1. Derivative Securities

1.1 Definitions and Other Basic Concepts

What are Derivative Securities?

It is difficult to speak generally about derivative securities. It is possible to observe that a derivative security involves a contingent claim; it is a security that has some essential feature, typically the price, that is derived from some future event. This event is often, though not always, associated with a security or commodity delivery to take place at a future date. The contingent claim can be combined with other security features or traded in isolation. This definition is not too helpful because financial markets are riddled with contingent claims. Sometimes the contingent claim is left bundled with the spot commodity, in which case the derivative security is also the spot commodity, e.g., mortgage backed securities. Yet, the term 'derivative security' is usually restricted further, to only include cases where the contingent claim is unbundled and traded as a separate security, effectively forwards, futures, options, and swaps. In what follows, this class of unbundled contingent claims will be referred to as derivatives securities.

Derivative securities trading is definitely not a modern development. The implicit and explicit embedding of derivative features was common in the types of securities traded in early markets. Early examples of securities with derivative features include: claims on the 14th century Florentine *mons* that had a provision for redemption at 28% of par, though that provision was seldom exercised; 16th century bills of exchange that combined a loan with a forward foreign exchange contract; and, 18th century life annuities that featured terms to maturity dependent on specific life contingency provisions (Poitras 2000). The 'to arrive' contracts traded on the Antwerp exchange during the 16th century may be the first instance where a contingent claim was unbundled and traded as a separate security on an exchange. Previous to this time, such derivative security transactions had been limited to private deals between two signatories executed using *escripen* or notaries.

In addition to securities with embedded derivative features, early financial markets can be credited with beginning exchange trading in modern derivative security contracts.[1] Though the precise beginnings of option trading are difficult to trace, it is likely that there was trading in options, as well as 'to arrive' contracts, on the Antwerp bourse during the early 16th century (Poitras 2000). By the mid-17th century, trade in options and forward contracts was definitely an integral activity on the Amsterdam bourse (de la Vega 1688). Trading in both options and forward contracts was an essential activity in London's Exchange Alley by the late 17th century, e.g., Houghton (1694). The emergence of exchange trading of futures contracts can be traced to either 19th century Chicago (Hieronymous 1971) or 18th century Japan (Schaede 1989).

From these early beginnings, modern markets have achieved full securitization of a wide range of derivative securities. The modern Renaissance in derivative security trading has posed considerable problems for the accounting profession, e.g., Gastineau (1995), Perry (1997). In order to address the accounting problems raised by the use of derivative securities by firms for risk management and other purposes, the notion of "free standing derivatives" was introduced. This reference to free standing derivatives is precise accounting terminology borrowed from the financial accounting standard FAS 133 (FASB 1998). Being 'free standing', derivative securities pose fundamental problems for conventional methods of preparing accounts. This point has not been lost on the accounting profession which has been engaged in ongoing attempts to produce a set of standards that permit an accurate financial presentation of the accounts of the firm, that do not permit substantial discretionary variation in the accounts. In a perfect world, two otherwise identical firms, both involved with using derivative securities, would not be able to present accounts that were substantively different, based on discretionary accounting choices, such as the method used to recognize gains or losses on the offsetting spot position.

As it turns out, the accounting profession is acutely aware of the question: what are derivative securities? The main difficulty for accountants is that the derivatives are free standing.[2] When the contingent claim is unbundled from the underlying transaction, it is difficult to attach that security back to the transaction that motivated the derivative security position. For obvious reasons, derivative securities require mark-to-market accounting. Yet, accounting for cash positions can be flexible, book value or market value, depending on the situation. Because of the potential for substantial discretionary manipulation of the accounts, accounting standards such as FAS 133 and 138 have been introduced. Under recent standards, the narrow class of unbundled contingent claims is now classified as free standing derivatives. As such, more flexible rules have been introduced to ensure that there is accurate hedge accounting for firms using these securities . This category excludes fixed income securities with embedded derivative features, such as mortgage backed securities and callable or convertible bonds.[3] A key implication of all this for non-accounting professionals is that, due to the introduction of FAS 133, substantially enhanced information about derivatives positions is now available in annual reports and other sources of financial information for publicly traded companies, , e.g., 10-K's.

This approach to defining derivative securities is not without conceptual difficulties. An essential feature of the free standing derivative securities is the action of setting a price today for a transaction to take place at a date in the future. However, this feature is also present in other types of financial securities. A bond, for example, sets a price today for a sequence of fixed cash flows that will be received in the future. Even a common stock sets a price today for a sequence of uncertain cash flows that will be received in the future. One element that distinguishes free standing derivative securities from financial securities such as bonds is the timing of the settlement. A forward contract involves settlement and delivery at maturity while a bond involves settlement today with delivery in the form of payments at future maturity dates. Using this approach, an option contract is somewhat anomalous, requiring a payment today to acquire the right to make a settlement at a price that is set today. The distinction between the various cases actually lies with the respective cash flows.

Some Definitions

At this point, some of the jargon that characterizes futures trading will be introduced. For practical purposes, an attempt has been made to use the terminology of the marketplace. The occasionally colorful language is often transparent in intent but confusing in application. For example, in futures and forward markets it is conventional to use the following:

A ***short*** position involves the sale of a commodity for future delivery

A ***long*** position involves the purchase of a commodity for future delivery.

