHLX] specialist will execute the order at 56 without waiting for the stock to sell in New York at 56 1/8. The transaction 'on volume' will occur when the volume of sales in New York at the limit price is such as would indicate that the firm can receive an execution at 56 in New York.

There are a variety of reasons brokers directed orders for securities listed on the NYSE to the PHLX. Small- and medium-sized brokerage firms with their headquarters in the mid-Atlantic region were often members of the PHLX but not the NYSE since membership in the PHLX required far less capital. If such firms received an order to trade a security listed on the NYSE and they directed it to a member of the NYSE for execution, they would have to pay the "public" fixed commission paid by all nonmembers.[11] This would reduce or eliminate their profit from originating the order. If such firms, on the other hand, executed the order on the PHLX, they could keep most of the public commission paid by their customers, paying only a minor member commission to the PHLX.

Firms that were solely members of the PHLX would direct some orders to the NYSE, either because of the size of the trade or because the security was not traded on the PHLX. They would have to choose a NYSE member to execute these orders on their behalf and pay the public commission. Because the cost of executing an order on the NYSE for a member was far below

[11] Members of an exchange pay a small commission to the exchange for all trades that they execute on the floor of the exchange. This commission helps cover the overhead costs of the exchange. Nonmembers who with to trade on an exchange must ask a member to execute the trade on their behalf. The nonmembers pay the member a "public" commission for handling the trade. Prior to 1975, all of the exchanges required their members to change a specified minimum public commission. The specified minimum commission was higher than what a free-market commission would have been, so all members charged the specified minimum commission and did not compete for orders on the basis of price. The minimum public commission was specified on a per-share basis, so large volume institutional traders paid the same commission per share as small retail traders. In addition, with only minor exceptions, all of the exchanges specified identical minimum public commissions (SEC, 1963, p. 299-300). An investor could avoid paying the minimum commission by directing a trade in a listed security to an over-the-counter dealer who made a market in that stock. But Rule 394 of the NYSE prohibited member firms from routing trading orders for listed stocks to OTC dealers. They were not, however, prevented from routing trades to regional exchanges. Rule 394 also prohibited NYSE member firms from acting as OTC dealers for listed securities. The effect of these rules was to limit access to the so-called "third market" to institutional investors that had the necessary communication facilities to communicate directly with OTC market makers and to compare the prices on the third market to those on the NYSE.

the minimum public commission, members competed aggressively to attract orders from non-members. The NYSE did not permit its members to discount public commissions or offer cash rebates in competing to attract orders, but the members could reward nonmember brokerage firms that were members of a regional exchange by sending them orders to execute on the regional exchange. In this way, the brokerage firm that was a sole member of a regional exchange could indirectly earn public commissions for handling orders that it directed to a NYSE member. Such orders were referred to as "reciprocal" order flow, and they accounted for a significant share of the trades directed to the PHLX and other regional exchanges prior to the liberalization of public commissions.

The largest brokerage firms that were members of the PHLX were often also members of the NYSE. In research conducted for its 1963 study, the SEC surveyed 41 of these firms to ask them why they would direct some of their order flow to the PHLX rather than the NYSE. About half of the firms cited "to retain a larger percentage of the commission" as the most important reason (SEC, 1963, p. 1086). This reason was likely cited by dual members that did not have execution and clearing facilities in New York, for they would have to pay another member of the NYSE to handle these tasks for them (SEC, 1963, p. 938). Another common reason that the firms gave for directing orders to the PHLX was "to save paying the New York State transfer tax." At that time, New York imposed graduated tax on the trading of stocks. For stocks that traded for $20 or more per share, the tax was $0.04 per share traded. Pennsylvania had no such tax. Thirteen of the 41 firms said that they direct some trades to the PHLX to "reduce market impact on the NYSE." These firms were undoubtedly breaking up block orders. Several dual-member firms reported that they directed trades to the PHLX as part of a reciprocal arrangement with another member of the PHLX. Finally, 10 of the 41 dual members said that they direct

some trades to the PHLX because, "Orders originating in the vicinity of the exchange." This likely refers to a desire for some Philadelphia area investors, bank trust departments, and brokerage firms to support local business interests.

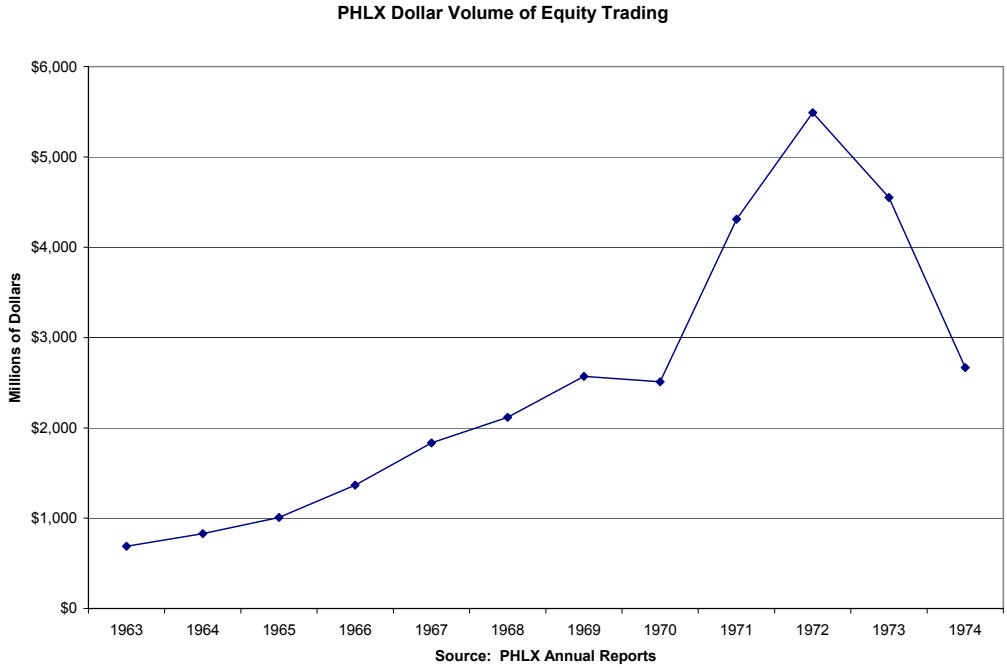
Although the overwhelming majority of trading on PHLX was in NYSE-listed securities, the securities of Philadelphia area firms accounted for a disproportionate share of trades on the floor of the PHLX in the early 1960s. Undoubtedly, the explanation for this observation is that ownership of Philadelphia area firms, especially at the retail level, was concentrated in the Philadelphia region. When these owners traded their shares, they were more likely to use regional brokerage firms that were members of the PHLX. Between 1962 and 1964, for example, the 10 most actively traded stocks on the PHLX in one or more of these years included the Philadelphia Electric Company, Scott Paper Company, Sperry Rand Corporation, Pennsylvania Railroad Company, and Philadelphia Transportation Company (PHLX *Annual Reports*, 1962-64). All of these companies were based in the Philadelphia metropolitan region.

B. 1964 - 1974

In the modern era, 1964 through 1972 were the best years for equity trading on the Philadelphia Stock Exchange. As shown in Graph 3, the dollar volume of shares traded on the PHLX grew rapidly from 1962 to 1969. It grew explosively from 1970 through 1972 before declining just as precipitously between 1972 and 1974. As shown in Graph 4, the growth in the dollar volume of trading on the PHLX between 1962 and 1968 was only sufficient to increase slightly its market share of exchange-traded equities. However, the explosive growth between 1969 and 1972 represented a 150 percent increase in its market share. The 1972-74 fall in trading volume was partly due to a decline in overall volume in exchange-listed equities and partly due to a de-

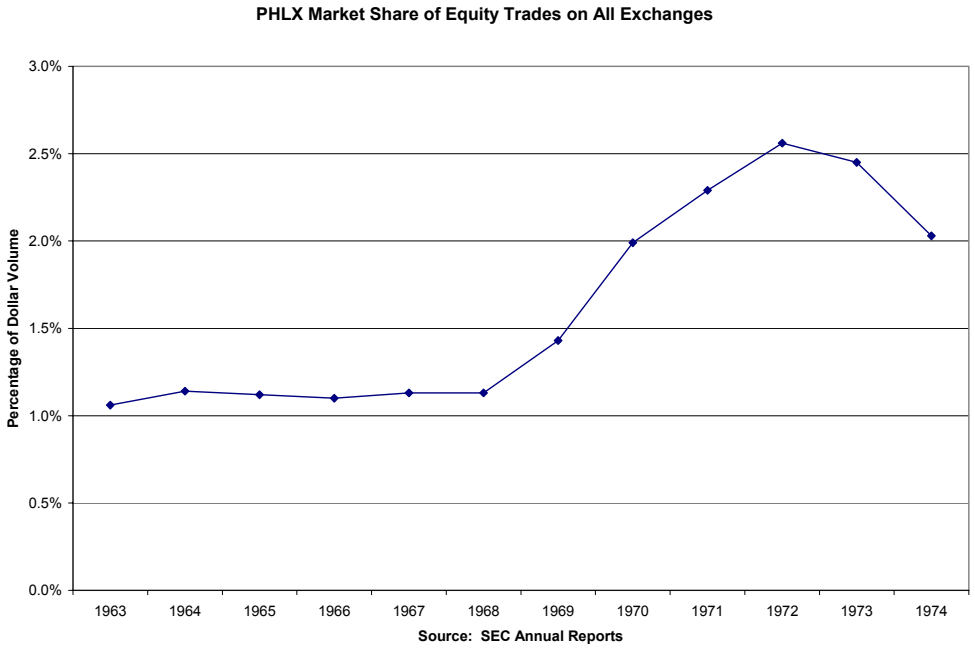
cline in the market share of the PHLX.[12] This section discusses the major developments that account for the changes in the market share of the PHLX from 1964-74.

Graph 3



[12] Table 1A in the Appendix presents the overall dollar trading volume of exchange-listed securities and the market shares of the exchanges.

Graph 4



Much of the growth in the PHLX's trading volume between 1964 and 1968 came from trades generated by mutual funds. As noted earlier, the NYSE and the regional exchanges imposed minimum public commissions with no volume discounts. Since the cost to a member firm of handling and executing a trade for a nonmember was well below the minimum commission, firms competed intensely to attract trading orders from the public, especially large volume trades. Were no rules to prevent it, brokerage firms that were members of the NYSE would have undoubtedly begun to offer cash rebates to block-traders that directed orders to them. But NYSE rules prevented cash rebates by members to nonmembers. Members could only share commissions with other members. In the early 1960s, most of the regional exchanges had similar rules to the NYSE --- a member of an exchange could only share trading commissions with other members of that exchange.[13]

[13] As of 1963, the Pacific Coast, Detroit, and Cincinnati exchanges permitted some discounting of commissions for nonmember brokerage firms (SEC, 1963, p. 936). As noted below, by the

At the same time, the Investment Company Act of 1940 placed a cap on the commissions that mutual funds could pay retail sales organizations. Mutual funds often wished to exceed this cap in order to sweeten the incentive for retail brokerage firms to sell shares in their funds. They found several ways to evade the cap. If a firm that sold shares in the mutual fund was a member of the NYSE, the mutual fund could reward it by asking it to execute trades on its behalf, paying the firm the fixed commission for this service. If the mutual fund preferred to use its traditional NYSE-member firm for executing trades, it could direct that firm to share its trading commission with another NYSE-member firm that the mutual fund wished to reward. This was known as a "give up." But many small brokerage firms that sold shares in mutual funds to retail clients were not members of the NYSE. If they were members of a regional exchange, there was a way to reward them for these sales. Assuming that the firm that traditionally executed trades for the mutual fund was also a member of the regional exchange, the mutual fund could ask the firm to execute some trades on the regional exchange and share the commissions with the member firm that the mutual fund wished to reward. In the early 1960s, such arrangements accounted for a substantial share of the order flow on regional exchanges (SEC, 1963, p. 316-7). The regional exchanges could handle the associated large block trades because the trades were often pre-arranged off the floor of the exchange.

In 1965, to attract even more business based on mutual fund directed give-ups, the PHLX changed its rules to permit commissions to be shared with brokerage firms that were not members of the PHLX (*1965 PHLX Annual Report*). Since some small brokerage firms that sold

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mid-1960s the PHLX and other regional exchanges joined these three exchanges in permitting a form of discounting through commission-sharing with nonmember brokerage firms.

shares in mutual funds were not members of any exchange, mutual funds could direct trading orders to the PHLX in order to reward them.[14]

A second factor that increased the market share of the PHLX in the mid-1960s was an increase in taxes on security trades in New York City. As the PHLX explained in its 1966 *Annual Report*, "A one cent increase in the New York Stock Transfer Tax, from four to five cents during the year, advertised the fact that there had been no such tax for many years in any of the States where regional exchanges are located. This attracted block orders to all of them…"

The New York Stock Exchange was, of course, unhappy to see trades that would normally be executed on its floor diverted to regional exchanges. It lobbied the SEC to halt all cash give-ups. The SEC agreed with the NYSE that give-ups could undermine fixed trading commissions and the cap on mutual fund sales commissions. In December 1968, all commission splitting ended when the exchanges agreed to ban the practice under pressure from the SEC (*Business Week,* January 3, 1970, p. 74).

