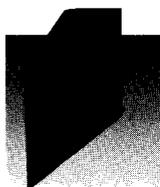


## Derivative markets and competitiveness

Janet A. Napoli



*“The opening up of new markets, foreign or domestic, and the organizational development...illustrate the same process of industrial mutation—if I may use that biological term—that incessantly revolutionizes the economic structure **from within**, incessantly destroying the old one, incessantly creating a new one.”*

Joseph A. Schumpeter

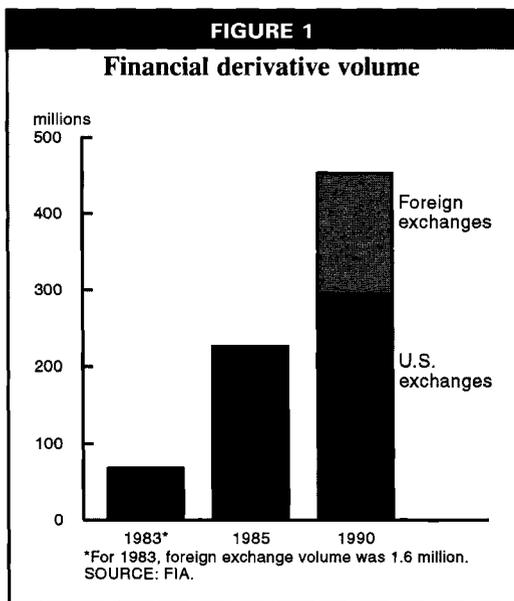
Derivatives are financial instruments, such as forwards, futures, options, and swaps, which are based upon the future value of a good or instrument. Prior to the 1980s, few futures and options exchanges existed outside the U.S. An unprecedented period of growth occurred during the 1980s as existing derivative exchanges continued to expand and as new derivative exchanges opened throughout Europe and the Pacific Rim. The 1980s growth resulted primarily from the increasing importance of financial derivatives. Figure 1 illustrates the dramatic increases in exchange traded financial derivative volume during the 1980s, with the 1990 volume twice the 1985 volume and almost seven times the 1983 volume. An important factor driving the proliferation of new derivative exchanges and new market participants was financial market deregulation. Derivative exchanges opened in countries where the majority of domestic financial markets had already been deregulated as well as in countries undergoing comprehensive programs of credit, capital, and exchange rate deregulation.

Over-the-counter (OTC) financial derivatives also experienced extraordinary growth during the 1980s. Prior to the 1980s, the primary instruments traded on the largest OTC market, the interbank foreign exchange market, were forward, future and, to a lesser extent, option instruments. The 1980s OTC market growth was based upon innovative financial engineering resulting in a number of new instruments: caps, collars, floors, swaps, and swaptions. In many cases, these derivatives are hybrid instruments, combining a conventional financial instrument, like a bond, with a derivative instrument, like an option. The popularity of the new instruments is attributable to the increasing ability of the OTC markets to customize specific risks, notably foreign exposures. The most actively traded of these new OTC derivatives are currency and interest rate swaps. As shown in Figure 2, the 1990 notional principal of these swaps is more than three times the 1987 notional principal.

This article explores the impact of the 1980s expansion on the derivative markets and its participants. In particular, the discussion focuses upon the growing importance of exchange competition and its impact on transaction costs and liquidity. This increase in competition is driving the continuing internationalization of national financial markets. At the

---

Janet A. Napoli is an associate economist at the Federal Reserve Bank of Chicago. The author is especially grateful to Herbert Baer for his insightful comments. The author would also like to thank John Behof, Hesna Genay, Carolyn McMullen, and James Moser for their comments.



same time, the growth of the exchange and OTC markets is forcing a restructuring of these markets.

**Exchange markets and the 1980s expansion**

The pervasive deregulation of financial asset markets during the 1980s increased the demand for derivatives based on these assets. The creation of a derivative market largely depends upon features of the underlying asset market. An asset market which is both actively traded and volatile creates investor demand to

trade on information about future prices and reduce the resulting price risk. The economic role of derivative instruments is to provide these price discovery and risk hedging functions [Black (1986) and Moser (1991)]. As highly regulated asset markets were transformed into open market structures, the liquidity, activity, size, and volatility of these markets increased. The new and expanding exchanges during the 1980s addressed the increased demand for price discovery and risk management instruments by introducing derivatives based on these deregulated assets. Today, more than 100 derivative products trade across different countries in comparison to less than 25 in 1983. These previously unavailable products have made the markets for derivatives an important part of the financial infrastructure in these countries.

Exchange traded derivatives based on financial instruments originated in the U.S. during the 1970s.<sup>1</sup> The currency, interest rate, and stock index futures and options introduced by U.S. exchanges were subsequently emulated by international exchanges throughout the 1980s. Whereas today financial derivative exchanges are an international phenomenon spanning 22 countries, only five exchanges—four U.S. and one non-U.S.—traded financial derivatives in 1980 [Miller (1990)]. Today, the Chicago Board of Trade (CBOT) still trades the most active future contract: the U.S. Treasury bond future; while the Chicago Board Options Exchange (CBOE) trades the most active option contract: the S&P 100 index option. The Chicago Mercantile Exchange (CME) trades the third, seventh, and ninth most active futures: the three month Eurodollar, S&P 500 stock index, and German deutschemark futures. The CME is also one of the more internationally oriented exchanges based upon its foreign currency and interest rate product offerings. In 1990, U.S. derivative exchanges accounted for 65 percent of worldwide volume in exchange traded derivatives (see Table 1 for a list of acronyms used in this article).