However, in options markets a *long* position refers to the purchase of a call or put option while a *short* position refers to the writing of a call or put option. This terminology applies even though purchasing a put option involves paying a premium for the right to sell for future delivery. In turn, a *short* position in the spot commodity market involves borrowing the commodity under a short sale agreement which is then sold in the spot market, generating a cash inflow. A *long* position in the spot commodity would involve a current cash outflow in exchange for possession of the physical commodity.

The use of analytical concepts such as profit functions requires introducing some notation that will be used throughout the book:

$F(t,T)$: the forward or futures price observed at time t for delivery at time T.

$S(t) \equiv S_t$: the *cash* or *spot* or *physical* price of the deliverable commodity observed at time t.

For consistency, it has to be that $T \geq N \geq t$. In much of what follows, the assumption, $F(T,T) = S(T)$ is made in order for the price of a futures contract observed on the delivery date $t=T$ to be equal to the price of the deliverable

commodity. In effect, the spot commodity is taken to be the deliverable commodity. This condition is readily satisfied for forward contracts, but requires assuming away the possibility of cross hedging if futures contracts are involved. Conventional subscripts that will be used are $t=0$ and $t=1$ with N for contracts that are *nearby* or closer to delivery and T for contracts that are *deferred* or farther from delivery.

Using a strictly legal definition, it is possible to be reasonably precise about what constitutes a futures contract. However, differences in the legal definition of futures contracts across jurisdictions would create problems. For present purposes, a brief summary of a futures contract is all that is required:

> A ***futures contract*** is an exchange traded agreement between two parties, guaranteed by the clearinghouse, that commits one party to sell a standardized grade and standardized quantity of a commodity, asset or security to the other party at a given price and specified location at a future point in time.

While useful, this brief summary disguises important features of futures trading. For example, one of the significant limitations of forward contracting is the requirement of precise specification of the grade and quantity of the commodity be determined by the parties to the contract. This procedure raises the problem of how to ascertain whether the commodity delivered meets the grade and quantity requirements. Because forward contracts typically require delivery of the commodity, this procedure is an essential feature of forward contracting. Because futures markets deal in a standardized commodity for which delivery can be avoided by taking an offsetting position prior to delivery, futures contracting avoids this problem.

Like futures, options have a specialized nomenclature. To understand this jargon, the essential notions of an option must be identified:

> An ***option contract*** is an agreement between two parties in which one party, the writer, grants the other party, the purchaser, the *right*, but not the obligation, to either buy or sell a given security, asset or commodity at a future date under stated conditions.

Options almost always involve the purchaser making some type of premium payment to the writer. The timing and form of the premium payment depends on the specifics of the contract. For exchange traded options and many OTC options, the premium is paid up front, when the option agreement is initiated. It is essential to recognize that an option does not represent an ownership claim. Rather, an option is a claim against ownership under prespecified conditions. While it is not necessary that options be exchange traded, many option contracts do originate on exchanges.

Given this, two types of options can identified:

> A ***call*** option gives the option buyer *the right to purchase* the underlying asset or commodity from the option seller at a given price.
>
> A ***put*** option gives the option buyer *the right to sell* the underlying asset or commodity to the option seller at a given price.

The seller of the option is often referred to as the option ***writer***. An option purchaser makes a payment to the option writer referred to as the option ***premium***. Once the premium has been paid, the purchaser has no further liability.

The following notation will be used for options:

$C[S,\tau,X]$ = Price of a European call $C_A[S,\tau,X]$ = Price of an American call[4]
$P[S,\tau,X]$ = Price of a European put $P_A[S,\tau,X]$ = Price of an American put
X is the exercise price T is the expiration date $\tau = T - t$ where $T \geq t$

The notation for time is handled in a somewhat non-standard fashion, where t^* and τ are often used in preference to t and T. This is to specifically indicate that time is being counted backwards and the unit of measurement for t^* is fractions of a year. Hence:

$$t^* = (T - t)/365 = \tau/365$$

t^* is the fraction of the year remaining on the security, where $T - t$ is the number of days from settlement to expiration with T being the expiration date and t is the settlement date. The seemingly redundant use of the variable τ is to emphasize cases where time counts backward: at any time t, $\tau = T - t$ and, as t increases to T, τ is reduced to where, on the expiration date T, $\tau = 0$.

Various features for exchange traded option contracts can be identified. Some or all of these features may apply to other types of option transactions. In order to be accurately specified, option contracts require an ***exercise*** or ***strike*** price as well as an ***expiration date***, on which the right is terminated. The exercise price is the contractually specified price at which the purchaser is allowed to buy (for a call) or sell (for a put) the underlying asset or commodity. When the exercise price is below (above) the current underlying price, the call (put) option is said to be ***in the money***. When the exercise price is above (below) the underlying price, the call (put) option is ***out of the money***. An ***at the money*** option has the exercise price and underlying asset or commodity price approximately equal. Exercising an option involves completion of the relevant transaction specified in the option contract. Options that can be exercised prior to the stated expiration date are referred to as ***American options***; to be contrasted with options that can only be exercised on the expiration date commonly referred to as ***European options***.[5] Depending on the type of option, either a spot delivery (physical settlement) or a net dollar value transaction (cash settlement) may be required to satisfy the conditions of exercise. Finally, the option contract will typically contain other adjustment provisions, e.g., handling of dividend payments, stock splits, and mergers for stock options.[6] Of particular importance, modern exchange traded American stock options are ***not dividend payout protected,*** i.e., the option purchaser is not entitled to receive dividends paid on the underlying stock during the time between purchase and exercise**.**