The loss of institutional business associated with the end of give-ups could have been a major blow to the PHLX. It was not, however, because the PHLX instituted two new measures to attract institutional trades. In the 1960s, the NYSE did not allow institutions active in a wide range of activities to become members of the exchange. Membership was open only to entities whose *primary* purpose was serving the public as brokers or market makers. In addition, the NYSE did not permit foreign-owned securities firms to become members. This forced large for-

[14] Other regional exchanges adopted similar give-up provisions. As *Business Week* (January 3, 1970, p. 74) reported in 1970, "[The regionals] raked in heavy trading from institutional investors because neither the Big Board nor the AMEX allowed give-ups of commissions to nonmembers…Thus, whenever a mutual fund, for example, wanted to reward a small brokerage firm that sold its shares or provided research but which did not belong to any exchange, it could direct its broker to place an order through one of the six regionals that permitted give-ups to nonmembers."

eign banks, many of which actively traded American securities on behalf of clients, to pay the public commission to trade on the NYSE. Prior to 1967, the PHLX had similar policies. But, beginning in 1967, the PHLX allowed securities firms that were owned by mutual fund companies, insurance companies, foreign-owned financial institutions or other institutions to become members (Seligman, 1982). By early 1971, 39 such institutionally affiliated securities firms had joined the PHLX and began to trade on behalf of the institutions that owned them (Wetherill, 1971). The institutional investors still had to pay the minimum public commission, but they paid it to firms owned by the institutions themselves. In this way, mutual funds and other institutions that traded high volumes of equities effectively received a discount from public commissions. Not surprisingly, this strategy was very successful for the PHLX. As reported in its 1969 *Annual Report*, 37 percent of its stock trading volume came from institutional trades in 1968 and 45 percent in 1969.

In 1968, the PHLX took a third measure to attract trading orders to the exchange. It doubled the number of seats, cutting the price of owning a seat in half. This made it feasible for even very small brokerage firms to join the PHLX. As members, if a mutual fund wished to reward them for selling shares in the fund, it could pay them the standard public commission for handling some trades. *Business Week* (January 3, 1970, p. 74) reported admiringly of the exchange, then known as the Philadelphia-Baltimore-Washington (PBW) Exchange,

> In 1968, its volume was up 25% to 48 million shares from the previous year. In 1969, volume rose another 23%. Two moves initiated by the exchange's president, Elkins Wetherill, helped to keep trading volume high: Doubling the number of seats and allowing institutions to become members. By cutting the cost of a seat in half (to $16,500), small firms that sell mutual funds and which once were rewarded with give-ups could join and receive commissions directly…The PBW is also picking up business by letting the institutions become members and save on commissions…Liquidity is no problem because in the case of large blocks of stock both the sale and purchase (a so-called cross) are arranged beforehand and then executed on the floor of the exchange.

Over the 1960s, not all regional exchanges were as successful as the PHLX. Several failed or were absorbed. One example was the Pittsburgh Exchange. By 1968, its share of the dollar value of all equity trades on exchanges had fallen to 0.03 percent (SEC *Annual Report*, 1969). This was too little volume to justify operating the exchange, and in 1969 the PHLX agreed to absorb it. Within two years, the PHLX closed the trading floor in Pittsburgh.

The market share of the PHLX grew strongly between 1968 and 1972. But over this same period, two serious threats were on the horizon. First, by the late 1960s there was much criticism of fixed trading commissions, and many influential groups were advocating deregulation. Since much of the business of the PHLX came from institutions that were trying to evade fixed trading commissions, freeing the commissions could threaten the viability of the exchange. Beginning in 1971, the exchange experienced a hint of this. On April 5, 1971, the SEC approved negotiated commission rates on orders above $500,000. This led institutions to redirect some of their large trades to the NYSE as they could negotiate discounted commissions. This explains much of the fall in the market share of the PHLX that began in 1972.

In a second threat to the PHLX, beginning in 1972 the SEC began to pressure the exchanges to exclude from membership brokerage firms that were owned by institutional investors. The PHLX lobbied hard against this (*Business Week*, February 26, 1972). But in 1975, Congress directed the SEC to adopt a ban on brokerage firms transacting business on behalf of affiliated institutional accounts. This was to become effective in 1978. As it turned out, this had little practical effect since fixed trading commissions were liberalized in May 1975.

C. 1975-1983

The period from 1975 through 1983 was one of tremendous innovation at the PHLX. In equity trading, the PHLX shifted away from trying to attract the business of institutions to trying to attract retail trades. More importantly, in 1975 the PHLX began to trade equity options and in 1982 it introduced currency options. These two products became the basis for most of the success that the exchange had in the 1980s and 90s.

Equity trading

Beginning in May 1975, exchanges were no longer permitted to specify minimum commissions that nonmembers had to pay to trade on the exchanges. This led to a rapid fall in commissions, especially the commissions paid per-share-traded by institutional investors. Institutions that had been directing many of their trades to regional exchanges began to return to the NYSE. After all, it was the market with the most competitive bidding on the floor and the only exchange with the depth to absorb fairly large trades in widely-held equities.

In 1978, there was a second major change in securities markets, the inauguration of the Intermarket Trading System (ITS). The ITS linked the floors of the exchanges. It enabled traders on the floor of any exchange to see prices and transactions on the other exchanges and to route orders to another exchange. Traders on the floor of an exchange were expected to match or exceed the best bid or offer price shown on any other exchange, known as the national best bid or offer (NBBO), or to route their orders to an exchange quoting the NBBO.

Despite the confusing terminology, a seller or buyer could conduct his or her transaction at the NBBO and still not receive the best price in the market. The NBBO is the best *quoted* price to buy or sell a stock up to a specified quantity limit. But dealers and brokers are often re-

luctant to quote the very best price that they are willing to pay. This is because they hope to pay less than the maximum they are willing to pay, and because the maximum that they are willing to pay depends on how well informed they believe their counterparty is likely to be. If a well-informed counterparty wants to sell at price $X, the dealer can assume that the stock might well be worth less than $X. Quoting conservative bid and offer prices reduces the chances that the dealer will be taken advantage of by well-informed traders. However, when a typical "uninformed" retail order came to the floor of an exchange, such as the NYSE, where there were commonly several brokers and dealers competing to get such orders, the competition often forced them to offer prices superior to the best quoted bid or offer prices. This "price improvement" meant that investors frequently obtained a price somewhat better than the NBBO. Price improvements were comparatively rare on the floor of the regional exchanges since the specialists generally did not face competition for orders from dealers or brokers on their floors. The specialists on the regional exchanges would, as required, match the NBBO or send the trade to another exchange. But they generally did not match any price improvement occurring on the NYSE.

The 1975 deregulation of brokerage commissions led to the rise of "discount" brokerage firms that charged low fees for providing basic retail trading services. Since they charged low commissions for handling the trades, in order to make a profit they had to execute these trades at a very low cost. Moreover since the profit on each trade was small, they sought to handle a high volume of retail trades. Thus, the discount brokers valued fast, reliable, automated executions of their trades more than they valued a time-consuming or costly search for the best price possible for their customers' trades. Discount brokers argued that, in most cases, their customers gained

more from low commissions than the customers would from paying higher commissions but getting the small price improvements often associated with less automated executions.

The PHLX responded to the changes that diminished its order flow from institutional traders by developing systems to meet the needs of retail discount brokers. It hoped that a high volume of small-value order flow could sustain the exchange and its members from two sources of revenue. First, the exchange could gain revenue since it was paid for reporting trade execution data to the "consolidated tape," a system that collected trading data from all of the exchanges. Second, specialists on the exchange could profit from the spread derived from functioning as consistent counterparties to the retail trades. But to attract the order flow from the emerging discount brokers, the PHLX had to offer automated, reliable executions at prices close to the best prices available anywhere. To do so, in 1975 the PHLX introduced a computerized order handling and execution system, called the Philadelphia Stock Exchange Automated Communication and Execution System, or PACE for short. PACE would route an entered retail order to the proper specialist. Orders that met predetermined criteria could be executed automatically by the specialist and the specialist would guarantee that the price of the trade would match that of the NBBO. [15]

Partly in response to the automation of retail order flow by several of the regional exchanges and third market dealers, the NYSE also moved to automate much of its retail order

[15] Competing on this basis became common for the regional exchanges and OTC dealers. As the SEC reported in its *Market 2000 Study* (SEC, 1994, pp A VI 40), "[Retail] orders are very rarely routed on the basis of quotations. Instead, order routing decisions are made on the basis of preexisting arrangements where service and costs are paramount and execution quality is eliminated as a factor because all markets guarantee execution at the BBO. Once the order is routed this way, it is rare that it will be sent to another market because the best quote will be matched instead of rerouting the order via ITS. Thus, market makers have little incentive to compete based on quotes. According to the Regional Exchanges, it is more effective to compete by marketing

flow with the introduction of its Designated Order Turnaround System (DOT) in March 1976.[16] But PACE was more fully automated than DOT, something that the discount brokers valued. The DOT system, for example, had a built in delay to permit brokers on the floor to better the price offered by the specialist or displayed in the specialist's limit book. PACE did not have this feature. By late 1977, PACE accounted for about 12% of the PHLX's share volume. In its 1977 *Annual Report*, the PHLX explained that "…a great percentage of the volume coming through PACE is new order flow for the Exchange – orders which would have been diverted to other markets in the past."[17]

As shown in Graph 5, between 1974 and 1983 the PHLX experienced a significant increase in the dollar value of its equity trading volume. But despite the PHLX's efforts to attract a high volume of retail trades, Graph 6 shows that it lost market share relative to the combined share of the other exchanges. By 1983, its market share had declined to 1.5 percent from 2.3 percent in 1974. In other words, despite the efforts of the PHLX to attract the order flow of retail trades, the exchange lost market share as large institutional orders returned to the NYSE following the 1975 deregulation of fixed trading commissions.

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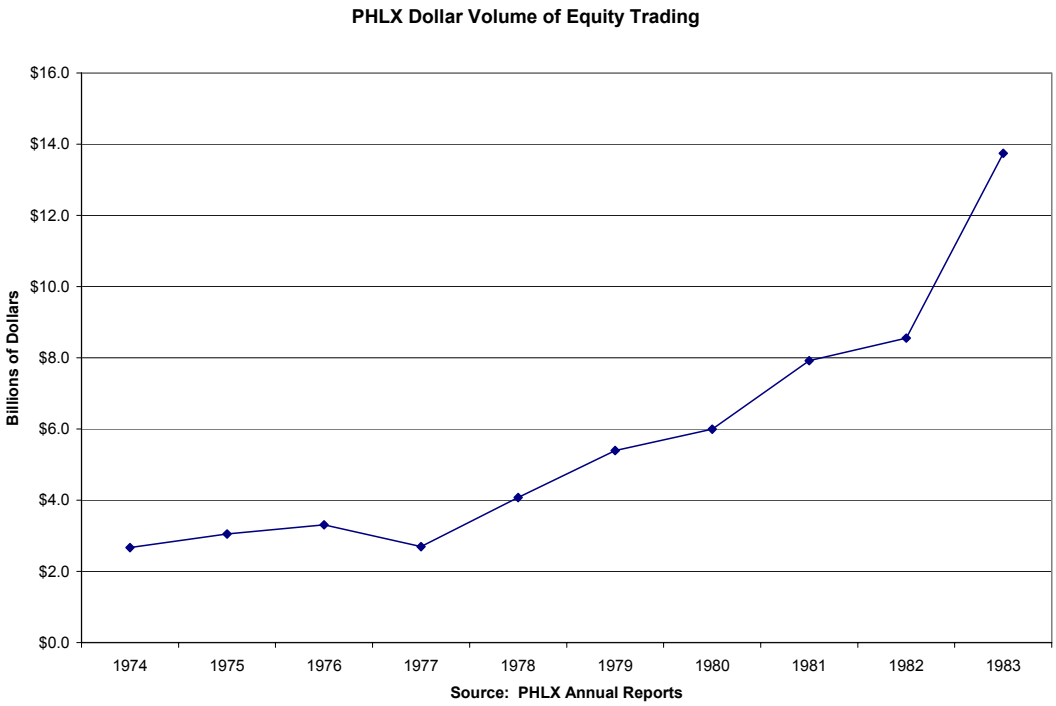
quicker and cheaper executions than by attempting to attract orders through displayed quotations."