One of the largest exchange traded derivative markets arose during the 1980s in Japan, where underlying financial market liberalization, primarily interest rate deregulation, continued to progress from the mid-1970s. Interest rates are now market determined for the money markets, the primary medium and long term government bond markets, as well as the sec-

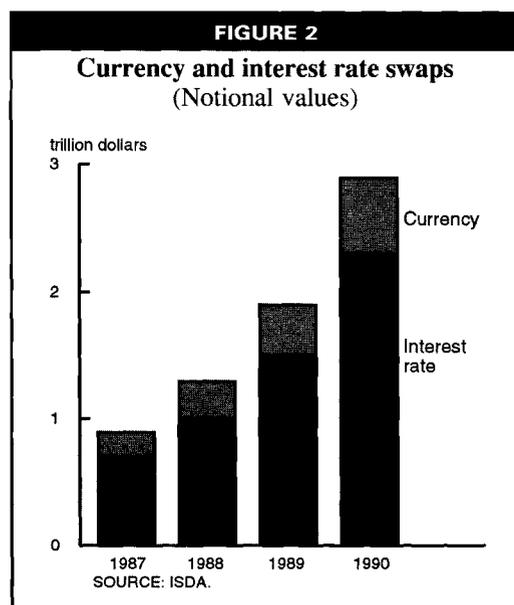


TABLE 1

## Exchange acronyms

Acronym	Exchange
AMEX	American Stock Exchange
CBOE	Chicago Board Options Exchange
CBOT	Chicago Board of Trade
CME	Chicago Mercantile Exchange
DTB	Deutsche Terminbörse
LIFFE	London International Financial Future Exchange
MATIF	Marché à Terme International de France
MIDAM	MidAmerica Commodity Exchange
NYSE	New York Stock Exchange
OM	OM Stockholm
OSE	Osaka Stock Exchange
PBOT	Philadelphia Board of Trade
PHLX	Philadelphia Stock Exchange
PSE	Pacific Stock Exchange
SFE	Sydney Futures Exchange
SIMEX	Singapore International Monetary Exchange, Ltd.
SOFE	Swedish Option and Future Exchange
TIFFE	Tokyo International Financial Futures Exchange
TSE	Tokyo Stock Exchange

ondary bond markets. Financial liberalization in Japan has increased securitization as more financial transactions are explicitly priced, with less reliance on indirect or intermediated finance [Cargill and Royama (1992)]. Secondary market equity trading has correspondingly increased, as trading on the Tokyo Stock Exchange (TSE) increased from 100 billion shares traded in 1980 to almost 220 billion shares traded in 1989. As part of the overall financial liberalization in Japan, derivative trading has also progressed incrementally. In 1985, the Ministry of Finance (MOF) permitted Japanese government bond futures to be traded on the TSE. Beginning in 1987, the MOF permitted a group of financial institutions to trade in foreign derivative markets. Following in 1988, the Japanese Securities and Exchange law was amended to permit Japanese stock exchanges to trade derivative products, notably stock index futures. Simultaneously, the Financial Futures Trading law sanctioned financial derivative exchanges, and the Tokyo International Financial Futures Exchange (TIFFE) opened in 1989

[Japan Securities Research Institute (1990)]. As of 1990, Japanese exchanges traded 13 percent of worldwide volume, constituting the largest derivative market in the Pacific Rim and the second largest worldwide. In the same year, the Nikkei 225 stock index futures contract, traded on the Osaka Stock Exchange (OSE), became the most actively traded stock index futures contract.

In addition to Japan, the Pacific Rim has financial derivative exchanges located in Australia, Hong Kong, New Zealand,<sup>2</sup> the Philippines, and Singapore, with a financial derivative exchange proposed in Malaysia. In 1990, these Pacific Rim exchanges traded 4 percent of worldwide exchange traded volume. The Singapore International Monetary Exchange, Ltd. (SIMEX), the first Asian financial derivative exchange, presently trades only nondomestic financial derivatives. In addition to its international derivative offerings and membership, SIMEX and the CME have effectively offered its members extended trading hours in British pound, German deutschemark, Japanese yen, and three month Eurodollar derivatives since 1984. This is done through a mutual offset system where trading positions established at one exchange can be transferred to or liquidated at the other exchange, providing inter-exchange fungibility for the designated contracts. The remaining exchanges primarily trade domestic financial derivatives.

Numerous financial derivative markets opened in Europe during the 1980s as the European Community (EC) countries modernized financial markets in preparation for Europe 1992. During the 1980s, France was one of the countries which underwent extensive credit, capital, and exchange rate deregulation. The removal of quantitative credit controls and the entry of nonfinancial participants into the money markets created new markets for negotiable rate instruments: commercial paper and certificates of deposit. Capital market reforms were assisted by the Banking Act of 1984 which increased the number of capital market participants by removing the distinction between commercial and investment banking. Throughout the 1980s, exchange rate controls were gradually liberalized [Ducruzet and Papadacci (1992)]. The culmination of France's financial industry liberalization and modernization created the demand for financial derivatives, and the

Marché à Terme International de France (MATIF) opened in 1986. As of 1990, MATIF trades the French *notional* bond future, the third largest government bond future worldwide. In contrast to France's financial market deregulation, Germany was motivated to open a derivative exchange by the successful trading of a German government *bund* future on the nearby London International Financial Future Exchange (LIFFE). Amendments to Germany's gambling law in 1989 permitted retail participation in derivative markets, followed by the opening of Germany's first financial derivative exchange, Deutsche Terminbörse (DTB), in 1990.<sup>3</sup> In addition to France and Germany, European financial derivative exchanges are presently more or less active in Austria, Belgium, Denmark, Finland, Holland, Ireland, the Netherlands, Spain, Sweden, Switzerland, and the United Kingdom, with financial derivative exchanges proposed in Italy, Luxembourg, and Norway. Similar to France, extensive financial market deregulation programs were implemented during the 1980s in Finland, Ireland, and Sweden. In 1990, European exchanges—excluding LIFFE—traded 10 percent of worldwide exchange traded volume.