In addition to exchange traded options, there are numerous other examples of options. In corporate finance, important types of options arise with warrants, rights offerings, convertible bonds, preferred stock and executive compensation packages.[7] It is even possible to interpret the firm's common stock or outstanding debt in terms of options. A ***warrant*** is an option issued by a corporation granting the purchaser the right to acquire a number of shares of its common stock at a given exercise price for a given time. When a warrant is exercised, the transaction results in a cash inflow to the corporation in exchange for a new issue of common shares, invariably resulting in a dilution of the outstanding common stock. Warrants are often exercisable prior to maturity, being "long term" at primary issue, e.g., five years or more. Occasionally, perpetual warrants with no fixed maturity date are offered. Given the long expiration dates, warrant exercise prices are usually set more than slightly above the current stock price. The precise conditions surrounding a warrant issue are contained in the ***warrant agreement*** that outlines the handling of stock splits, future new stock issues below the current price, and callability. Despite this, terms laid out in a warrant agreement are not always unambiguous. In effect, warrants are not as standardized as exchange traded options.

Preemptive ***rights issues***, sometimes called subscription warrants, are another form of option designed to facilitate sale of common stock.[8] However, unlike warrants that often support sales of stocks at a much later date, rights issues are short-dated; a 2-10 week duration period is typical.[9] In addition, rights issues are granted, on a *pro rata* basis to existing shareholders of record on the ex-rights date. In effect, shareholders receive the right to purchase a fraction of a new common stock issue equal to the fraction of the current outstanding common stock the shareholders of record own. Rights are valuable because the exercise price is usually set more than slightly below the current stock price, giving the right a definite market value.[10] Many rights issues are tradable, either on the OTC or on the centralized stock exchanges. Unlike rights issues and warrants, executive compensation options are usually not tradeable. These warrants are used to provide a bonus system to encourage senior management to pursue the interests of shareholders. Typically, these options are given (not sold) to the employee. The usefulness of this form of compensation in achieving its stated objective has been the subject of considerable

debate and research.

From these basic types, there are numerous variations, both theoretical and practical. Options, for example, feature a bewildering array of possible theoretical variations, e.g., digital barrier options, knock-out Russian options, perpetual Bermuda options and so on. One specialized derivative contract that possesses cash flows which can theoretically be replicated with forward contracts is a swap. Such transactions can be defined in general terms as:

A ***swap*** is an exchange of cash flows deemed to be of equal value at the time the swap is initiated.

While the future exchange of future cash flows is common to all swap transactions, certain types of swaps also include an exchange of current cash flows.

Swap transactions can be conceived as bundles of forward contracts. Early examples of such transactions occurred in foreign exchange (FX) markets, where the swap involved combining spot and forward FX transactions, e.g., at $t=0$ domestic funds are exchanged for foreign funds with an additional agreement that the foreign funds will be exchanged for domestic, at the current swap rate, at $t=1$. While, in general, the cash flows involved in a swap can originate from any security, asset or commodity, there are two important types of swaps: interest rate swaps and currency swaps. These swap types are a securitization of common underlying financial market transactions. In a "plain vanilla" interest rate swap (Abken 1991), the cash flows involve fixed-to-floating interest rates. In a currency swap, the cash flows are cross currency. A plain vanilla interest rate swap does not involve an exchange of $t=0$ cash flows, while a currency swap will exchange the $t=0$ cash flows. There are a substantial number of variations on the plain vanilla swap structure.

Futures vs. Forward Contracts: Basic Issues[11]

Futures and forward contracts both facilitate a fundamental market transaction: fixing a price today for a commodity transaction designated to take place at a later date. Unlike a futures contract, which is securitized and exchange traded, forward contracts come in a variety of forms. Some forward contracts, such as those traded on the London Metal Exchange, have many of the essential features of futures contracts. Other types of forward contracts are more complicated, e.g., the forward contracting provisions that were embedded in the Metallgesellschaft (MG) long term oil delivery contracts. Some forward contracts, e.g., fixed to floating interest rate swaps, can be constructed using futures contracts, e.g., using strips of Eurodollar futures.[12] In some respects, futures contracts represent an evolution of forward trading. Yet, much of the modern progress in derivatives contracting has come in OTC trading, the home of forward contracting.

Some of the practical differences between forward and futures contracting methods are illustrated in Figure 1.1. Considerable variation is observed in the relative use of forward or futures contracting across commodity markets. For example, in currency markets, the large value and volume of individual trades has the bulk of transactions conducted in OTC forward and short dated FX swap markets. Exchange traded currency derivatives are an insignificant fraction of total trading volume. As trading in forwards is closely integrated with cash market transactions, direct trading in forward FX contracts is restricted to the significant spot market participants, effectively the large banks and financial institutions. Because currency forward and swap contracts do not have regular marking to market, restricting participation is needed to control default risk.