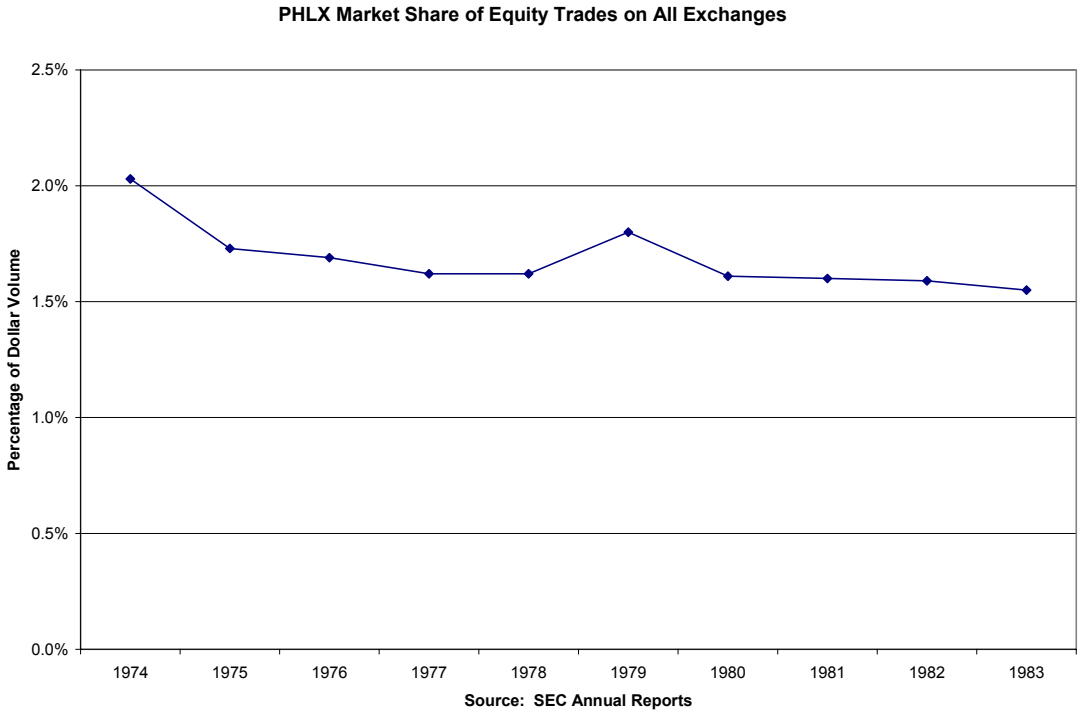
[16] The DOT system later evolved into SuperDOT. In 1999, SuperDot handled about 90% of NYSE orders accounting for about half of the exchange's dollar trading volume (NYSE, 2000, p. 24). As with DOT, SuperDot does not allow for fully automated executions since NYSE rules require the specialist to expose incoming orders to the crowd for possible price improvements.

[17] Well into the 1980s, news accounts credited PACE with attracting significant retail order flow *(Philadelphia Inquirer*, April 18, 1986, p. c12).

Graph 5



Graph 6



Stock and index options

On June 27, 1975, the PHLX began to trade options on equities. It was the third exchange to do so. The Chicago Board Options Exchange (CBOE) had pioneered this path when it began to trade stock options in April 1973. Prior to that, options on equities had been traded only in an opaque over-the-counter market. Interest in trading options on the CBOE developed rapidly. In January 1975, the American Stock Exchange became the second exchange to trade equity options. It was followed shortly afterwards by the PHLX and the Pacific Stock Exchange.

When the PHLX introduced options trading, it started on a limited basis and expanded over time. Initially, for example, the PHLX listed only call options on five stocks. It slowly added other call options over the next few years. The PHLX began to list put options in June 1977.

The main reason that the PHLX was slow to add new equity options was that the CBOE and the AMEX had already listed the most desirable options by the time the PHLX began to look for listings. Prior to 1977, although there was no rule that prevented the exchanges from doing so, the exchanges rarely listed option contracts that were already traded on another exchange. As I discuss below, people later charged that the options exchanges did not list each other's options because of an implicit agreement to limit competition among the exchanges. In addition, the SEC and the exchanges expressed concerns about multiple listing of options contracts since, unlike the equity exchanges, the options exchanges were not linked. This meant that there was no organized system to tell traders instantly on one exchange about the quoted bid and offer prices and volumes on other exchanges. And there was no process to ensure that a trade on one

exchange would not occur on terms less favorable than that offered on another exchange.[18] The SEC worried that public investors might be taken advantage of in such fragmented markets and that the continuity and liquidity of the markets could be impaired.

Although the listing of the same option contract on more than one exchange was rare, it was becoming more common as the exchanges competed for order flow (*Investment Dealer's Digest*, August 17, 1992, p. 14). In 1977, the SEC responded to its concerns about market fragmentation by placing a moratorium on the listing of new equity options while it studied the options market and considered how to handle the multiple-listing issue.[19] Although the exchanges did not develop a linkage system during the moratorium, the SEC felt that it could not leave the moratorium in place indefinitely and it lifted it in March 1980. Still concerned about multiple trading on markets that were not linked, in June 1980 the SEC initiated a lottery for allocating the right to trade any new options on equities. Under this system, the exchanges would provide a list to the SEC of equity options that they wished to list. The SEC would then use a lottery to allocate the exclusive right to trade these options to specific exchanges. This system remained in place until 1990. Over these ten years, the options exchanges never developed a system to link their markets although they were persistently pressured by the SEC to do so.

Under the SEC lottery system, the flow of option trades to the exchanges depended on their ability to attract business for the options that they had listed prior to the moratorium of 1977 and their luck in obtaining the right to list desirable equity options through the lottery. By these

[18] Traders on the floor of one exchange could follow prices and transactions on another exchange by obtaining data through third-party vendors, but this still would not provide the traders with an inter-market order routing system.

[19] The PHLX supported this move, stating in its 1977 *Annual Report*, "The imposed options moratorium, temporarily at least, answers our request for the halt to dual option trading. Earlier in the year, the PHLX attempted to call attention to a so-called dual trading war which was occurring between the options exchanges in their attempts to capture increased order flow."

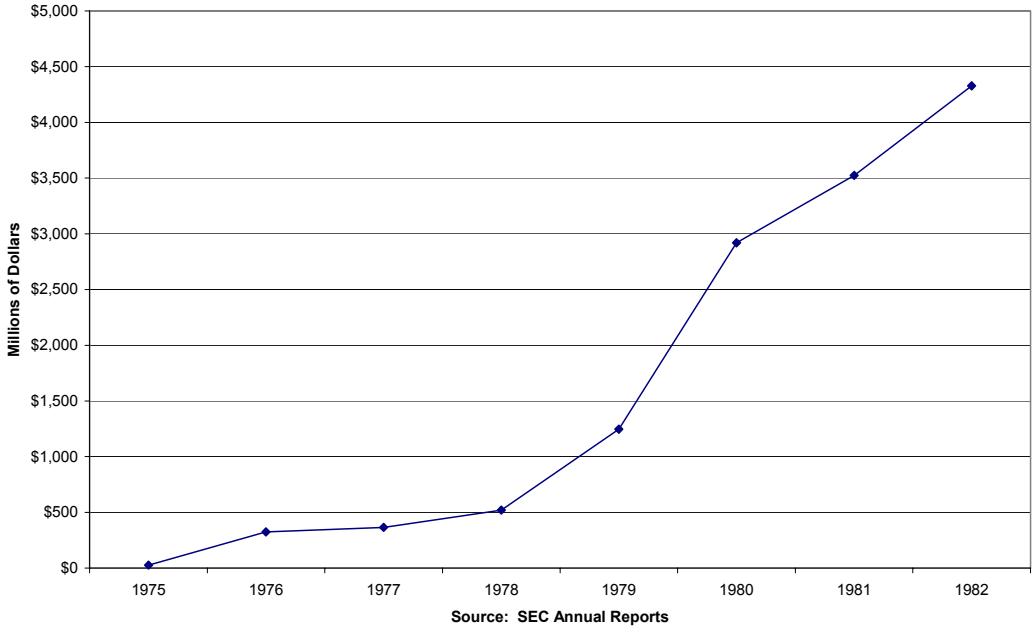
measures the PHLX did well. As shown in Graph 7, the volume of equity options traded on the exchange grew consistently between 1975 and 1983. After 1978, the growth was particularly rapid. As shown in Graph 8, the market share that the PHLX had in equity options hovered around 3 percent between 1976 and 1978. During this period, the CBOE, with its first–mover advantage, had over 70 percent of the market. The AMEX's share hovered around 20 percent.[20] But the rapid growth in equity option trades on the PHLX between 1978 and 1983 led to a tripling of its market share. By 1983, it had almost 9 percent of the overall volume of equity option trades on exchanges. This created bustling activity on the options floor, for unlike the equity floor, it was active with market makers trading for their own account in addition to brokers and specialists. These were heady days among option traders on the PHLX and many boasted publicly of the easy money to be made (Loren, 1983). [21]

[20] Table 2A in the Appendix provides a time series of data on the overall volume of equity options trading and the market shares of the exchanges.

[21] This was also true on the currency options floor. In both cases, the PHLX was a primary market in which national prices were set rather than, as in the case of the equity floor, a secondary market that based its prices on those determined by another exchange.

Graph 7

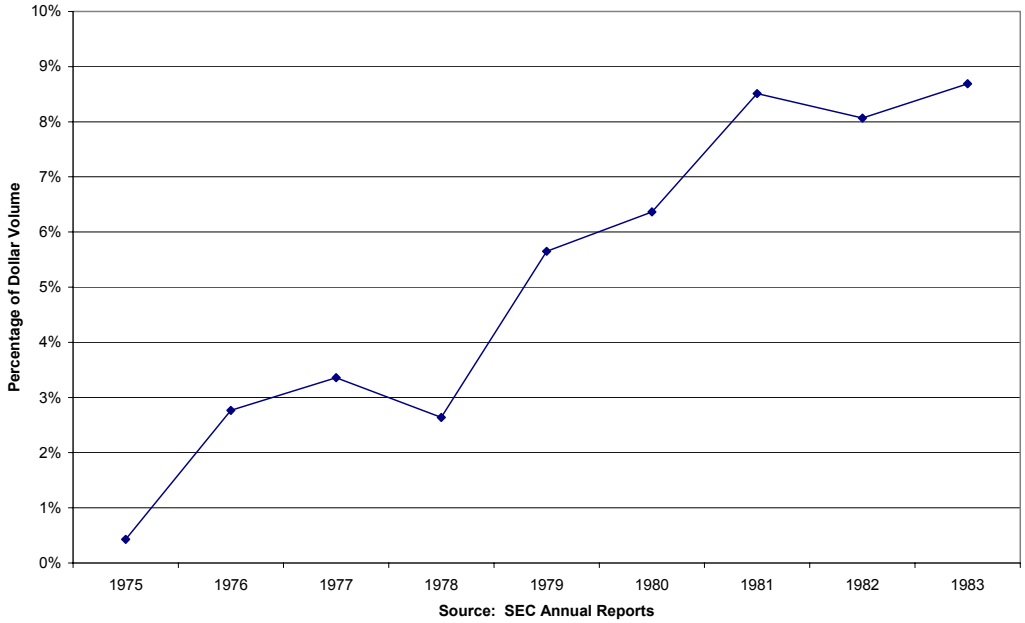
PHLX Dollar Volume of Equity Option Trades



Source: SEC Annual Reports

Graph 8

PHLX Market Share of Exchange-Traded Equity Options



Source: SEC Annual Reports

At the end of 1983, there was a little noticed development in options trading that would later have important implications for the PHLX. In December of that year, the exchange began to trade options on indices reflecting the price of the equities of firms in a particular economic sector (*Securities Week*, December 12, 1983, p. 11).[22] Since these options settled only in cash, one could consider them to be purely a bet on the market-weighted average price of stocks in a particular economic sector. The PHLX began with two such sector indices, a precious metals index and a gaming/hotel index. Initially there was little trading volume in such sector index options, but that would change over time.

Currency options

Although the PHLX demonstrated foresight in moving relatively early to trade equity options, it could not claim to have pioneered this development. It simply copied the innovation that the CBOE had launched. In the case of currency options, the PHLX was the innovator.

In the late 1970s, there was a huge spot market in foreign exchange and active over-the-counter forward and exchange-based futures markets. There was no organized market for foreign exchange options. A staff member of the PHLX at that time, Arnold Staloff, proposed that the PHLX should initiate trading options on foreign currencies. With the backing of PHLX management and some key members of the exchange, he started a long and complicated process to obtain approval from the SEC.[23] One major complication was that laws in the U.S. treated foreign exchange as a commodity, and the commodity exchanges were regulated by the Com-

[22] The CBOE was the first options exchange to trade a stock market index option. It initiated trading on a broad market index in March 1983 (*New York Times*, April 11, 1983, p. D9). The CBOE and AMEX began trading index options on narrower economic sectors in September 1983 (*Securities Week*, September 5, 1983, p. 9).

modities Futures Trading Commission (CFTC). The CFTC and the Chicago-based futures exchanges were determined to prevent SEC-regulated entities, such as the PHLX, from becoming centers for trading currency options. Since the SEC already regulated option trading in equities, it was equally determined to oversee options on other financial instruments, including foreign currencies. After much political and legal maneuvering, the SEC and the CFTC finally reached a compromise, known as the Shad-Johnson Accord, in late 1981. Under the terms of the compromise, the SEC was to oversee exchange-based trading in options on foreign currencies. Shortly afterwards, the SEC approved the PHLX to start trading foreign currency options.

The PHLX opened its currency option trading floor on December 10, 1982. To help promote its new product, the PHLX initiated a series of seminars to explain to market professionals how it had structured its currency options market and to promote the use of exchange-traded currency options for hedging and speculation. In the first year of trading, the product appeared to be headed for success (*Financial Times*, October 6, 1983, p. I16). Trading volume started small and grew slowly but steadily. Orders came from small scale speculators, and from nonfinancial and financial businesses, many based in Europe, that used the exchange to hedge risks.

D. 1984-1999

The period from 1984-99 was perhaps the most successful for the PHLX in modern times. Volume was heavy on almost all stock markets, including the PHLX. In addition, the two principal innovations of the previous period --- the introduction of equity and currency options --

[23] The book by Gregory Millman (1995) provides an entertaining account of the efforts by the PHLX to develop and market foreign currency options.

- brought a very high volume of order flow, and associated high incomes for many PHLX members for extended periods of time.

At the same time, many members and managers of the exchange worried that the success was likely to be short-lived. There were no barriers to entry, other than the PHLX's first-mover advantage, that would protect its dominance of currency options. And the SEC repeatedly indicated that it was dissatisfied with the monopolies that the options exchanges had in the majority of equity options. The SEC pushed hard for the options exchanges to create a linkage system and move to multiple listings. Few PHLX members held high hopes for the future of pure equity trading. The PHLX continued to lose market share in this arena and members could foresee growing threats from computerized trading platforms.