LIFFE is the oldest and largest European financial futures exchange. Unlike the majority of European exchanges, LIFFE's derivatives and membership are internationally oriented. LIFFE trades EC, German, Italian, Japanese, Swiss, and U.S. financial derivative products. For each country, LIFFE offers a range of products, notably interest rate derivatives with maturities spanning the yield curve. Additionally, LIFFE trades derivatives based upon the four most actively traded government debt markets: German, Japanese, U.K. and U.S. government bond futures. LIFFE is the third largest volume exchange worldwide, following the U.S. and Japanese markets. In 1990, LIFFE traded 8 percent of worldwide exchange traded volume.

### **The transaction cost difference**

The increasing number and growing size of derivative exchanges has increased exchange competition. Derivative exchanges and their members are increasingly competing with other derivative and cash exchanges through product offerings, trading hours, and notably, competitively priced transaction costs. As similar derivative products continue to be listed and trad-

ed across multiple exchanges, trading will tend to flow to the market offering the lowest transaction costs. The continuing internationalization of markets finds market participants increasingly trading on exchanges across several countries with different cost structures. Assessing execution costs between markets is a complex exercise because transaction costs vary within an individual market across time. A derivative market's transaction costs vary in accordance with the degree of liquidity and price discovery, the size of the trade, the type of market participant, the activity in the underlying financial asset market, and the legal and regulatory framework over a country's financial markets.

Transaction costs for exchange traded derivatives typically include the bid-ask spread (the difference between the bid price and the asked price), commissions, exchange and clearing fees, and margin requirements. Internationally, the trend has been to reduce these costs. Commissions are generally negotiated in most countries' markets according to the market participant and the size of trade, with the exception of the Japanese markets which still adhere to fixed commission rates.<sup>4</sup> Competitive pressures are reducing negotiated commissions, as shown by a 1991 CBOT survey which reported the majority of CBOT members had reduced average commission rates between 21 percent to 50 percent over the past five years.<sup>5</sup> During 1991, brokers at MATIF dramatically lowered and, in some instances, temporarily waived commission fees to attract market participants.<sup>6</sup> Actively traded markets typically have narrow bid-ask spreads, minimizing this trading cost component. New exchanges, such as DTB and MATIF, have asked dealers to minimize the bid-ask cost in order to attract market participants.

To the extent margin requirements force traders to hold assets in proportions that they would not otherwise hold, these requirements impose indirect transaction costs on the trader. The major exchange clearinghouses generally do not require noninterest bearing (that is, cash) margin, except for the Japanese exchange clearinghouses. This increases Japanese trading costs by the amount of foregone interest which could have been earned on investing the noninterest bearing margin in an interest bearing instrument. Other exchanges are actively seek-

ing to reduce the opportunity costs associated with margin requirements. For instance, a CME proposal currently under review by the Commodity Future Trading Commission (CFTC), the U.S. future exchange regulatory agency, could further reduce margin opportunity costs by extending permissible collateral to include stock and mutual fund shares. Exchanges are also seeking to reduce the burden of margin requirements by recognizing offsetting positions traded on the same exchange. This portfolio approach to margin setting leads to reduced margin requirements because margin is calculated on positions which offset and therefore reduce risk [Behof (1989)]. These intra-exchange cross margin programs have been established by the CBOT, CME, LIFFE, MATIF, SIMEX, and Sydney Futures Exchange (SFE) clearinghouses. Cross margin programs have also been established between exchanges, with an inter-exchange program established in 1989 between the CME clearinghouse and the Options Clearing Corporation (OCC), the clearinghouse for five U.S. exchanges which trade options. As a result of this inter-exchange cross margin program, margin requirements have been reduced by 70 percent for some positions. Similarly, the CBOT clearinghouse and OCC established an inter-exchange cross margin program in 1991.<sup>7</sup>

A country's legislative and regulatory rules may impose additional transaction costs. Although the legislative and regulatory playing field is not yet level, many countries are altering or eliminating laws and regulations which increase trading costs. Between 1990 and 1991, Germany, the Netherlands, Sweden, and the U.K. abolished security transfer taxes on their respective asset markets [White, Kupiec, Duffee (1990)]. Along with the elimination of the taxes on the asset markets, Sweden and the U.K. correspondingly eliminated taxes on derivative trades. Presently, derivative taxes are assessed in Finland, France, Hong Kong, and Japan.<sup>8</sup> Sweden offers an illustration of the impact that transaction taxes can have on an exchange. Sweden doubled its equity transaction tax in 1986, increasing equity trading on Swedish stocks in foreign markets, notably London. In 1989, Sweden extended the tax to futures and options trades, which substantially reduced futures trading on Sweden's OM Stockholm (OM) and closed the Swedish Op-

tion and Future exchange (SOFE).<sup>9</sup> Although the derivative tax included option trades, the tax on these trades was considerably lower and did not dramatically reduce option trading on OM. The futures tax effectively eliminated futures trading on OM during 1989 and 1990, in comparison to over 300,000 futures contracts traded at OM in 1988, the year prior to the introduction of the derivative tax. With the abolition of the tax on both the underlying asset and derivative markets in 1990, OM's futures volume for 1991 approached 4 million contracts.