Currency forward and swap contracts have many features of futures contracts. For other commodities, forward contracts can take a variety of forms. Consider the industrial and precious metals where active trading in both futures and forward contracts is observed. In the metals markets, the most important derivatives exchanges, the London Metals Exchange and the COMEX, also play an important role in providing cash market supplies through the exchange delivery process. In other commodities, such as crude oil, due to the wide variation in deliverable grades, there are significant practical differences between the forward and futures contracts. Yet, despite requiring delivery of a standardized grade of oil, the NYMEX crude oil futures contract still plays a key role in the cash market both as a pricing benchmark and as a delivery contract. For many agricultural commodities, such as grains and livestock, futures contracts are also the pricing benchmarks.

In general, forward trading is carried out in conjunction with cash market activity. This effectively excludes participation by traders not involved in the cash market. In some instances, the size of trades is so large that even smaller cash market traders are also excluded from directly participating in the forward market. These traders must access the cash market by placing and clearing trades with the larger market participants. This exclusivity is in keeping with the structure of cash deals that require an element of market recognition and implied creditworthiness in order to reduce riskiness. This feature of restricting direct access to forward trading has decided advantages, particularly in financial commodities such as currencies and debt instruments where large numbers of trades, involving millions of dollars per trade, are done each trading day. Much of this business is done through brokers, where credit lines in forward positions are imposed in order to further limit the intrinsic riskiness of forward contracting.

Figure 1.1 **Comparison of Futures and Forward Contracts**

	Forwards	**Futures**
Contract Amount	Depends on buyer and seller	Standardized
Price Movement Restrictions	No limit.	Varies; typically restricted by the exchange with provisions for increase or decrease
Position Limits	Market determined	Set by exchanges and regulators
Delivery Date	Depends on buyer and seller	Standardized
Market Location	Decentralized, often a telephone/computer network of dealers, brokers and other participants	Centralized exchange floor where trading is executed by open outcry between exchange members
Clearing	No direct, separate clearing mechanism	The exchange clearinghouse
Settlement	By delivery of goods as specified in contract	Marking-to-market daily using a margin system Some deliveries by specialized traders
Regulation	Self-regulation; contract law; general securities law	Exchange rules; Commodity Exchange Act; CFTC; State regulators; specific legislation

The intent of most forward trading is, ultimately, to deliver the spot commodity on the maturity date. As a rule, because forward contracts require settlement by spot delivery, it is somewhat difficult for purely speculative trading to occur. In addition, speculative interest is also deterred because forward contracts are not readily transferable. As a result, in order to offset a forward position for which the delivery is no longer desired, the trader must typically initiate another offsetting forward contract for the same grade, amount, delivery date and delivery location.[13] The two offsetting positions are then settled by crossing the trade at delivery. For example, to offset a ***long*** forward position with Bank A for $10 million Canadian dollars delivered on June 12, the trader will enter a ***short*** forward contract with Bank B, also for $10 million Canadian dollars and delivery on June 12. On the delivery date the trade will be crossed by taking delivery from Bank A on the long position and using the $10 million Canadian to make delivery on the short position with Bank B. The profit on the trade will be the difference

in the price of the short and long positions. This process is decidedly different than in futures markets where trades are, effectively, done with the clearinghouse and the futures position is canceled when a trader takes the offsetting position.

For some commodities, lack of liquidity in forward contracts makes it difficult for hedgers and other traders to find compatible grades, delivery dates, and delivery locations. In these situations, canceling the forward position by crossing in the cash market is difficult. Such complications will increase the attractiveness of using futures contracts. With the agreement of the counter-party, the forward agreement could be structured to have variation in the allowable grades and amounts or to be transferable under certain conditions. For forward agreements that do not contain such conditions, the best method of offsetting the forward position may be to engage in cash market transactions on the delivery date. For example, a metal refinery that has a forward contract to deliver copper cathodes but, for some reason, is unable to make delivery from current production, can enter the cash market for cathodes and purchase the copper necessary to settle the contract. The costs of engaging in such cash market transactions will vary according to the specifics of the situation.

The differences in the functioning of futures and forward markets impacts the specific method of contracting selected for conducting commodity transactions. For example, in contrast to forward trading, futures markets are designed to encourage participation by small speculative traders. The increased participation of speculators not directly involved in the spot market provides an important source of additional liquidity to futures markets not available in forward markets. In order to achieve this liquidity certain restrictions are imposed on trading, such as filing requirements and limits on position sizes. By restricting participation to large players in the spot market, many of the restrictions required for the functioning of futures markets are not present in forward markets. For hedgers, the underlying commodity for a futures contract does not, in many instances, have precisely the same characteristics as the hedger's spot commodity. Futures contracts are often entered into with the intention of closing out the position on the maturity date of the hedge and then covering the spot transaction in the cash market.