These concerns, as well as the recognition that the PHLX would have to spend large sums to keep its software, hardware, and self-regulatory functions abreast of other exchanges, led to numerous explorations of merger possibilities with other exchanges. The PHLX held serious merger talks with other exchanges in 1989-91 and in 1993. In 1998, it came very close to merging with the AMEX.[24] The merger was called off at the last minute because major changes in the options industry, discussed below, raised serious doubts about whether it would be advantageous to both parties (*Philadelphia Inquirer*, April 23, 1999, p. D1).

The period from 1984 to 1999 was not one that purely relied on the innovations from the previous era. During these 15 years, the PHLX made one further significant innovation. In

[24] In June 1998 the PHLX Board tentatively agreed to a merger proposal from the AMEX. It was reported that PHLX lagged in technology and thought that it had to invest many millions of dollars to catch up *(Investment Dealers Digest*, June 15, 1998). The AMEX, on the other hand, had state-of-the-art technology that allowed for electronic processing of orders, cancellations and replacement orders. The desire of the PHLX to gain AMEX's technology and the desire of the AMEX to gain PHLX's options business were the apparent motivations for the merger. Under

March 1988, after a two-year costly development effort the PHLX asked the SEC to approve its application to trade "cash index participations," or "CIPs" for short. The CIP was to trade like a stock but, like a futures index, its price would depend on the value of an index of stocks. Unlike a futures index, the CIP would pay a quarterly dividend based on the dividends of the stocks in the index and it would have no expiration date. Shortly after the PHLX filed its application with the SEC, the AMEX and CBOE applied to trade very similar products.[25] The PHLX asked the SEC to permit it to trade CIPs for several months prior to permitting the trading of similar products at the other exchanges, but the SEC gave its approval for the simultaneous launching of the products at all three exchanges. Soon after the CIP began to trade on the options floor of the PHLX, the CFTC brought a lawsuit, arguing that CIP-type products were futures contracts and should be regulated by the CFTC and traded on futures exchanges. In August 1989, a federal court ruled in favor of the CFTC and ordered the PHLX and the other stock exchanges to stop trading CIPs (*Philadelphia Inquirer*, June 19, 1990, p. E1).[26] They all did so, but the AMEX worked to redesign its CIP-type product to enable it to avoid designation as a product that should be traded on a futures exchange.[27] In 1993, the AMEX introduced an "exchange traded fund,"

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the terms of the merger, PHLX's options business would have moved to New York City. The merger plans were aborted in April 1999.

[25] A former official of the PHLX told me that the PHLX and the other exchanges commonly faxed to each other copies of proposed routine rule changes so that they could maintain a harmonized set of rules. Accordingly to this individual, an administrative assistant at the PHLX mistakenly faxed copies of PHLX's plans for the CIP to the other exchanges. This enabled the other exchanges to immediately present the SEC with copy-cat proposals.

[26] Nicholas Giordano, the president of the PHLX at the time, was obviously frustrated with the CFTC. Referring to Mr. Giordano, *The Banker* (January 1, 1990) reported, "The CFTC should stick to what it is good at, he suggests, 'like regulating pork bellies'."

[27] The PHLX had a futures exchange and could have reintroduced the CIP as a futures product, but it did not do so. In the view of the PHLX, the CIP could not succeed as a futures product since far fewer brokers were qualified to trade futures contracts than spot contracts.

the replacement for the CIP. In subsequent years this became a highly successful product for the AMEX.

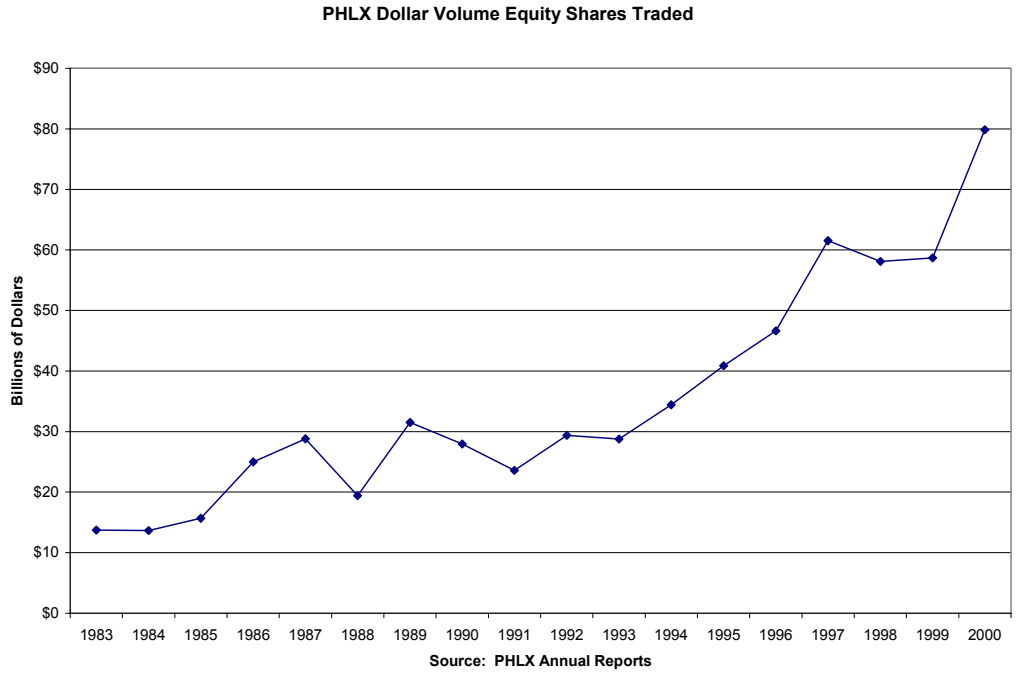
In addition to creating the CIP, the PHLX opened a futures exchange, named the Philadelphia Board of Trade (PBOT), in May 1985 (*New York Times*, May 13, 1985, p. D5). The first securities traded on the PBOT were cash-settled options on Eurodollars futures and a futures contract on an other-the-counter stock market index. Due to a lack of interest, the exchange stopped trading both products in 1986. In the same year, however, it introduced trading in futures contracts on a variety of foreign currencies. It hoped that traders on its currency options floor might direct trades to the PBOT to hedge their risk exposures. The PBOT had up and down years closely tied to the general activity in currency markets, but as a late entrant it never gained more than a tiny share of the foreign currency futures market. In 1999, the PHLX closed the PBOT. Nevertheless, during the years in which the PHLX hosted an equity trading floor, an equity options floor, a currency options floor, and a futures market, it was the most diversified exchange in the country.

Equity markets

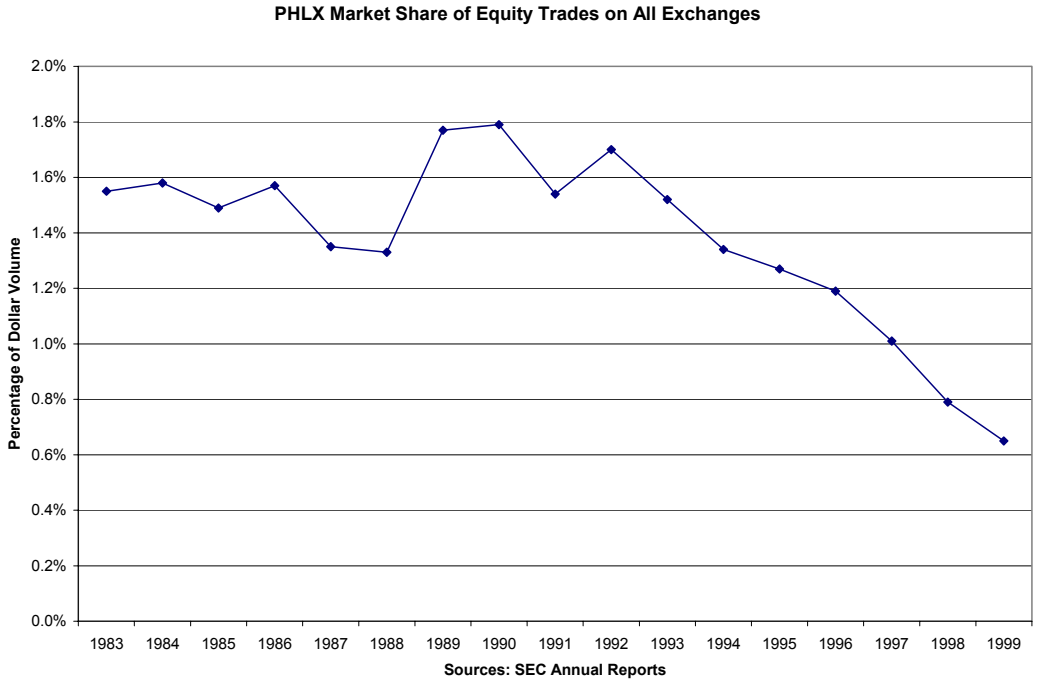
As shown in Graph 9, with the exception of just a few down years, equity trading volume on the PHLX grew strongly from 1984-1999. This reflected the general boom in equity markets over this period. This growing order flow fed the profits of specialists on the PHLX and other exchanges. But there was an important offsetting development. As noted earlier, specialists and OTC dealers competed to attract retail order flow since they could profit from the spread between the bid and ask price. Not surprisingly, in competing for this order flow, specialists on the regional exchanges and OTC dealers began to offer financial incentives to brokerage firms that

were willing to direct orders to them. This became known as "payment for order flow." Although it is not clear who initiated the practice and when, by the mid-1980s there were reports that the practice was common among OTC dealers (Sasseen, 1985). Discount brokers, who were competing with each other to charge the lowest trading commission, were particularly likely to seek payments for order flow. These payments enabled them to cover their operating costs by means other than commissions.

Graph 9



Graph 10



There is no record of when specialists on the PHLX began to pay for order flow, but it likely started in the mid-1980s.[28] This helped the specialists attract the order flow but reduced their profits on each trade. Thus, the profits to the specialists associated with the rapid increase in trading volume illustrated in Graph 9 were less than what they would have reaped without having to pay for much of the order flow.

As shown in Graph 10, the market share of the PHLX between 1984 and 1992 varied between 1.2 percent and 1.8 percent. Beginning in 1993, the PHLX began to lose market share at a fairly consistent rate. By 1999, its market share was about 0.6 percent. It is unclear exactly what caused this decline in market share. One possibility is that, although specialists on the NYSE did not, strictly speaking, pay for order flow, in 1993 the NYSE began to offer cash credits to bro-

kers who executed small trades on its DOT system (*Wall Street Journal,* January 14, 1993, p. C1). A second factor was that the NYSE made many improvements in SuperDot, its automated order routing and reporting system and, allegedly, pressured its members to refrain from directing orders to the regional exchanges (Osterland, 1998, and *Securities Week*, March 31, 1997, p.1). A third factor may have been the ever increasing competition from the other exchanges**.** From 1993 to 2000, for example, the market shares of the AMEX and the Chicago Stock Exchange, based on the dollar volume of trading of exchange-listed securities, increased notably (see Appendix 1A). [29]

Managers and members of the PHLX were fully cognizant that the exchange needed to take major steps to increase the order flow on its equity-trading floor. In the mid-1980s, the management of the exchange appealed to large financial institutions located in the Philadelphia metropolitan area to support the exchange by directing some of their stock-trading business to the PHLX (*Philadelphia Inquirer*, April 18, 1986, p. C12). But this appeal apparently had little effect.[30]

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[28] The SEC announced in early 1986 that it would informally study the use of payment for order flow among dealers for listed securities on the exchanges (*Securities Week*, February 17, 1986, p. 4).

[29] In an effort to attract order flow, the Boston, Cincinnati, and Pacific Stock Exchanges encouraged affiliates of large brokerage firms to become specialists on the exchange. On each of these exchanges, more than half of the specialists were affiliated with order-flow providers (SEC, 1994, p. 71). The brokerage firms would direct trading orders to their affiliated specialists since they shared the specialists' profits. In the early 1990s, on the PHLX only 15% of the specialists were affiliated with "upstairs" firms. Most of its specialists on the equity-trading floor remained independent operations.

[30] In interviews, two former presidents of the PHLX told me that Boston-area financial institutions have long supported the Boston Stock Exchange by ensuring that it receives some of their stock-trading orders. They lamented that Philadelphia area financial institutions were not equally supportive of the PHLX. This reminded me of the claim by sociologist E. Digby Baltzell (1979) that the wealthy families of Boston have always been much more civic-spirited than have those of Philadelphia.