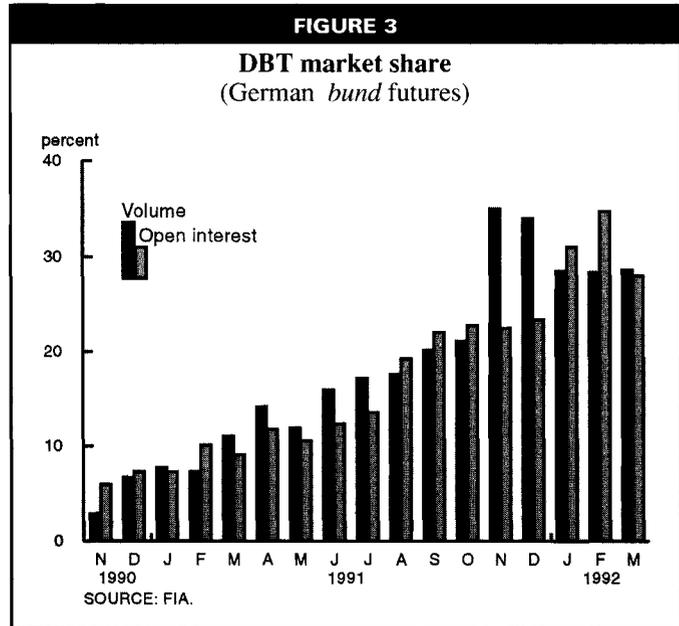
Given the difficulty of making transaction cost generalizations on a "by market" basis, a more feasible comparison can be completed on a "by transaction" basis. A 1991 Salomon Brothers transaction cost study replicated a stock index portfolio transaction specified at a face value of (U.S.) \$50 million in the Japan, U.K., and U.S. markets [Gastineau (1991)]. In the futures markets, total transactions costs were lowest in the U.S., followed by Japan and, finally, the U.K. The noninterest bearing margin requirement of Japanese exchanges and the large bid-ask spread on U.K. exchanges were responsible for the relatively lower transaction costs in the U.S. However, since this study was completed, commission and margin requirement increases have substantially increased the total transaction costs of executing this transaction on the Japanese future markets. In the option markets, total transaction costs were lowest in Japan, followed by the U.S. and the U.K. Cost differences between Japan and the U.S. were slight, with the bid-ask spread marginally higher in the U.S. The study highlighted the fact that of all the U.S. cost estimates, the bid-ask spread on options was the most difficult to estimate because this cost varies widely under different market environments. Once again, the relatively large bid-ask spread increased the total costs of executing the option transaction in the U.K.

### **Competition for liquidity**

A primary characteristic of a successful derivative market is liquidity. Liquid markets are actively traded, with small price changes. Prior to the 1980s expansion, trading in a particular type of future or option contract tended to be concentrated on a single exchange, usually the first exchange to introduce the contract. Being first to create a liquid contract market gave an exchange a competitive advantage which typically eliminated any trading for the same contract

on a competing exchange [Miller (1990)]. With the industry's expansion, exchanges are aggressively competing for existing liquid contract markets. In some instances, newer exchanges are gaining considerable market share, neutralizing this former "first exchange advantage." Decreasing transaction costs assist in increasing market share and, correspondingly, liquidity. In particular, the exchange growth is challenging the internationally oriented exchanges, such as the CBOT, CME, LIFFE, MATIF, and SIMEX, to retain and expand product offerings. During the 1980s, exchanges opened specifically to recapture trading in domestic financial products that was occurring at foreign exchanges. At the same time, many existing exchanges which trade domestic financial derivatives expanded through foreign product introductions. Exchange markets also faced increasing competition from OTC markets for derivative products. For some financial derivatives, exchanges have had greater difficulty in competing with the older, more established OTC markets.

Prior to 1990, German law prohibited the trading of futures. As a result, trading in the German government *bund* future was launched by a nondomestic exchange, LIFFE in 1988. Since November 1990, DTB has pursued German government *bund* future volume traded on LIFFE. DTB's *bund* futures market has consistently grown to account for 34 percent of total volume and 23 percent of total open interest as of December 1991 (see Figure 3).<sup>10</sup> DTB's growing market share is the result of transaction costs reductions to competitively position its contract against LIFFE's contract (see Table 2). Margin requirements were lowered beginning June 1991<sup>11</sup> and exchange fees were temporarily suspended beginning August 1991. Dealers are increasing market liquidity by trading at least 20 contracts with a maximum spread of no more than 3 ticks—a tick being the minimum allowable price movement—or 75 deutschemarks.<sup>12</sup>



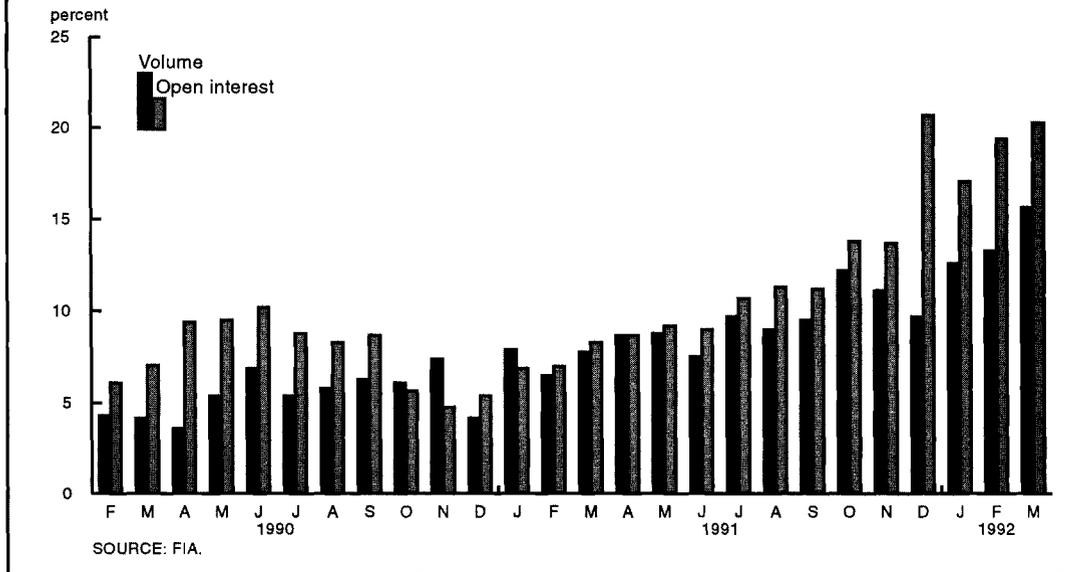
Until recently, TIFFE easily dominated trading of its domestic three month Euroyen future, introduced in June 1989. In October of 1989, SIMEX introduced a comparable future, but volume languished. Until the last half of 1991, TIFFE's market share has been 90 percent of total volume and open interest. Since mid-1991, SIMEX trading gains have gradually increased, exceeding 10 percent of total volume and 20 percent of total open interest by December 1991 (see Figure 4).<sup>13</sup> Although the competitive impact cannot yet be assessed, TIFFE has responded to SIMEX's increasing market share by extending trading hours to coincide with SIMEX's longer trading hours. However, competition between the two exchanges is not a straightforward transaction cost issue at present. Although SIMEX's transaction costs are lower than TIFFE's, some observers of the Japanese markets believe SIMEX can compete only for a