The Exchange

Another significant difference between futures and forward contracts arises because futures are exchange-traded while most forward contracts are created by individual parties operating in a less centralized market. Because a futures contract originates on an exchange, the traders originating the contract actually use the exchange ***clearinghouse*** as the counter-party to their trade.[14] While both a short and a long trader are required to create a futures contract, both traders execute the trade with the clearinghouse. This allows a futures contract to be created without the problems associated with forward contracting which typically depends on the creditworthiness of the counter-party. By design, futures contracts are readily *transferable* via the trading mechanisms provided by the exchange. Because forward contracts depend on the performance of the two original parties to the contract, these contracts are often difficult to transfer. One practical implication of this difference is that if a futures trader wants to close out a position, an equal number of offsetting contracts for that commodity month is purchased and the original position is canceled. Forward contracts are usually canceled by creating an offsetting forward contract with terms as close as possible to those in the original contract. Unless the forward contracts provide a method for cash settlement at delivery, this will potentially involve two deliveries having to be matched in the cash market.

Typically, trading on a futures exchange is conducted on an exchange-floor with each commodity having a designated "pit" or trading area. The largest group of floor traders or *locals* in the pit are floor brokers, filling orders for speculators and hedgers acting through commission house accounts. Some brokers work for commission houses, some for their own account. The next type of pit traders are the speculators, usually trading for their own account. This group breaks down into one of three not mutually exclusive types of traders. These participants can be referred to by a number of possible names. Perhaps the most useful terminology is *scalpers, day traders and position traders*. Scalpers attempt to profit from the bid/offer spread, sometimes called *the edge*, in effect playing the role of market maker. The scalper attempts to predict short-run, intra day price movements. While scalpers typically hold positions for as short a period as possible, depending on the level of market activity scalpers and other speculators will take larger intra day positions, holding them for a longer period. The skilled floor trader will be able to identify situations that arise both in the regular course of business, e.g., a large hedging order needs

filling, and due to special circumstances, e.g., a rush of orders from an unexpected government report. These speculators are essential to the liquidity of futures markets.[15] Scalpers and day traders add substantially to the volume of trade, without having to post any margin, because trades are closed out prior to the last trade of the day. As a consequence, these traders do have any direct impact on open interest.

Futures exchange market activity is more difficult to measure than, say, for stock exchanges, where transactions volume is sufficient. In order to provide a measure of trading activity that is independent of the activities of the market makers and day traders, the notion of *open interest* is used which indicates the number of contracts outstanding at the beginning of the trading day. Open interest represents the number of contracts that are being carried from one trading day to another. Because every futures contract that is created requires a long and a short position, open interest can only increase if both a new long and a new short position is created. If a new long (short) position is created with a short (long) position that is closing out a previous position, open interest is unchanged. If both long and short positions are being closed out, open interest will decrease. This process is illustrated in Table 1.1. Because scalpers and day traders do not usually carry positions over night, the activities of these traders only affect volume, not open interest. As a result, a more accurate indication of the participation of (position trader and other off-exchange) speculative activity would be to measure, say, the ratio of maximum open interest to contract deliveries.

The Futures Contract

To facilitate exchange trading, futures contracts possess a number of features; most important for present purposes are the features of ***standardization and marking to market.*** The essential elements of standardization have been recognized and emphasized for years. For example, Fowke (1957) identifies the essential elements involved in futures contract standardization:

> The elements of standardization provided by the futures contract and by the rules and regulations of the exchange governing such contracts may be identified under the following headings: (1) the commodity, (2) the quantity, (3) the range of quality within which delivery is permissible, (4) the month of delivery, (5) the nature of the option concerning specific grade and date of delivery, that is, whether it is a seller's or a buyer's option, and, finally, (7) the price.

Standardization is achieved by making each contract for a given commodity identical to all other contracts except for price and the delivery month-- which is fixed according to a bi-monthly or quarterly schedule.[16] As a result, futures are a basis contract, with the actual price being for the commodity that is cheapest to deliver under the terms of the contract.

In order to be a viable instrument, futures contracts written for deliverable spot commodities require adequate supply of the commodity for delivery purposes. In order to ensure adequate supply, many contracts permit substantial variation in the commodity grade delivered or in the delivery location. The option for selecting the specific grade or delivery location is a ***seller's option***. As a result, contracts that permit a range of deliverables will have one specific grade that is *cheapest to deliver*. Some contracts, such as the Tbond contract, have a number of different delivery options available (see Appendix II). Forward contracts differ widely in the degree of standardization. For example, forwards for financial commodities such as the major currencies or Government of Canada securities are de facto standardized,[17] indicating that the benefits associated with standardization are also important for some types of forward trading. In the absence of a clearinghouse, forward markets capture default risk efficiencies excluding many of the potential, largely speculative participants who require standardization in order to participate effectively in the market. As with futures, standardization is an important support to market liquidity.

In addition to standardization, forwards and futures also differ in how changes in the value of the contract over time are handled. For futures, daily settlement, also known as *marking to market*, is required. In effect, a new futures contract is written at the start of every trading day with all gains or losses settled through a *margin* account at the end of trading for that day. This method of accounting also requires the posting of a "good faith" initial margin deposit combined with an understanding that, should the value in the account fall below a maintenance

margin amount, funds will be transferred into the account to prevent the contract from being closed out. On the other hand, settlement on forward contracts occurs by delivery of the commodity at the maturity of the contract or, in certain cases, a cash settlement at maturity based on the difference between the forward price that was agreed upon and the prevailing spot price for the relevant commodity specification. Hence, futures have cash flow implications during the life of the contract while forwards do not.