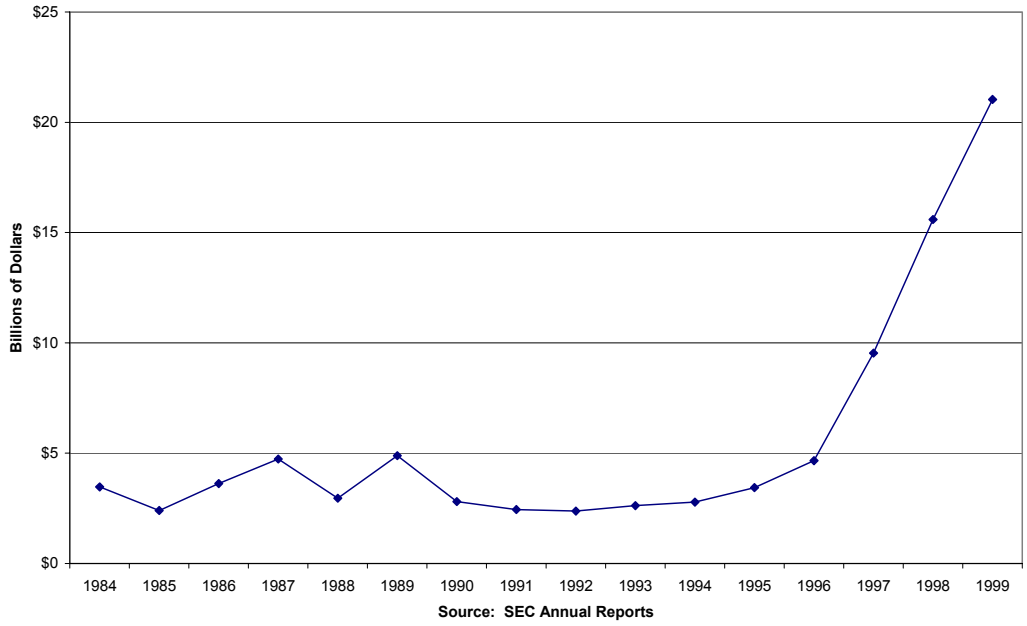
In February 1993, the PHLX implemented a second major effort to increase order flow to its equity-trading floor. At that time it began to trade selected stocks that were listed on the NASDAQ (*1992 PHLX Annual Report*). The SEC had approved this possibility on a limited basis in 1986 and on a more extensive basis in 1990. The Chicago Stock Exchange began to trade a subset of NASDAQ-listed stocks in May 1987 and attracted sufficient volume to maintain the effort. The PHLX thought that it too might attract order flow for several of the NASDAQ-listed stocks in which it had active options markets. This effort was unsuccessful, however, and the PHLX halted trading in the NASDAQ stocks in early 1996 (*Securities Week*, January 7, 2002, p.4).

Equity and index options

As shown in Graph 11, the volume of trading in equity options on the PHLX was relatively stable from 1983 to 1989. This was despite the 1985 entry of the NYSE into the equity options market. The NYSE was simply too late. It could not use its dominance of exchange-based equity trading to gain more than a tiny toehold in the options market. When the NYSE entered the market, other exchanges had already listed the most desirable options, and dual listing of options on exchange-traded stocks was not permitted. Prior to 1990, the only way that the NYSE could trade an option on an exchange-listed stock was to participate in the SEC's lottery for new listings. Even after 1993, when the SEC began to allow multiple listings for all stock options, the NYSE, like the other exchanges, chose not to trade options that had been allocated to other exchanges through the lottery. After more than a decade of fighting to build its options business under such restrictions, in 1997 the NYSE gave up, shutting down its options trading floor.

Graph 11

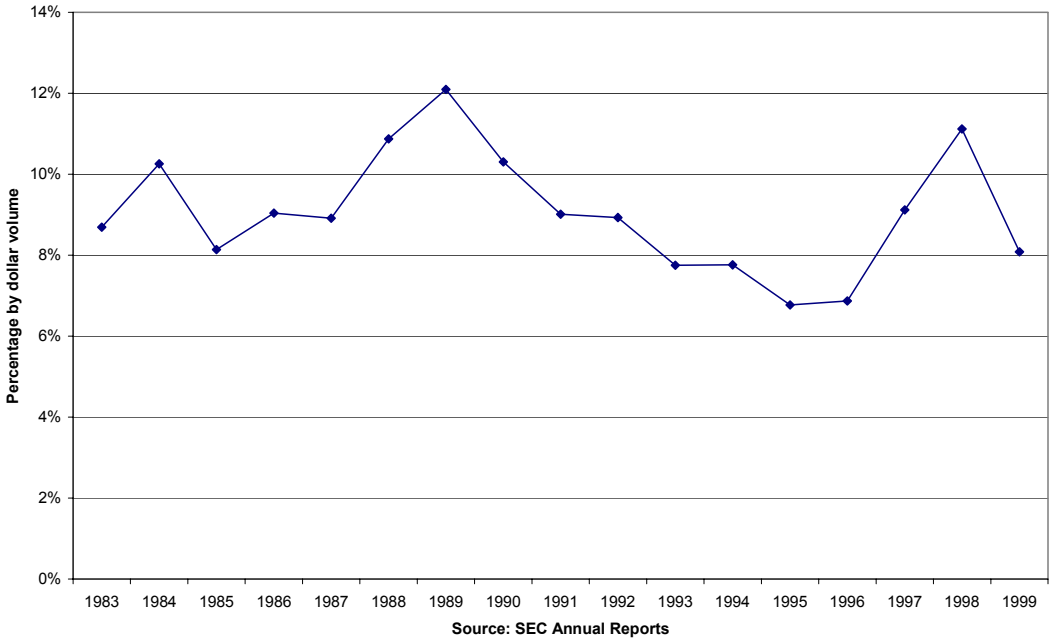
PHLX Dollar Volume Equity Option Trades



Source: SEC Annual Reports

Graph 12

PHLX Market Share of Exchange-Traded Equity Options



Source: SEC Annual Reports

The PHLX, along with other options exchanges, experienced a slump in the volume of options trading between 1990 and 1992. This is commonly attributed to the end of the corporate takeover era associated with the 1990s failure of Drexel Burnham and the creation of more effective corporate take-over defenses (*Philadelphia Inquirer*, September 26, 1990, p. E10.) In the late 1980s, a substantial share of the business in options came from individuals and institutions speculating on possible takeover targets.

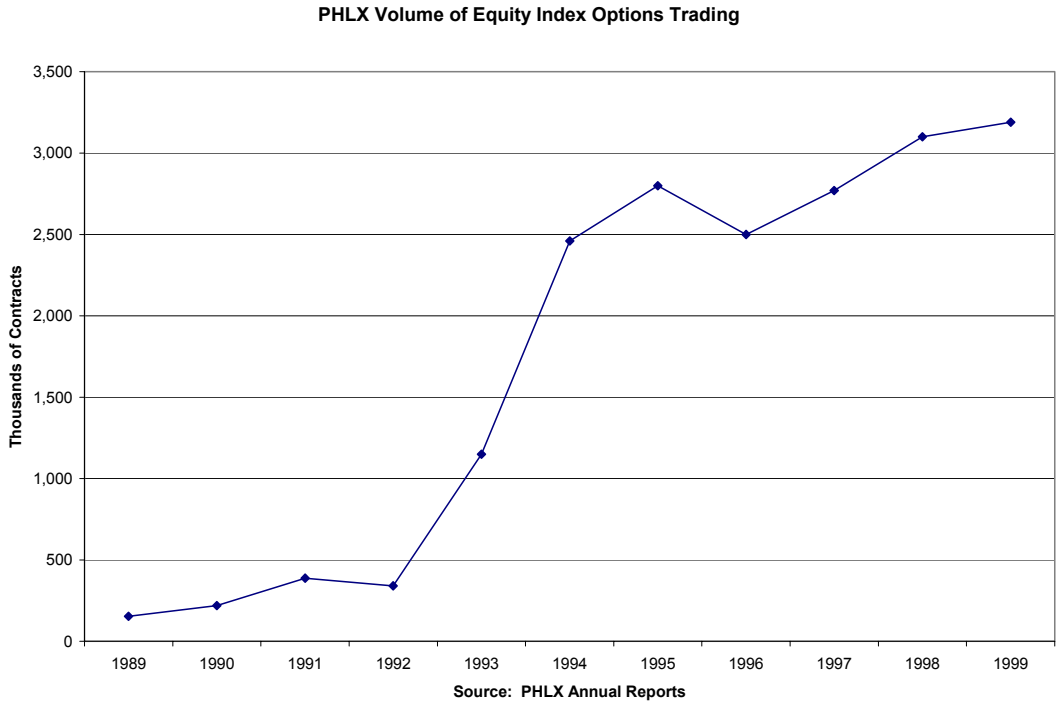
The volume of options trading on the exchanges picked up in 1992, but the PHLX saw very little of this. As shown in Graph 12, the PHLX lost significant market share in equity option trades between 1989 and 1995. Much of this decline was simply due to bad luck. The PHLX did not happen to list some of the equity options that saw the highest volume of trading in this period.

The luck of the PHLX turned around in the mid-1990s. Beginning in 1996, there was general boom in equity option trading, much of which represented speculation or hedging in the stocks of high-flying technology companies. Since many of these firms were relatively young, the CBOE and AMEX had not generally listed options on their stocks prior to the entry of the PHLX into options trading. Thus, the PHLX had almost as substantial of a listing of options on the stocks of these firms as did any other exchange. When the boom began, the PHLX was well positioned to participate. As shown in Graphs 11 and 12, whether measured in absolute trading volume or market share, between 1996 and 1998 the PHLX saw rapid growth in trading on its equity options floor. In fact, the explosive volume led to serious problems for the PHLX since its trade routing, executing, and reporting technologies were antiquated and could not keep up with the order flow in its most active options (*Wall Street Journal*, April 27, 1999, p. B30). This hurt the reputation of the exchange and cost it potential business. Nevertheless, as reflected in

the price of seats to trade equity options, these were boom times. The highest price paid for a seat to trade equity options on the PHLX in 1993 was $20,000. By 1998, it was $305,000 (data provided to the author by the PHLX).

As noted earlier, the PHLX introduced trading in sector index options in 1983. Shortly afterwards, the PHLX also began to trade options on broad equity market indices. At first there was only modest interest in the PHLX's index options. But, as shown in Graph 13, order flow for index options grew very rapidly between 1992 and 1999. Trading in the PHLX's sector index options was particularly strong. As the PHLX noted in its 1994 *Annual Report*, "Three of the Exchange's [sector index options]… are by a significant margin the most actively traded instruments of their type in the securities industry."

Graph 13



Although equity options were a major success for the PHLX from 1984 through 1999, the exchange could never be sure that this success would last. As noted earlier, over the 1980s the

PHLX and the other options exchanges had a legal monopoly in the trading of many of their most active options. The SEC had created this situation because of its concern that multiple listings among unlinked markets would be detrimental to public investors.

The SEC pressured the options exchanges to create a linkage system during the period when it allocated exclusive trading rights via a lottery. But the options exchanges failed to create such a system even after a decade of discussions (*Wall Street Journal*, October 6, 1999, p. C20). Frustrated, the SEC decided to end the monopolies that the exchanges enjoyed in options listings while continuing to pressure the exchanges to create a linkage system. The SEC took an incremental approach. In 1985, it decided that the right to trade options on OTC stocks would not be allocated through a lottery. These options could be listed on multiple exchanges. In January 1990, the SEC ended its lottery system for allocating options on exchange-listed stocks. The SEC ruled that henceforth any options that were listed for the first time on an exchange could be listed on another exchange. These changes in policy had only a modest effect. In August 1992, only 111 of 1,000 listed options traded on more than one exchange (*Investment Dealers Digest*, August 17, 1992, p. 14). At year-end 1992, the PHLX traded 228 equity options. Only 31 of these were traded on other exchanges **(***1992 PHLX Annual Report***).** In November 1992, the SEC began to lift exclusive trading privileges for the approximately 500 equity options listed through the lottery system prior to 1990. It did so in stages, starting with the least actively traded options. By the mid-1990s all restrictions on multiple listings had been lifted, but the exchanges still chose not to list options that had been allocated to other exchanges under the lottery system. In mid-1999, for example, about 60 percent of equity options still traded on only one exchange, and these included most of the most active options (*Financial Times*, August 19, 1999, p. 28). The PHLX, for example, was the only exchange to trade options in Dell Computers prior to late

1999. This was an extremely active option --- it alone accounted for 30 to 50 percent of the volume in equity options on the PHLX during much of 1999.

Despite the strong volume of order flow to the PHLX options floor in early 1999, many people were highly pessimistic about the continuing health of this business. And, in fact, a number of the threats that they worried about quickly came to fruition. Several large securities firms, for example, announced in 1998 that they were investing in the creation of an all-electronic options exchange, to be known as the International Securities Exchange (ISE). The backers of the ISE also announced that this exchange would trade popular option contracts traded on other exchanges. In other words, it planned to break the monopolies that the exchanges had enjoyed in many options listings.

A second threat was the escalating pressure that the SEC and U.S. Justice Department were applying to induce the options exchanges to list the other exchanges' active options. By the late 1990s, the reluctance of the options exchanges to compete for other exchanges' listed options led the SEC and the Justice Department to charge that there was a "gentlemen's agreement" among the exchanges not to compete. Both agencies filed suit. The exchanges denied the charge but, in 2000, they agreed to spend millions to improve self-regulation as part of a settlement with the Justice Department and SEC. The PHLX, in particular, committed to spend $8 million. The PHLX also paid $2.8 million in 2000 to settle a class action lawsuit accusing it of increasing option spreads by squelching competition.