**TABLE 2**  
**German *bund* future transaction costs**

	DTB	LIFFE
Commission	Negotiated	Negotiated
Margin	3,000 DM	2,000 DM
B/A spread	50-75 DM (2-3 ticks)	25-50 DM (1-2 ticks)
Exchange fees	None	90 pence

FIGURE 4

**SIMEX market share**  
(Three month Euroyen futures)



subset of the total trading volume. These observers indicate Japanese market participants tend to trade through domestic markets, as shown by TIFFE's market share. SIMEX's competitive transaction costs, however, should continue to challenge TIFFE.

Through a series of competitive contract introductions, MATIF is challenging LIFFE's status as the leading international exchange in Europe. The rivalry started in 1989 when MATIF listed its first nondomestic future, the three month Eurodeutschmark future. LIFFE's contract succeeded, in great part attributable to LIFFE's established international product offerings and membership, but MATIF's failed. However, MATIF followed with the successful introduction in October 1990 of an ECU bond futures contract. By December 1991, MATIF traded 99 percent of total volume and 95 percent of total open interest. Competitive transaction costs and a product revision assisted MATIF's success. Increased competition between brokers substantially reduced commission costs, and similar to DTB, dealers committed to competitive position and bid-ask spreads. MATIF revised its contract to broaden the range of deliverable ECU bonds in comparison with LIFFE's contract, ironically extending delivery to include British ECU bonds.<sup>14</sup> Once again both exchanges went head-to-head in the

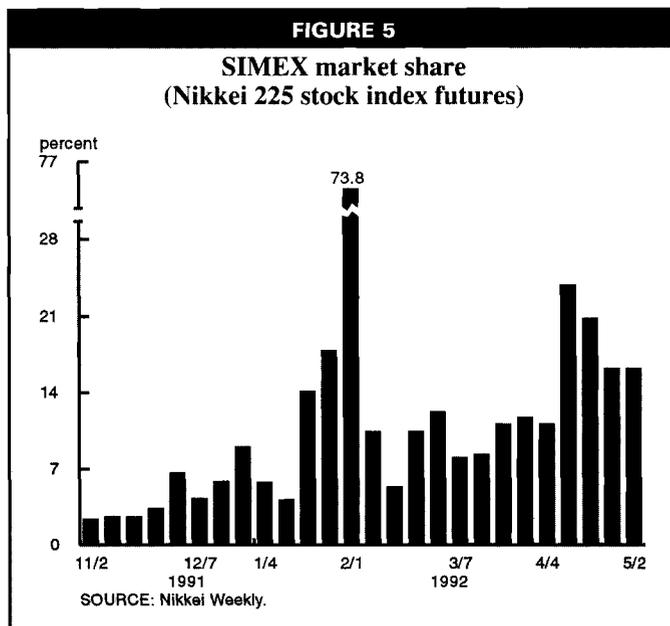
September 1991 launch of Italian bond futures, LIFFE easily dominating trading as London is the largest market for lira denominated debt outside of Italy. However, LIFFE will be challenged by another competing domestic exchange, as Italy is organizing a derivative exchange to trade Italian bond derivatives.<sup>15</sup>

Nikkei 225 stock index derivatives are one of a growing number of derivative products that can be exchange traded almost 24 hours through exchange listings on the OSE, SIMEX, CME, and American Stock Exchange (AMEX).<sup>16</sup> Nikkei 225 stock index futures were introduced on SIMEX in 1986; by the OSE in 1988; and by the CME in 1990. The introduction of OSE's contract after SIMEX's contract did not reduce SIMEX's volume. Rather, contract volume at both exchanges increased, however OSE's volume grew faster than SIMEX's. Although the OSE continues to dominate Nikkei 225 stock index future trading, large increases in transaction costs at the OSE have increased SIMEX and CME Nikkei 225 stock index futures trading. Specifically, OSE commissions have doubled, margin requirements have been successively raised from 9 percent of contract value in 1988 to 30 percent in 1992, and trading has been restricted within a narrow range of the previous trading day's closing price, effectively reducing the price

discovery process on the OSE. SIMEX and CME margin requirements are half of the OSE's requirement and, unlike the OSE, do not require noninterest margin collateral [Waltner (1992)]. SIMEX, OSE's regional competitor, has benefitted considerably from OSE's increasing trading costs, increasing market share from only 2 percent of volume in November 1991 to 23 percent in April 1992 (see Figure 5).