Numerous studies on the difference between futures and forwards are available, e.g., Cox, Ingersoll and Ross (1981), Richard and Sundaresan (1981). Considerable interest has centered on the marking to market feature of futures. Assuming that the cost of commissions, good faith deposit, etc. are ignored then the value of both futures and forwards contracts can be taken to be equal to zero upon creation. (This does mean that the price of the contracts is zero.) This follows from the derivative nature of contracting for future delivery; because no actual investment of funds is required to establish a position, only future changes in the value of the commodity will produce value. Absent marking-to-market, forwards involve settlement requiring one lump payment or delivery at maturity. In comparison, due to marking to market, futures contracts will involve a stream of payments over time. As a consequence, the value of the futures over its life will depend not only on the behavior of the price of the cash commodity but also on the covariance of the cash price with interest rates over the time path. In addition to theoretical analysis of this point, there are also numerous empirical papers which, for identical or nearly identical deliverable commodities, compare futures and forward price behavior. While, in some cases, there are some minor differences that cannot be explained by transactions costs, on balance futures and forward prices for the same commodity are more-or-less identical.

Due to the nature of futures and forwards, it is understandable that the mechanisms for delivery will also differ. Because forwards are usually initiated with the object of taking delivery in mind, participants in forward markets will invariably be capable of completing a delivery. This is definitely not the case in futures markets where the demands of delivery are compounded by the standardized grades and delivery locations which are required. As a result of the considerable cost in establishing and maintaining an operation capable of making deliveries, the futures delivery process is dominated by a relatively small number of specialist firms capable of capturing the sometimes significant profit opportunities that emerge during the delivery period. These firms are also often clearinghouse members. Because much of what follows will not be concerned with so-called delivery arbitrage activity, it will be convenient to assume that both futures and forward contracts obey the condition that the price of the contract on the delivery date is equal to the cash price of the deliverable commodity even though, in certain practical situations, this may not be precisely correct.

Margins[18]

An essential feature of the futures contract is the marking-to-market process inherent in margin system. The amount of margin deposited represents a "good faith deposit" that ensures a party to the futures contract meets his obligations. The margin deposit is *not* an investment in a commodity position. All that has been transacted is an agreement to buy or sell a given amount of the commodity at a future date for a pre-specified price. This is decidedly different than margins for equity where the deposit is in partial payment for securities purchased in the cash market. Margin deposits for futures are only required to ensure sanctity of the contract in the face of fluctuations in its value. Given this, it is understandable that there are different types of margin requirements depending on the individual's position in the exchange process. The three general types of margin requirements are: 1) clearinghouse margins; 2) exchange (but not clearinghouse) member margins; and, 3) commission house margins. Specific details depend on the exchange and commodities involved. Acceptable collateral for deposit in a margin account also differs in much the same way.

*Table 1.1** **Open Interest, Futures Trading, and the Associated Cash Flows**

Assumptions: Contract is for 5,000 units and initial margin deposit is $750 per contract, with a maintenance margin of $500.

Date	Trans. #	Buyer	Seller	Volume	Contrcts O/S	Open Interest	Price
1/1	1	A	B	1	1	0	3.00
	2	C	A	2	1		3.03
	3	C	D	3	2		2.96
	4	B	C	4	1		2.96
	5	D	C	5	0		3.00
	6	E	F	10	5		3.10
	7	G	H	15	10		3.10
(Close)	8	F	E	18	7		3.00
2/1						7	

Profit (Marking to Market) from Trading on 1/1:

A	B	C	D	E	F	G	H
150	-200	-150	200	-2500	2500	-2500	2500

Margin Account and Marking to Market Cash Flow for 1/1

A	B	C	D	E	F	G	H
750	750	750	750	3750	3750	3750	3750
+150	+200	-150	-200	-2500	2500	-2500	+2500
-900	-950	-600	-550				

Line 1: Initial Margin Payment Credit (Receivable to Clearinghouse)
Line 2: Marking to Market for 1/1
Line 3: Adjustment to Margin Balance from Closing Out the Position

Margin Balance at Start of Trading 2/1

A	B	C	D	E	F	G	H
0	0	0	0	1250	6250	1250*	6250

*G is required to deposit and additional $1250 in order to satisfy the maintenance margin level of (500)(5)=$2500, otherwise the trade will be closed out at the open.

G and H have 5 contracts O/S
E and F have 2 contracts O/S Open Interest on 2/1 = 7 contracts

In practice, clearinghouse members will typically receive the lowest margin requirements. Even though clearinghouse and other exchange members have the same stated requirements for each individual trading ticket

generated, on almost all exchanges margin is assessed on a clearing member's net position, calculated by netting the number of short and long positions for a given commodity delivery month on the clearing member's books at the end of trading. While larger than effective clearinghouse margins, exchange member margins are small relative to the value of the underlying physical commodity being traded. For example, on 31/8/01, the gold contract traded on the Commodity Exchange (Comex) in New York had exchange member and clearing member margins of $1000, for both initial and maintenance margins. Non-member margins were $1350 for initial and $1000 for maintenance margin. Margins are also given for calendar spreads, specific inter-commodity spreads and written options. Table 2.2 provides a summary list of exchange member margins for most of the important contracts as of 1/6/90. Depending on the clearing member that is handling the trader's account, up to 25% of this margin must be met in cash. The remaining margin can be satisfied with a wide variety of acceptable collateral: warehouse receipts (with a "haircut" or markup); government securities; corporate and municipal bonds; equities; and, in the case of clearinghouse members, letters of credit. For one-to-one gold spreads, there is a decidedly lower, if somewhat more complicated, set of requirements. Specifically, there is a flat rate of $120 per spread up to 100 spreads and $200 per spread for all spreads above 100. There is also a per spread rate of $40 plus $20 per month of spread leg. Of these, the cheapest method is selected, depending on the type of trade involved.[19]