By late 1999, litigation threats from the SEC and Justice Department and the threat by the ISE to list other exchange's option contracts finally had the result that the SEC desired. In August 1999 the CBOE and AMEX broke the alleged gentlemen's agreement when they began to trade options in Dell Computers. They immediately attracted a significant share of the Dell order

flow away from the PHLX. Not surprisingly, the PHLX retaliated by listing several of the most actively traded options listed on the CBOE and AMEX (*New York Times*, August 24, 1999, p. C3).[31]

Options traders on the floor of the PHLX did have some good news in 1999. As was noted earlier, in the mid-1990s the computerized trading systems of the PHLX, especially for options, were antiquated and could not handle especially high volumes of trading activity. Gaining access to better trading technology had been much of the impetus for the merger discussions of the late 1990s. While those discussions were underway, the PHLX began a costly, but intentionally low profile, internal effort to improve its systems. In early 1999, almost at the same time as it announced that merger plans with the AMEX were no longer under consideration, it unveiled new computerized trading systems (*Wall Street Journal*, April 27, 1999, p. B30). The systems were widely recognized to be state-of-the-art. The trading technology of the PHLX ceased to be an issue impeding its success.

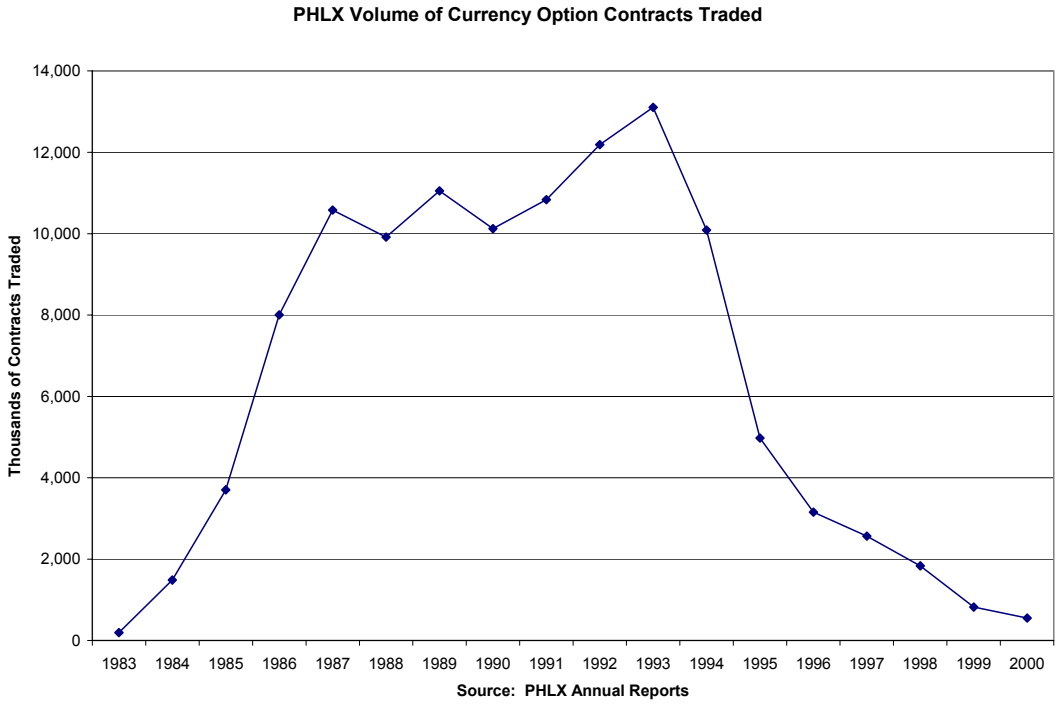
Currency options

As the PHLX worked to promote its fledgling currency options market, large commercial banks and investments banks increasingly began to write tailor-made currency option contracts for their corporate customers who were looking for better ways to hedge exchange rate risks

[31] Multiple listing occurred despite the lack of an intermarket linkage system. In October 1999, SEC Chairman Levitt reprimanded the options exchanges for failing to comply with his request (made in February) that they link their markets. He gave them 90 days to come up with a plan for doing so and they did. In July 2001, PHLX began to phase in the "Interim Linkage" plan for options. Under this plan, brokerages can route orders to a particular exchange. If the exchange does not quote the National Best Bid and Offer (NBBO) then its specialist can match the NBBO or send the order to an exchange that has the NBBO. The Options Linkage Association subsequently developed a long-term linkage plan under the auspices of the Options Clearing Corp

(*American Banker*, January 24, 1984, p. 1). The banks hedged their own net risk exposures by taking appropriate positions in the spot market or futures market, by trading currency options with each other in a developing OTC market, and by trading options on the PHLX (*American Banker*, January 17, 1985, p.16). When the banks traded on the PHLX, their orders were generally far larger than the specialists and market makers could handle. The banks would therefore use a broker to find another institution, generally another bank, willing to take the other side of the trade. Once two parties agreed to the terms of the trade, they would execute it on the floor of the exchange. Market makers on the floor would not interfere with these block trades. This practice enabled the exchange to handle large trades smoothly and it contributed to the rapid growth in trading volume between 1983 and 1987 that is illustrated in Graph 14.

Graph 14



(OCC). The options exchanges began to phase in linkage to a single electronic quote system in early 2003.

By mid-1984, it was clear that the PHLX had become the dominant trading center for what could become a very large market. Financial officers at large internationally-active firms who never knew that Philadelphia had a stock exchange, were now acutely aware of its presence (*Financial Times of London*, October 2, 1984, p. I13). The success that the PHLX was having with currency options was not lost on other exchanges, several of which also began to trade them. The Chicago Board Options Exchange began to trade currency options in September 1985, two years after the PHLX initiated the market. But it could never overcome Philadelphia's first mover advantage, and few traders could see any reason to divert order flow from the PHLX (*Journal of Commerce*, August 3, 1987, p. 7B). Although the CBOE had a dominant share of the equity options business, the people and institutions trading currency options were not the same as those trading equity options, so the CBOE could not benefit from economies of scope. In August 1987, the CBOE withdrew from the business.[32]

Much of the order flow for currency options came from institutions in Europe, especially London.[33] Not surprisingly, the European exchanges resented that an American exchange dominated the business. In mid-1985, the London Stock Exchange and the London International Financial Futures and Options Exchange (LIFFE) started to trade currency options (*Financial Times*, August 5, 1985, p. I5). Similarly, the French futures exchange, the Marché à Terme International de France (MATIF), started trading currency options in early 1994 (*Financial Times*, July 28, 1994). But none of these competitors were able to displace the dominance of the PHLX in exchange-traded currency options.

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[32] When the CBOE stopped trading currency options, *The Chicago Tribune* (August 3, 1987, p. B7) quoted the president of the CBOE as saying, "History keeps proving that the first one there (in the market) is the most likely to succeed."

As shown in graph 14, after several years of rapid growth the volume of trades on the PHLX leveled off between 1987 and 1990. This was primarily due to the growth of the over-the-counter market and the creation of exchange rate bands for the European currencies that belonged to the European Monetary System. The reduced volatility of these currencies relative to each other reduced the demand to hedge currency risks and opportunities for speculation. Nevertheless, this was a halcyon era for many currency options traders on the PHLX who reaped substantial profits from market-making and speculating on the floor of the exchange that dominated currency options. Growth in trading volume resumed with the turmoil among European exchange rates of the early 1990s (*Philadelphia Inquirer*, September 18, 1992, p. A16).

After the peak in 1993, the volume of trading in currency options on the PHLX started a precipitous decline. By 2000, trading volume was so low as to be an insignificant part of the business of the exchange. This decline was mainly caused by the continued growth of the OTC market. Many corporations preferred to hedge in the OTC market since banks would tailor contracts to their specific needs (*Investment Dealers Digest*, September 7, 1992, p. 5).[34] In addition, the major international banks that had provided much of the order flow to the PHLX began to deal exclusively in the OTC market. By the early 1990s, this market was well-developed with numerous very well-capitalized market makers. As the market developed in the mid-1980s, the option contracts that banks traded among each other to hedge their net exposures became rather standardized, adding to their liquidity (*Financial Times*, December 11, 1985, p. III6). As Garry Schinasi et al (2000, p. 64) wrote in a recent report issued by the International Monetary Fund,

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[33] *The New York Times* (May 13, 1985, p. D5) quoted Nicholas Giordano, then the president of the PHLX, as saying, "60% of our volume in foreign exchange options comes from overseas hedgers and traders."

[34] In 1994, the PHLX introduced customized currency options contracts in an effort to compete with the OTC, but these never gained much market share from the banks.

> The development of an extensive and sophisticated OTC market structure in the 1980s and 1990s with many of the world's largest financial institutions serving as market makers has greatly enhanced the liquidity of OTC derivatives markets. This, in turn, has lowered the cost of participation and supported the expansion of the market. Measured by notional principal, OTC derivative markets have grown to roughly nine times the size of those for exchange-traded derivatives …

One close observer of the PHLX market provided an additional reason for why banks and other large institutions moved their business to the OTC market. He explained that, as the currency options floor of the exchange grew, market makers on the floor began to behave more aggressively. They began to insist on participating in large trades that had been negotiated off the floor of the exchange. This fragmented these large orders and frustrated the institutions that were trading such orders though the PHLX. Many responded by shifting all of their trades to the OTC market.[35]

E. 2000 through 2002

In 2000, members and managers of the PHLX were likely looking back on early 1990s as a golden era for the exchange. For at the beginning of the 21st century, the PHLX faced several serious threats to its core businesses. The exchange continued to think strategically about how it might adapt to thrive, or at least survive. It is still too early, however, to know whether the strategic adjustments that it made in the first few years of the new century will enable the exchange to survive the decade.

Equity trading

[35] In late 1993, the PHLX tried to prevent the fragmentation of large currency option trades by stating that orders of more than 1,000 contracts could be required to execute at a single price (*Securities Week*, November 15, 1993, p. 5). Unfortunately for the PHLX, by this time most block

In the case of equity trading, the exchange faced two major threats between 2000 and 2002. First, specialists saw a narrowing of profit margins on their trades. One force behind the narrowing of spreads was the SEC-mandated conversion from pricing in fractions of a dollar to pricing in decimals. Whereas prior to 1999 the narrowest possible spread was $1/16^{th}$, or $0.0625, by 2001 it was one penny. The switch to pricing in finer increments achieved exactly what its advocates intended. It narrowed average spreads. One recent study estimated that spreads narrowed by about 50 percent for NASDAQ-listed securities and about 28 percent for NYSE-listed securities (Murphy & Krayterman, 2002, p. 18).

A second force behind the narrowing of spreads came from pressures on market centers to offer prices better than the national best bid and offer (NBBO). The SEC, in response to its concerns about the practice of payments for order flow, mandated that, beginning in November 2001, brokers clearly reveal to their clients whether or not they are paid to direct orders to particular markets centers. The market centers must, in turn, provide detailed information about the quality of their executions, on a security by security basis, and must reveal the percentage of trades taking place at prices superior to the NBBO. In addition, the SEC indicated that brokers should be prepared to explain why their order routing practices were in the best interests of their customers. The effect of these rulings was to put pressure on market centers to trade at prices that were superior to the NBBO so that brokers routing their trades to these centers could argue that their customers were receiving competitive prices. But such price improvement narrowed the spread received by specialists and other market makers. Pressures to offer price improvements affected the PHLX as it did other market centers. In June 1998, for example, the PHLX modified PACE so that it would automatically offer a price that was $1/16^{th}$ superior to the NBBO

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traders had already, or were planning to, shift to OTC market and were not willing to return to

for many trades (*PR Newswire*, June 1, 1998). Since that time, the PHLX has continued to refine this automatic price improvement feature.

The narrowing of pricing spreads meant that specialists needed to conduct a much higher volume of business than they did previously to remain adequately profitable. The danger is that specialists on the PHLX may not be able to draw sufficient volume to justify their operations on that exchange. If a sufficient number of specialists withdraw from the PHLX, ultimately the exchange could be forced to close its equity-trading floor.

In addition to the narrowing of trading spreads, the PHLX faced a second serious threat. In May 2000, under pressure from the SEC, the NYSE rescinded its Rule 390.[36] This rule had prevented NYSE members from acting as OTC dealers in many NYSE-listed stocks. The elimination of the rule could lead to a significant increase in the "internalization" of trades. Under Rule 390, a large brokerage firm that was a member of the NYSE could direct its trades to the NYSE or to a regional exchange. As discussed earlier, it might use the regional exchange because of speed or quality of execution, because of payments for order flow, or because it was affiliated with a specialist on the regional exchange. After May 2000, it did not need the exchanges since it could function as a market maker handling the trades internally. If brokerage firms with a significant share of trading orders begin to execute the trades in-house, this would hurt all of the exchanges. Those, such as the PHLX, with relatively small market shares, might be most severely affected.

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the PHLX.

[36] Rule 390, which replaced Rule 394 of the NYSE in 1976, permitted NYSE members to execute orders for customers in the third market but still prevented them from acting as dealers. In 1980, the SEC issued Rule 19c-3, which permitted member firms to act as dealers for stocks listed after April 26, 1979. By early 2000, the rule applied to 23 percent of NYSE-listed stocks producing 46 percent of NYSE share volume (Murphy & Krayterman, 2002, p. 19). In May

PHLX members and management were, of course, acutely aware of these threats. The PHLX responded by looking for products or business relationships that might become new sources of order flows. By year-end 2002, it had announced three such initiatives. First, in mid-2000, the PHLX announced that it would work to cultivate business relationships with fully computerized trading platforms, known as electronic communication networks (ECNs). Institutional investors, market makers, and broker-dealers can register with an ECN and place trades with it. They typically submit limit orders. ECNs post these limit orders on their systems for other registered users to see. If an entered limit order matches another order on the system, the trade is executed. Because of the NYSE's Rule 390 and other factors, ECNs have mainly traded NASDAQ stocks.[37]

With the demise of Rule 390, ECNs have been trying to expand their market share in exchange-listed securities.[38] But to display widely and promptly their quotes for exchange-listed securities, ECNs need to get access to the consolidated quote system (CQS) that the exchanges use. ECNs, as with OTC market makers that trade exchange-listed stocks, can show their quotes on NASDAQ's Computer Assisted Execution System (CAES) which interfaces with the Intermarket Trading System (ITS) that links the quotes and routing of trades across the exchanges. But many ECNs want no part of the ITS because they consider it to be unreliable and slow (McAndrews and Stefanadis, 2000). For one thing, when exchange A sends exchange B a commitment to trade, Exchange B has up to two minutes to respond. For many automated trading operations, this is far too long to wait.