Options on the S&P 500 stock index have been traded on nearby rival exchanges (the CME and CBOE) since 1983. The CME option is based on one S&P 500 stock index future contract, also traded at the CME; while the CBOE option is based directly on the S&P 500 stock index.<sup>17</sup> Prior to 1988, the CME option was more actively traded than the CBOE option. As a result of the stock market decline of October 1987, margin requirements on both option contracts were raised, increasing the transaction costs of trading these contracts. CME option trading was more severely impacted than CBOE option trading, possibly due to factors other than the increase in transaction costs. CME option volume declined by 60 percent in 1988, while CBOE option volume declined by only 20 percent. For year-end 1991, the CBOE option traded 57 percent of total option volume. In addition to option competition with the CME, the CBOE now competes with four other U.S. exchanges—AMEX, the New York Stock Exchange (NYSE), the Philadelphia Stock Exchange (PHLX), and the Pacific Stock Exchange (PSE)—for option trading. The Securities and Exchange Commission (SEC), the regulatory body of the five exchanges, terminated option exclusivity in October 1991 to foster competition between the five exchanges.

The 1980s exchange expansion did not include growth of exchange traded currency derivatives. For example, LIFFE delisted all currency derivatives in 1990. The majority of currency derivatives have traded and will continue to trade on OTC interbank foreign exchange markets. The largest of these markets is located in London, with New York, and Tokyo



also major foreign exchange centers. These OTC markets dwarf exchange traded markets because of their large size, product depth, and 24 hour accessibility. The market for yen denominated derivatives illustrates the role of the exchange in this particular product market. Currently, the Japanese yen is the second largest OTC currency traded. Japanese yen derivatives are also exchange traded on the CME, and to a much lesser extent on the MidAmerica Commodity Exchange (MIDAM), Philadelphia Board of Trade (PBOT), PHLX, and SIMEX. Similar to LIFFE, TIFFE no longer trades Japanese yen futures due to Tokyo's active foreign exchange market. The gross daily turnover in 1989 of OTC Japanese yen approximated \$28 billion [Federal Reserve Bank of New York (1989)], seven times the estimated \$4 billion notional principal traded daily on exchanges in 1991.

#### **Exchange versus OTC market structures**

The derivative exchange market is a relatively new market organization compared with the OTC market. An exchange market is a highly organized market, specifying rules of trading, contractual terms, market's mode of operation, and conditions of membership. In contrast, an OTC market generally lacks these standardized features [Mulherin, Netter, and Overdahl (1991)]. With growth often a precursor to change, the 1980s expansion foreshadows

a change in the structure of derivative markets. Driving these changes is the increasing sophistication of market participants, as institutional participants trade both exchange and OTC markets. Increasingly, many of the new exchanges do not resemble their predecessors, while certain OTC markets increasingly resemble exchanges. Exchange markets are evolving new trading structures, while OTC markets are incorporating exchange clearinghouse features. This restructuring process tends to be more critical for exchanges, because exchange markets are under regulatory jurisdiction.

Many OTC markets span the New York-London-Tokyo trading day. Likewise, exchange traded derivatives are available for an increasing portion of the 24 hour trading day. However, customers are currently required to shift from exchange to exchange as the day proceeds. The financial derivatives which can be traded currently beyond the normal trading day are: the British pound, German deutschemark, three month Eurodollar, Japanese government bond, Japanese yen, Nikkei 225 stock index, and U.S. Treasury bond futures and options.

Developments since the 1980s point to the increasing acceptance of alternative trading methods which bypass the trading pit. Prior to the 1980s, derivative exchanges traded primarily through the open outcry system, where traders physically convey their bids or offers in the trading pit. The majority of new exchanges which opened in the 1980s instead have selected automated forms of trading, ranging from LIFFE's Automated Pit Trading (APT) open outcry trading system to DTB's trade matching system. LIFFE's APT system supplements the trading pit, extending trading hours as well as supporting markets for low volume derivative products during the LIFFE trading day. Other exchanges with after-hour automated trading also operate in Australia and Japan. In contrast, DTB's trade matching system completely replaces the trading pit. Other fully automated exchanges trading financial derivatives also operate in Austria, Belgium, Denmark, Japan, New Zealand, Spain, Sweden, and Switzerland. With the exception of the Japanese exchanges, these exchange markets are small compared to existing open outcry exchange markets.

Automated trading systems are noticeably absent from U.S. derivative exchanges with the CBOT and CME operating several internation-

ally important open outcry markets. In addition, until recently, the only off-exchange trade permitted by the CFTC was an exchange for physicals (EFP), a trade—primarily after-hour—of an asset for a future based on the asset. CFTC records estimate EFP transactions account for between six and eight percent of currency future volume and between four and six percent of bond future volume.<sup>18</sup> However, the CME's forthcoming Global Automated Transaction System for Futures and Options (GLOBEX) represents the first U.S. automated after-hour trading system. Another automated trading system, the CBOT's Project A, will emulate LIFFE'S APT system for facilitating low volume markets, and additionally will provide access to underlying asset markets.<sup>19</sup> Besides automated trading, the CME's Large Order Execution System (LOX) is the first program which permits large, primarily institutional, S&P 500 future trades of 300 or more to be executed outside the trading pit, known as upstairs trades. LOX trades are similar to the crossing trades already permitted on the U.S. stock exchanges.