MARGINS - COMMODITY FUTURES

June 1, 1990
Change from Prior List

COMMODITY	LONG OR SHORT INITIAL	LONG OR SHORT MAINTENANCE	SPREADS INITIAL	SPREADS MAINTEN.
GRAINS				
Corn (5M BU)	$ 405	300	$ 150	$ 100
Oats (5M BU)	308	200	100	100
Soybeans (5M BU)	1,350	1000	500	400
Soybean Meal (100 Tons)	675	500	400	400
Soybean Oil (60M Lbs)	675	500	500	400
Wheat (5M BU)	405	300	300	300
LIVESTOCK AND PRODUCTS				
Bellies (38M Lbs)	1,000	750	100	400
Feeder Cattle (44M Lbs)	800	750	400	300
Hogs (30M Lbs)	600	500	300	300
Live Cattle (40M Lbs)	800	750	100	100
NEW YORK MARKETS				
Cocoa (10 Tons)	1,400	1,100	300	225
Coffee (37.5M Lbs) Non-spot	2,250	1,688	750	750
Cotton (50M Lbs)	1,500	1,125	500	375
Orange Juice (15M Lbs)	3,000	2,250	750	500
Sugar (112M Lbs)	2,000	1,500	500	355
Sugar Spot 2 months	3,000	2,250		
METALS				
Copper (25M Lbs)	2,000	1,500	500	200
Gold (100 Oz)	1,300	975	120	90
Kilo Gold (32.15 Oz.)	400	300		
Palladium (100 Oz)($2,000 spot MO)	1,500	1,100	150	105
Platinum (50 Oz.)	1,600	1,200	200	140
Silver (5M Oz.)	1,300	975	120	90
Silver (1M Oz.)	300	200		
FINANCIAL				
Major Market Index	20,000	15,000	500	500
New York Stock Index	8,300	3,000	350	250
S&P 500 Stock Index	20,000	15,000	400	200
Value Line stock Index	7,500	5,000	1,500	1,200
Eurodollars	1,400	1,000	700	500
T-Bills ($1,000,000)	675	500	500	500
T-Bonds ($100,000)	2,700	2,000	200	200
CRB Index (500 Times Index)	2,000	1,500		
ENERGY FUTURES				
Crude Oil (1,000 Barrels)(Non - Spot)	2,500	1,825	300	225
Heating Oil (42M Gal.) Non Spot	2,500	1,875	200	140
Unleaded GAS (42M Gal.) Non Spot	2,500	1,875	200	140
Lumber (150M BD Ft)	900	700	300	200
CURRENCIES				
British Pound	2,700	2,100	300	200
Canadian Dollar	800	625	300	200
Deutsche Mark	1,788	1,300	300	200
Japanese Yen	2,750	2,500	2,500	200
Swiss Franc	2,700	1,825	500	300
U.S. Dollar Index	1,000	750		

OTE: These amounts are frequently changed. This list is only a guide to levels of margins required, and is subject to change without prior notice. Margin requirements for spot months are often higher than the above amounts.

The highest margin requirements usually have to be satisfied by customers of commission houses who are not members of the exchange, and have to use an exchange member to execute their trades. The actual margins vary from customer to customer and from commission house to commission house. For large active accounts, margin can typically be met with interest bearing collateral such as treasury bills. Alternatively, margin balances may be deposited on behalf of the client in the dealer's money market account. Small, low activity accounts may be required to deposit cash. For example, to trade the Comex gold contract, small commission house accounts may be required to by put up $3000-$5000 cash in a money market account or deposit a $10,000 security such as a treasury bill and meet cash flow requirements on an ongoing basis. To understand the precise nature of the cash flows involved requires a distinction to be made between the two types of margin requirements: ***initial margin***; and, ***maintenance margin***. Up to this point, the discussion has implicitly focused on initial margin: the dollar value of the acceptable collateral that must be deposited in the margin account in order for the contract

to be created. In turn, maintenance margin is the dollar value of the acceptable collateral that must be in the margin account at the beginning of a trading day. To avoid undue administrative hassles, this margin level is set at some fraction-- usually between 60 and 85%-- of the initial margin level.

Even though the implications of margin buying are well-known, it is useful to review the implications of the leverage that futures trading provides. If the margin deposit is crudely treated as funds invested in the position, the leverage provided by futures is significantly greater than that provided by equities. To see this, assume that initial margin on a one-lot (or one contract) customer trade of the 100 oz. COMEX gold contract has been assessed at $4000 with maintenance margin at $3000. If the price of August gold is taken to be, say, $400, then the underlying value of the gold being purchased is $40,000. If the trader goes long August gold at $400 and, in the next trading day, the price falls to $385, then the value of the position has fallen to $38,500-- a loss of $1500. At the end of trading, this loss is debited from the margin account leaving $2500, a value that is below the maintenance margin level. As this point, the commission house broker will call the customer with a "margin call", notifying the customer that if the margin account is not brought up above the maintenance margin level, the contract will be closed out. The payment that must be made to bring the margin account to an appropriate level is known as ***variation margin***. At this point the customer must assess his position. A $15 move in the price of gold over one trading period has resulted in a 37.5% loss, i.e., ($1500)/$4000, in the value of the funds on margin deposit. Variation margin cash flows played a key role in a number of the recent debacles examined in Sec. 1.2, e.g., for Metallgesellschaft and the Hunt brothers.