2000, the NYSE eliminated Rule 390 so that now all member firms can act as OTC dealers for any NYSE-listed security.

[37]ECNs began to operate in the late 1990s. By early 2002, they captured about 50 percent of NASDAQ trading volume (*New York Times*, June 23, 2002, p. C7).

The PHLX saw mutually beneficial opportunities as ECNs sought to increase their volume of trading in exchange-listed stocks. For example, in June 2000 it announced an agreement with the Bloomberg Tradebook, an ECN that mainly serves institutional investors (*Securities Week*, June 12, 2000, p. 1). Under the agreement, Bloomberg could go through the PHLX to post its quotes on listed securities on the CQS. The PHLX, in turn, hoped to gain equity order flow from the Bloomberg agreement and get transaction and market data fees from any trades that Bloomberg generated. The PHLX announced that it would like to strike similar deals with other ECNs. In fact, the chairman of the exchange announced that the PHLX would seek to become the self-regulatory organization for ECNs (*Securities Week*, March 19, 2001, p. 6). The idea is that ECNs could join the PHLX, gaining access to the privileges of an exchange, such as direct access to the CQS, without having to pay for the substantial regulatory expenses associated with being an exchange. In return, the revenue that the PHLX could earn from the new business generated by the ECNs could help it cover its substantial overhead expenses. To encourage ECNs to send a high volume of trades to the PHLX, in early 2002 the exchange introduced a flat monthly fee for ECNs, rather than a per-transaction fee (*Wall Street Letter*, March 17, 2002).

In a second effort to increase the order flow to its equity floor, the PHLX announced in 2001 that it planned to begin trading, once again, some NASDAQ-listed equities (*Security Industry News*, July 16, 2001).[39] But by early 2003, it still had not implemented this plan.

In a third initiative to bolster equity trading, in November 2001 the PHLX announced that it would start a competing specialist program, rather than a pure primary specialist system. That

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[38] By 2001, ECNs had gained only about 5 percent of the volume in exchange-listed stocks (Murphy and Krayterman, 2002).

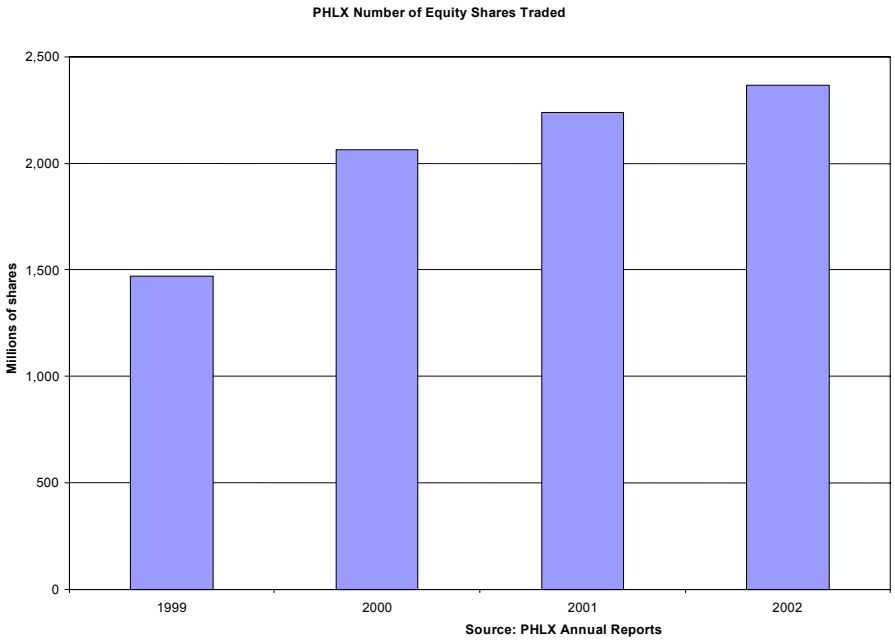
is, the exchange could designate more than one specialist for some equities. It hoped that this would attract more order flow by improving pricing for some trades directed to the exchange and by increasing the size of the orders that it could fill promptly. In addition, the exchange began a remote specialist system in 2002 (*Securities Week*, November 19, 2001, p. 3). This allowed specialists to access PACE without maintaining a physical presence on the floor of the exchange. This should lower operating costs for specialists, especially those based outside of Philadelphia, encouraging them to become or remain active on the PHLX even as per-trade profit margins fall.

It is unclear whether these initiatives will be able to increase or maintain the volume of equity trading on the PHLX, for other exchanges are taking, or have taken, similar measures, which may offset any gains that the PHLX might achieve. The Boston Stock Exchange, for example, started a competing specialist program in 1994 and remote specialist program in February 2001. And by early 2002, all of the regional exchanges were either trading selected NASDAQ stocks or had announced plans to do so (*Securities Week*, January 7, 2002, p. 4). Other regional exchanges have also been attempting to use business relationships with ECNs to bring trading orders to their floors. The ECN, Archilpelago, took over the equity trading floor of the Pacific Stock Exchange in 2002, effectively gaining all of the privileges of an exchange (*Financial Times*, April 3, 2002, p. 4). In February 2002, the Cincinnati Stock Exchange (CSE) announced that it had reached an agreement to "print" a substantial share of the trades of Island, the largest ECN. Previously, Island, which trades mainly NASDAQ stocks, had reported its trades through the NASDAQ reporting system. In order to gain this business, CSE had to offer to make payments to Island based on the transaction and market-data fees that CSE would earn from Island's business. These rebates made it less costly for Island to process its trades at the CSE than to

[39] The 1994 Unlisted Trading Privileges Act gave exchanges the right to trade a broad range of

process the same trades through the NASDAQ. After the agreement, the CSE changed from an exchange that reported daily trading volume of about 5 to 10 million shares to one that reported daily trading volumes of about 170 million shares (*Chicago Sun Times*, May 23, 2002, p**.** 49). Most of this volume was in the NASDAQ stocks that Island traditionally traded.[40]

Graph 15



Despite doubts about the likely effectiveness of some of the PHLX's efforts to increase the volume of equity trading orders, its performance between 2000 and 2002 was solid. As shown in graph 15, the number of equity shares traded on the exchange increased 15 percent between 2000 and 2002. However, due to the decline in stock prices generally over this period, the

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NASDAQ securities.

[40] In July 2002 the SEC ordered the CSE to stop the rebate program. The SEC expressed concerns that the exchange might not be able to afford to fulfill its proper oversight role if it rebates transaction and market data fees. The SEC also worried that the rebates might encourage brokerage firms to enter sham orders just to obtain the rebates. The CSE responded to the SEC ruling by "mutualizing" revenues with its members. This maneuver allowed it to effectively continue to a form of rebate to Island.

value of the shares traded on the PHLX declined 27 percent between 2000 and 2002 (*2002 PHLX Annual Report*). The decline in the average price of shares traded likely further contributed to the narrowing of specialists' spreads since the bid and offer spread on a lower priced stock, all other things equal, tends to be narrower than that on a higher priced stock (Harris, 2003).

Options

At the beginning of 2000, the four major options exchanges (CBOE, AMEX, PHLX, and Pacific Stock Exchange (PSE)) were increasingly starting to list the option contracts that were most active on other exchanges. This competition became even more heated when the new, all-electronic, ISE options exchange opened for business in May 2000. It listed option contracts active on other exchanges.

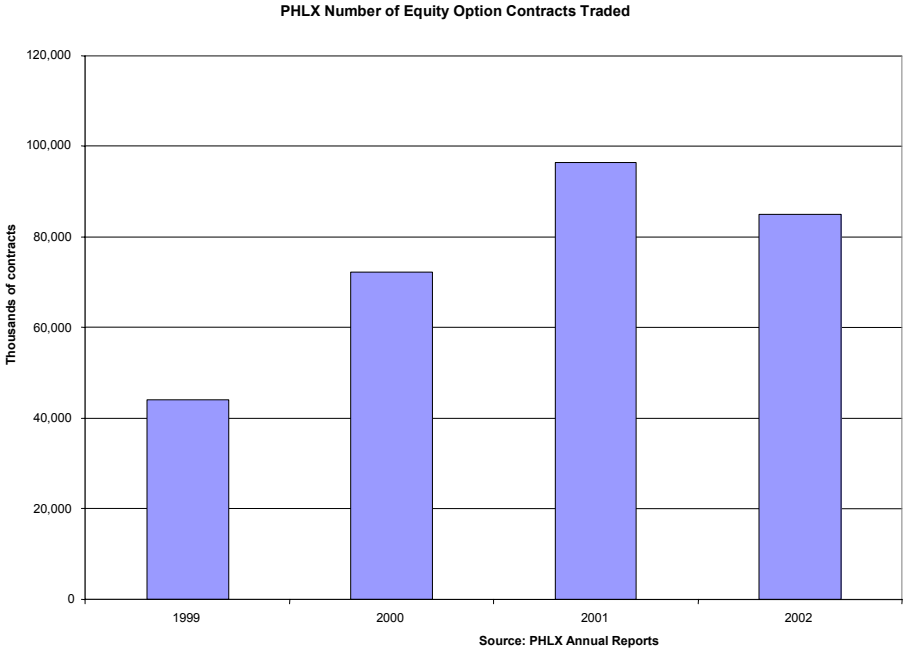
Many people had argued that multiple listing of options contracts might be particularly damaging to the PHLX since it had a relatively small market share and depended heavily on a small number of active options contracts. These worries had partly motivated earlier efforts by the PHLX to merge with another exchange. Contrary to these concerns, the move to multiple listings benefited the PHLX within the near term, partly because of the way that the PHLX managed it. When the CBOE and the AMEX began to trade the Dell options that were the backbone of the PHLX in the late 1990s, the PHLX immediately retaliated by permitting several of its specialists to begin trading some of the options most active on the other exchanges. After that, however, it proceeded at a more deliberate pace. The exchange would announce plans to trade an option contract active on another exchange. But rather than allocating the specialist position to one of the firms already active on the PHLX, it would offer it to a large specialist operation that had not previously traded on the PHLX. In this way, the PHLX used the opportunity to list

desirable new options contracts to entice the largest and best capitalized specialist firms to become active on the PHLX.[41] Since these firms could attract a high volume of order flow, this also brought order flow to the floor of the PHLX.

As the exchanges competed for each other's order flow, it is perhaps not surprising that the specialists on the various exchanges began to pay for order flow (*Wall Street Letter*, October 25, 1999). In July 2000, the CBOE escalated this competition by instituting a system that effectively taxed all specialists and market makers to raise funds for order flow payments. The PHLX announced that it opposed this exchange-sponsored system of payment for order flow. But it also made clear that it would not sit on the sidelines while others took its business. In August 2000, the PHLX instituted a system similar to that of the CBOE but with even higher fees on its specialists and market makers and higher order flow payments. As illustrated in Graph 16, this policy, along with the increasing presence of large specialist firms trading on the PHLX, helped feed a boom in PHLX order flow in late 2000 and early 2001 (*Philadelphia Inquirer*, January 21, 2001, p. E1).

[41] The PHLX encouraged specialist firms that were not able to attract significant order flow to transfer their specialist positions to other firms that might be able to attract more business. It did this by levying a fee on all specialist firms. The fee was based on the assumption that the firms have 10 percent of the aggregate exchange-traded order flow in their option contacts.

Graph 16



Between July and August 2001, the CBOE, PHLX and the AMEX announced sequentially that they would no longer operate exchange-sponsored systems to pay for order flow (*Securities Week,* October 21, 2002, p. 1). Only the ISE and the Pacific Stock Exchange continued their exchange-sponsored payment-for-order-flow systems. The three exchanges that terminated their systems apparently did so because market makers on the floor of the exchanges complained that their profits from trading were too depressed to enable them to contribute to a payment-for-order-flow fund. There were also concerns that the practice involved the exchanges in a system that many people thought to be unseemly. The termination of exchange-sponsored payments-for-order-flow did not prevent specialists on the exchanges from paying for order flow with their own money.

Although the PHLX saw strong growth in its equity options business in late 2000 and early 2001, trends after that raised questions about its likely success over the long term. From mid-2001 through 2002, overall option volume declined as equity markets slumped. The volume

of equity index options traded on the PHLX followed a similar pattern. By mid-2002 the ISE, which never abandoned exchange-sponsored payments for order flow, surpassed the PHLX in its market share of equity options trading. Moreover, in early 2002 the Boston Stock Exchange, in partnership with other financial firms, announced that it would launch an all-electronic Boston Options Exchange, expected to begin operating in 2003 (*Business Wire*, October 31, 2002).

Competition among the exchanges to attract order flow and the shift to decimal pricing on equities and options narrowed spreads on options and reduced the profits of many specialists and market makers.[42] Competition also increased the risk for many traders since they competed to take larger positions. The reduced profits and increased risk associated with trading options was reflected in the price of seats on the PHLX. In 1999 a seat to trade options had sold for $236,000. In 2002, the highest price paid for an options-trading seat was $105,000. In a further reflection of the slump in options trading, some prominent specialist firms closed their operations on the PHLX.