As trading of exchange products evolves, the exchange clearinghouse remains the critical mainstay of this market structure. The clearinghouse role as guarantor to member trades mitigates counterparty credit risk, permitting exchange members and their customers to focus on price risk. The exchange clearinghouse has various means to monitor members' risk: customer position limits, large customer reporting systems, member capital-based position limits, and sophisticated risk analysis programs. The exchange clearinghouse also reduces the potential for default of a member through mark to market variation settlement, multilateral netting, additional margin requirements, or position reduction requests. If a member defaults, the clearinghouse has various levels of financial recourse. Since clearinghouse positions are marked to market on a daily basis, and can even be updated within the trading day, financial losses are minimized to, at most, a single trading day's price movement. The first level of financial recourse is the member's margin; following is the member's clearing capital; and finally, losses can be divided pro-rata among other clearinghouse members [Baer and Evanoff (1990) and Rutz (1989)]. The extensive exchange clearinghouse guarantee system is a primary, and critical, difference between

exchange and OTC markets. Although OTC derivative markets are large, these markets are constrained by the lack of mechanisms to control counterparty credit risk.<sup>20</sup> If an OTC party defaults, counterparties bear the financial losses of the derivative obligations. Lacking the exchange clearinghouse capitalization, the extent of financial losses borne by OTC counterparties may increase financial system risk [Miller (1990)].

The importance of the clearinghouse's guarantor role lessens when the general level of credit quality of its participants is high and comparable to the clearinghouse, while the clearinghouse is a more attractive counterparty as credit quality deteriorates. During the 1980s, pervasive credit quality deterioration increased counterparty risks in international OTC markets. A large number of financial and nonfinancial firms were downgraded by credit rating agencies. For example, only four private sector banks are rated triple-A worldwide. Motivated by the credit deterioration, OTC market participants are incorporating attributes of the exchange clearinghouse above traditional counterparty selection and monitoring systems. Several OTC participants now require collateral or escrow deposits to be marked to market, similar to the clearinghouse margining system.<sup>21</sup> A consortium of banks in North America and Europe, respectively, are planning clearinghouses for foreign currency transactions. Both the North American Clearinghouse Organization (NACHO) and the European Clearinghouse Organization (ECHO) would clear and settle OTC interbank foreign exchange trades. An important precedent for NACHO and ECHO is the Government Securities Clearing Corporation (GSCC). Since 1988, the GSCC has cleared and settled U.S. government securities, which trade on OTC markets like the interbank foreign exchange markets [Woldow (1989)]. The GSCC is the counterparty to every trade, providing the guarantor and multilateral netting functions of the exchange clearinghouse. On a very small scale, clearinghouses of derivative exchanges are already clearing and settling OTC derivative trades. The MATIF clearinghouse clears and settles OTC trades on the *notional* bond future.<sup>22</sup> Beginning in 1992, the clearinghouse for OM Stockholm and its franchise, OM London, will clear and settle OTC trades on a small number of OTC derivatives.<sup>23</sup> By assuming the counterparty risk, the ex-

change clearinghouse creates fungible exchange traded products.

To the extent OTC markets adopt features of the clearing and settlement systems, such as those employed by exchanges, counterparty credit risk will be more efficiently managed and the safety of the entire financial system will increase [Committee on Interbank Netting Schemes(1990)]. As the OTC market structure increasingly resembles the exchange market structure, regulatory policy will become a central issue. Exchange markets are regulated, while OTC markets are not, although many OTC market participants are regulated. In the U.S., this issue has been raised by the exchanges and is being reviewed by Congress. Currently, the OTC financial swap market, like the OTC forward market, is exempt from the CFTC's regulatory jurisdiction. Forward foreign exchange transactions are exempted under the Commodity Exchange Act (CEA). A 1989 policy statement provided criteria—referred to as the “safe harbor” guidelines—which exempt swap transactions from CFTC regulation [CFTC Policy Statement (1989)]. Several industry analysts argue that the unregulated OTC markets have an unfair competitive advantage compared to the regulated exchange markets [Miller (1990) and Mulherin, Netter, and Overdahl (1991)]. An alternative view would argue that regulated and unregulated markets simply fill different needs. Unlike exchanges, OTC markets facilitate the customization of unique risk management needs and are favored by high credit quality participants who do not require the clearinghouse financial guarantee. Part of the issue is that although the CFTC regulates exchange traded derivatives, there presently is no definition of futurity—what distinguishes a derivative market that is subject to CFTC regulation from a derivative market that is not. Instead, the CFTC has reviewed market issues, like the financial swap market, on a case-by-case basis. The outcome of this issue in the U.S. may serve as a precedent for exchange markets worldwide.

## Conclusion

Recent developments indicate that the expansion of the derivative industry will continue. Five countries have opened financial derivative exchanges since 1990 and several other countries are either organizing or proposing financial derivative exchanges. The further application of financial engineering will increase the precision

of managing unique risks, expanding the product offerings of the OTC market. Institutional investor preferences with respect to products, transaction costs, and clearing and settlement features will continue to drive competition and changes in both the exchange and OTC markets. As a result, exchanges are increasing their efforts to lower transaction costs and expand

their array of products. Competition between exchanges operating under different regulatory regimes is driving regulators to reconsider their approach to regulation. Competition from the OTC markets and the blurring of the OTC and exchange market structures will only add to this pressure.

---

## FOOTNOTES

<sup>1</sup>In 1972, the CME introduced the first financial derivatives: British pound, Canadian dollar, Dutch guilder, German deutschemark, Japanese yen, Mexican peso, and Swiss franc currency futures.

<sup>2</sup>The New Zealand Futures and Options Exchange (NZF&OE) has recently been purchased by Australia's Sydney Futures Exchange (SFE).

<sup>3</sup>Ginger Szala, "Financial walls tumble for German investors," *Futures*, January 1990, pp. 42-44.

<sup>4</sup>"Japan fights big bang," *Futures*, November 1991, pp. 8-9.

<sup>5</sup>Mary Ann Burns, "FCMs today: lean, mean trading machines," *Futures Industry*, September/October 1991, p. 19.

<sup>6</sup>Paul Dickins, "Commissions, commotion, competition trying MATIF," *Futures*, April 1991, p. 48.

<sup>7</sup>"Cross-margining system planned for CBOT trades," *Wall Street Journal*, February 22, 1991.