In response to its declining market share relative to the upstart ISE and threats from some specialist firms that they might leave the PHLX, in late 2002 the PHLX re-instituted an exchange-sponsored payment for order flow system (*Wall Street Letter*, November 11, 2002, p. 4). In doing so, it announced that it still opposed exchange-sponsored payment for order flow but that it would not "unilaterally disarm." Some market makers on the floor of the PHLX bitterly complained that payment-for-order-flow levies were simply transferring resources from them to the specialists with whom they competed (*Securities Industry News*, November 4, 2002). They may have been partly mollified when the PHLX announced in late 2002 that it would allow mar-

[42] SEC Chairman Arthur Levitt (2000) reported that "In four of the five actively traded options we examined, effective spreads have fallen between 22 and 44 percent since these options went from single exchange trading to multiple listings."

ket makers to enter their own orders into its electronic limit order system, effectively allowing their quotes to compete with those posted by the specialists. The PHLX hoped that this reform would increase price competition on the floor, attracting greater order flow to the exchange.

Between 2000 and 2002, currency option trading remained severely depressed. Volume fell from 551,000 contracts traded in 2000 to 418,000 contracts traded in 2002 *(2002 PHLX Annual Report*). At its peak, in 1993, the PHLX traded 13.1 million currency option contracts.

III. Conclusions

At the end of 2002, it was unclear whether the PHLX would be able to survive in an increasingly competitive environment for securities trading centers. Its market share in equity trading was well under one percent and narrowing bid/offer spreads hurt its specialists on both the equity and options floors. In equity options, the PHLX struggled to maintain its market share in the face multiple listings and the rise of the ISE.

The PHLX's strategy for survival appears to be based on two related initiatives. First, it hopes to stay at the cutting edge of technology. While it will not abandon its trading floors in the near term, it is clearly moving to increase the percentage of trades that are fully automated (*Wall Street and Technology*, November 1, 2002, p.14). The main impediment to this strategy is the substantial investment required to stay abreast or ahead of competitors. Financing these efforts is especially challenging for a small exchange, such as the PHLX. The PHLX does not benefit from the economies of scale that the NYSE and, to a lesser extent, the CBOE have. In addition, the PHLX, as with other exchanges, sees serious threats to its traditional sources of revenue. As the chairman of the PHLX stated in a recent speech (Frucher, 2001),

> Exchanges have historically made money three ways:
> - Taxing members

- Charging access fees to customers
- And selling trade data

> But customers no longer want to pay access fees, and now very often want to be paid for their order flow. In turn, specialists and market makers are shouldering many fees once paid by customers at a time when they are contending with profit pressures caused by payment for order flow, narrow spreads in the wake of decimalization and increasing technology costs. Data, which has long provided exchanges with a reliable revenue stream, may not be so reliable in the future. The Securities and Exchange Commission is considering regulatory changes that would substantially lower, and perhaps eliminate, data fees.

The PHLX has been forced to turn to its members to finance much of its recent investments in technology. In June 2000, for example, the PHLX initiated a three-year program requiring the owners of the Exchange's 505 seats to contribute $1,500 a month to fund technological improvements and other capital needs. But its ability to keep imposing such levies is limited by the declining profitability that many of its members have experienced. The PHLX has also sought to help cover the costs of its technological investments by marketing its technology to other market centers (*Wall Street & Technology*, July 2001, p. 49). But it is unclear whether it will be successful in this regard.

The second part to the PHLX's survival strategy is to develop strategic partnerships, perhaps even combining its operations with that of other exchanges (*Securities Industry News*, June 16, 2003). This could bring it new order flow, would give it a partner or partners with whom it could share the costs of developing new trading and compliance technologies, and could bring it low-cost access to advanced technologies already developed by strategic partners.

In support of both of these efforts, in mid-2003 the PHLX announced that its directors had voted to convert from a member-owned organization to a for-profit stock corporation (*Philadelphia Inquirer*, July 9, 2003, p. C1).[43] Before such a move is enacted, however, it will have to be approved by the membership and the SEC. Top managers at the PHLX cite a number

of benefits to becoming a for-profit corporation. First, they emphasize that a for-profit status would facilitate much faster decision-making by the exchange since changes in the strategic direction of the exchange would no long have to be approved by the members, many of whom have conflicting interests (*Wall Street Letter*, January 6, 2003). And they claim that fast decision-making is especially critical in the increasingly competitive environment in which the exchange operates. The management has also noted that a for-profit status could help the exchange raise outside funds necessary to finance technological investments. Finally, demutualizing the exchange could facilitate the development of strategic partnerships, for it would enable the PHLX to issue equity to fund the purchase of ownership interests in other trading centers and it would enable other centers to purchase ownership stakes in the PHLX.

In view of the significant challenges facing the PHLX, some might consider the imminent demise of the oldest American stock exchange to be inevitable. One consideration strongly argues against this. As the account in this paper demonstrates, the PHLX has successfully confronted many threatening changes in financial markets over the past 50 years and adapted to survive. It may well be able to continue to adapt to face the new challenges. If so, the PHLX may survive, but it will likely be a very different stock exchange in the years to come.

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[43] This is a step that a number of other exchanges have taken in recent years (Steil, 2002).

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Appendix

Table 1A
Market Shares of Dollar Volume of Equity Trades by Exchanges

Year	Total $ Volume (in millions)	NYSE	AMEX	CHX	PSE	PHLX	BSE	CSE
1945	16,285	82.75	0.81	2.00	1.78	0.96	1.16	0.06
1950	21,808	85.91	6.85	2.35	2.19	1.03	1.12	0.11
1955	38,039	86.31	6.98	2.44	1.90	1.03	0.78	0.09
1960	45,310	83.80	9.35	2.72	1.94	1.03	0.60	0.07
1961	64,072	82.43	10.71	2.75	1.99	1.03	0.49	0.07
1962	54,855	86.32	6.81	2.75	2.00	1.05	0.46	0.07
1963	64,438	85.19	7.51	2.72	2.39	1.06	0.41	0.06
1964	72,462	83.49	8.45	3.15	2.48	1.14	0.42	0.06
1965	89,549	81.78	9.91	3.44	2.43	1.12	0.42	0.08
1966	123,698	79.77	11.84	3.14	2.84	1.10	0.56	0.07
1967	162,189	77.29	14.48	3.08	2.79	1.13	0.66	0.03
1968	197,116	73.55	17.99	3.12	2.65	1.13	1.04	0.01
1969	176,390	73.48	17.59	3.39	3.12	1.43	0.67	0.01
1970	131,708	78.44	11.11	3.76	3.81	1.99	0.67	0.30
1971	186,375	79.07	9.98	4.00	3.79	2.29	0.58	0.05
1972	205,956	77.77	10.37	4.29	3.94	2.56	0.75	0.05
1973	178,864	82.07	6.06	4.54	3.55	2.45	1.00	0.06
1974	118,828	83.63	4.40	4.90	3.50	2.03	1.24	0.06
1975	157,257	85.20	3.67	4.64	3.26	1.73	1.19	0.17
1976	195,225	84.35	3.88	4.76	3.83	1.69	0.94	0.53
1977	187,393	83.96	4.60	4.79	3.53	1.62	0.74	0.75
1978	251,618	83.67	6.13	4.16	3.64	1.62	0.61	0.17
1979	300,476	83.72	6.94	3.83	2.78	1.80	0.56	0.35
1980	476,501	83.53	7.33	4.33	2.27	1.61	0.52	0.40
1981	491,017	84.74	5.41	5.04	2.32	1.60	0.49	0.40
1982	603,094	85.32	3.27	5.83	3.05	1.59	0.51	0.43
1983	958,304	85.13	3.32	6.28	2.86	1.55	0.66	0.16
1984	951,318	85.61	2.26	6.57	2.93	1.58	0.85	0.19
1985	1,200,128	85.25	2.23	6.59	3.06	1.49	1.20	0.18
1986	1,707,117	85.02	2.56	6.00	3.00	1.57	1.44	0.41
1987	2,286,903	86.79	2.32	5.32	2.53	1.35	1.33	0.35
1988	1,587,951	86.81	1.96	5.46	2.62	1.33	1.34	0.40
1989	1,847,767	85.49	2.35	5.46	2.84	1.77	1.56	0.54
1990	1,616,798	86.15	2.33	4.58	2.77	1.79	1.63	0.74
1991	1,778,154	86.20	2.31	4.34	3.05	1.54	1.72	0.83
1992	2,032,684	86.47	2.07	4.28	2.87	1.70	1.52	1.09
1993	2,610,504	87.21	2.08	4.10	2.38	1.52	1.35	1.37
1994	2,817,671	88.08	2.01	3.49	2.09	1.34	1.31	1.68
1995	3,507,991	87.71	2.10	3.26	2.24	1.27	1.43	1.99
1996	4,511,780	88.91	1.91	3.01	2.03	1.19	1.32	1.63
1997	6,559,992	89.13	2.13	3.25	1.87	1.01	1.23	1.38
1998	8,308,156	87.57	3.37	3.93	1.79	0.79	1.58	0.98
1999	10,681,363	85.08	4.18	5.06	1.93	0.65	2.04	1.06
2000	13,691,342	81.93	5.53	7.58	1.19	0.62	1.87	1.26
2001	12,750,234	84.20	6.30	5.50	0.40	0.60	1.74	1.24

Source: SEC Annual Reports

Table 2A
Market Share of Equity Option Sales by Exchange
(Includes stocks, rights, and warrants)

Year	Total $ Volume of Equity Options Traded (in millions)	AMEX	NYSE	PSE	PHLX	CBOE	ISE
1973							
1974							
1975							
1976	11,734	19%	0%	1%	3%	77%	0%
1977	10,899	17%	0%	4%	3%	69%	0%
1978	18,953	19%	0%	4%	3%	72%	0%
1979	23,158	26%	0%	4%	5%	60%	0%
1980	45,873	27%	0%	4%	6%	61%	0%
1981	41,423	33%	0%	5%	9%	54%	0%
1982	53,660	27%	0%	5%	8%	60%	0%
1983	59,599	25%	0%	6%	9%	60%	0%
1984	33,822	26%	0%	8%	10%	55%	0%
1985	29,544	28%	0%	10%	8%	53%	0%
1986	40,054	32%	1%	9%	9%	49%	0%
1987	53,123	31%	1%	11%	9%	49%	0%
1988	27,164	33%	2%	10%	11%	44%	0%
1989	40,423	27%	2%	11%	12%	48%	0%
1990	27,219	30%	2%	12%	10%	46%	0%
1991	27,104	34%	1%	13%	9%	42%	0%
1992	26,586	35%	2%	12%	9%	42%	0%
1993	33,779	34%	1%	12%	8%	45%	0%
1994	35,883	29%	1%	14%	8%	47%	0%
1995	50,803	29%	1%	19%	7%	44%	0%
1996	67,862	33%	1%	15%	7%	44%	0%
1997	104,535	33%	0%	17%	9%	40%	0%
1998	140,261	32%	0%	16%	11%	41%	0%
1999	260,294	28%	0%	16%	8%	48%	0%
2000	481,440	28%	0%	17%	15%	40%	0%
2001	258,885	28%	0%	19%	18%	35%	0%

Source: SEC Annual Reports

Table 3A
Market Share of Non-Equity Option Sales by Exchange
(Includes stock indices, interest rates, and foreign currencies)

Year	Total $ Volume of Non-Equity Options Traded (in millions)	AMEX	NYSE	PSE	PHLX	CBOE
1982	50					
1983	4,624					
1984	19,160	8.3%	3.3%	0.3%	3.3%	84.7%
1985	29,029	10.2%	2.3%	0.1%	9.5%	78.0%
1986	47,888	12.8%	1.6%	0.1%	9.5%	75.9%
1987	65,749	14.0%	0.7%	0.4%	7.2%	77.7%
1988	35,456	9.4%	0.4%	0.5%	11.6%	78.1%
1989	36,351	11.5%	0.3%	0.5%	11.3%	76.5%
1990	51,794	8.7%	0.1%	0.2%	8.1%	82.8%
1991	49,012	9.7%	0.1%	0.1%	10.0%	80.1%
1992	45,590	10.3%	0.1%	0.1%	16.7%	72.8%
1993	41,400	8.1%	0.0%	0.2%	18.3%	73.4%
1994	58,587	4.7%	0.0%	0.1%	9.6%	85.6%
1995	68,072	3.9%	0.0%	0.1%	7.4%	88.6%
1996	80,243	4.9%	0.0%	0.0%	3.4%	91.6%
1997	114,459	5.5%	0.0%	0.1%	3.3%	91.0%
1998	128,816	5.0%	0.0%	0.0%	3.6%	91.4%
1999	133,225	6.1%	0.0%	0.0%	4.0%	89.9%
2000	145,660	5.5%	0.0%	0.0%	4.4%	90.0%
2001	110,940,896	2.4%	0.0%	0.0%	4.5%	93.1%

Source: SEC Annual Reports

Index

NYSE: New York Stock Exchange
AMEX: American Stock Exchange
CHX: Chicago Stock Exchange
PSE: Pacific Stock Exchange
PHLX: Philadelphia Stock Exchange
BSE: Boston Stock Exchange
CSE: Cincinnati Stock Exchange
CBOE: Chicago Board Options Exchange
ISE: International Securities Exchange