<sup>8</sup>Thomas R. Donovan, "International taxing matters," *Futures Industry*, May/June 1992, pp. 16-17.

<sup>9</sup>Tony Shale, "Why did SOFE have to die," *Euromoney*, March 1989, pp. 49-52.

<sup>10</sup>LIFFE introduced a German *bund* option in April 1989 and DTB in August 1991. As of December 1991, DTB traded 16 percent of total volume and 12 percent of total open interest.

<sup>11</sup>*DTB Deutsche Terminbörse Press Information*, June 12, 1991.

<sup>12</sup>"Global roundup," *Futures*, September 1991, p. 42; Tony McAuley, "Europe's futures markets hotly pursue U.S. leaders," *Wall Street Journal*, December 27, 1991, p. C1.

<sup>13</sup>SIMEX introduced a three month Euroyen option in June 1990 and TIFFE in July 1991. As of December 1991, TIFFE accounted for 80 percent of total volume and 87 percent of total open interest.

<sup>14</sup>"European futures exchanges-street fighters," *The Economist*, December 1, 1990, pp. 96-97.

<sup>15</sup>Paul Dickins, "LIFFE, MATIF meet once again in Eurowars sequel," *Futures*, September 1991, p. 40h.

<sup>16</sup>AMEX trades Painewebber Nikkei put warrants and Japanese index options, similar to the Nikkei 225 stock index.

<sup>17</sup>The CBOE changed the S&P 500 option from an American to a European option beginning in 1986. This contract change also contributed to substantial volume trading of the CBOE option.

<sup>18</sup>Keith Schap, "EFPs: Do regulations ruin their utility," *Futures*, November 1991, pp. 14-16.

<sup>19</sup>Ginger Szala and Kira McCaffrey, "CBOT has A-plan to automate floor," *Futures*, April 1992, p. 46.

<sup>20</sup>Kerry Tremble and Arun Sarwal, "Happiness is a full net," *Euromoney*, April 1991, pp. 34-35.

<sup>21</sup>"Seminar: on-exchange versus off-exchange derivatives," Futures Industry Association's Seventh Annual Futures and Option Conference, Chicago, October 1991.

<sup>22</sup>"Seminar: transnational transaction issues," Futures Industry Association's Seventh Annual Futures and Option Conference, Chicago, October 1991.

<sup>23</sup>*Derivatives Week*, April 13, 1992, p. 13.

---

## REFERENCES

**Baer, Herbert L. and Douglas D. Evanoff,** "Payment system issues in financial markets that never sleep," Federal Reserve Bank of Chicago, *Economic Perspectives*, November/December 1990, pp. 2-15.

**Behof, John P.,** "Intermarket cross-margining for futures and options," *Issue Summary of the Federal Reserve Bank of Chicago*, May 1989.

**Black, Deborah G.,** "Success and failure of futures contracts: theory and empirical evi-

dence," *Monograph Series in Finance and Economics: Salomon Brothers Center for the Study of Financial Institutions*, 1986, pp. 1-31.

**Cargill, Thomas F. and Shoichi Royama**, "The evolution of Japanese banking and finance," in George G. Kaufman, ed., *Banking Structures in Major Countries*, 1992, pp. 333-388.

**Committee on Interbank Netting Schemes**, *Lamfalussy Report*, Bank of International Settlement, Basle, Switzerland, November 1990.

"Commodity futures trading commission: regulation of hybrid instruments; policy statement concerning swap transactions; final rule and notice," *Federal Register*, Volume 54, No. 139, July 21, 1989, pp. 30684-30697.

**Ducruzet, L. Beduc F. and P. Papadacci**, "The French financial system," in George G. Kaufman, ed., *Banking Structures in Major Countries*, 1992, pp. 245-292.

*Euromoney*, various issues.

**Federal Reserve Bank of New York**, "U.S. foreign exchange market survey," April 1989.

*Futures*, various issues.

*Futures Industry*, various issues.

**Futures Industry Association**, *Monthly Volume and Open Interest Reports for Futures and Options*, various issues.

**Futures Industry Institute**, *Futures and Options Fact Book*, 1992.

**Gastineau, Gary L.**, "A framework for the analysis of portfolio execution costs—stocks versus derivatives," *Portfolio Trading*, Salomon Brothers, October 1991, pp. 1-14.

**Japan Securities Research Institute**, "Securities futures trading," *Securities Markets In Japan*, 1990, pp. 102-111.

**Miller, Merton**, "International competitiveness of U.S. futures exchanges," *Journal of Financial Services*, 1990, pp. 129-150.

**Moser, James T.**, "Futures margin and excess volatility," *Chicago Fed Letter*, June 1991.

**Mulherin, Harold, Jeffrey M. Netter, and James A. Overdahl**, "Prices are property: the organization of exchanges from a transaction cost perspective," Draft, Washington D.C., January 22, 1991, pp. 54-80.

**Rutz, Roger D.**, "Clearance, payment, and settlement systems in the futures, options, and stock markets," Board of Trade Clearing Corporation, February 24, 1989.

*The Economist*, various issues.

*Wall Street Journal*, various issues.

**Waltner, Nicholas W.**, "Nikkei 225 futures: Osaka illiquidity and SIMEX boom," *Japanese Equity Research*, Salomon Brothers, Draft, 1992.

**White, Pat A., Paul Kupiec, and Gregory Duffee**, "A securities transactions tax: beyond the rhetoric, what can we really say?," Finance and Economics Discussion Series, Federal Reserve Board, August 1990, p. 13.

**Woldow, Robert**, "The Government Securities Clearing Corporation (GSCC)," *Study of International Clearing and Settlement*, Bankers Trust Company, Volume 1, 1989, p. 63.