OTC vs. Exchange Trading: Policy Issues

The strategic direction of derivative security regulation, both in the US and internationally, is almost incoherent. The difficulties associated with bringing greater clarity and direction are considerable. There are numerous unresolved theoretical issues that need to be identified and analyzed before practical implications can be drawn. One of the key theoretical issues to be addressed concerns the method of contracting, e.g., Abken (1994). What is the best mix of OTC vs. exchange trading for a particular commodity? It is possible to argue that OTC contracting needs to be legislatively discouraged in order to direct liquidity to futures and options exchanges where activity can be more closely monitored and the gains of concentrated liquidity and mark to market accounting can be captured. Others could argue that futures exchanges are little more than vestiges of an old transactions technology, extracting rents from a legislatively sanctioned monopoly.

The incoherence of strategic direction is apparent in the layering of regulation associated with the different methods of contracting. The resulting competition among the various regulatory bodies almost certainly imposes real economic costs. For example, a US financial firm has a range of regulators concerned with monitoring and regulating derivative trading activity, from the CFTC to the Board of Governors to the SEC. There are also an array of less formal regulators, including the BIS, as well as the exchanges and trading associations.[20] Each of these regulatory entities requires resources, derived from the firm being monitored, in order to verify that there is compliance with the rules. Yet, a fragmented regulatory structure has only limited resources to dedicate for each individual regulator to verify that firms actually are in compliance with the particular part of the overall rules which that regulator is responsible for monitoring. All this is complicated by an extremely fluid market situation where new products and ideas are being introduced at a rapid pace.

To see the quandaries arising from this layering of regulation consider the case of Barings Bank. This firm was an English merchant banking group. Though Barings had an impressive pedigree, in England the bank was mid-sized and considered relatively conservative. Faced with the competitive pressures surrounding the Big Bang in London's financial markets in 1986, the bank's strategy was to expand activities offshore in Asia, where Barings had a considerable market presence, with the Barings Securities affiliate being the top Western securities firm in Japan during the incredible runup in the Japanese equity market during the 1980's. Barings was acknowledged to have special status on a number of Asian exchanges, due to the sizable amount of business that Barings transacted. Barings was a clearing member of a number of Asian futures and options exchanges. Which regulatory body or individual was ultimately responsible for monitoring the activities that led to the bank's collapse? Possible candidates include: English banking regulators, Simex, the Monetary Authority of Singapore,

and the internal banking auditors.

The explosion in derivatives trading has exhibited a number of trends toward increased trade using OTC contracting methods. These trends include: the migration to international markets, the increasing growth of OTC derivative trading relative to exchange trading, and the emergence of sophisticated risk management products All this has been amplified by the revolution in information technology. Yet little seems to have changed since Abken (1994, p.19) summarized the regulatory status quo on OTC contracting

> The central policy issue in derivatives regulation is whether further federal regulation is appropriate or whether the existing structure can oversee these markets. The six federal banking and securities regulators believe that the current regulatory structure is capable of supervising the OTC derivatives markets. Policy makers need to be cautious about changing regulatory structures because such alterations often bring unintended and unforeseen consequences.

As it turns out, regulatory denial conveniently sustains a status quo solution. It seems as though the desired regulatory outcome is whether the current regulatory structure is sufficient to prevent severe market disruptions. For pragmatic reasons, public deliberations about the optimal regulatory structure appear to be out of order.

Central issues in the debate over appropriate regulatory structure are not new. Increased regulation aimed at channeling market activity into one venue or the other runs the risk of imposing costs greater than the associated benefits, running the risk of inhibiting the innovation and development of new products and practices. A guiding assumption underlying the current regulatory structure seems to be: the self-interest of market participants, combined with benevolent regulatory oversight, is sufficient to contain the potential difficulties associated with the explosion in OTC derivatives trading. Consistent with this approach and spurred on by the LTCM collapse, major OTC market participants have recently banded together into self-regulatory groups motivated to develop rules-of-the-game aimed at heading off the potential interference of government regulators.

Through all this, there is an inherent tension between two views: one view strongly promotes the expanded use of OTC derivatives to achieve optimal risk management outcomes for firms operating in increasingly volatile and globalized markets. The OTC markets provide the flexibility and convenience needed to sustain progress in development of complicated risk management products. Limiting access to market makers and key players in the cash markets is an effective method of controlling both credit risk and system wide leveraging. The opposing view is seriously concerned about the increase in system-wide leveraging brought on by the increased use of derivatives. This increase in leverage is compounded by the increasing use of OTC products, that are largely unregulated and for which there is only a patchwork of reporting standards. Channeling derivative activities through exchanges would make all such activities more transparent. In addition, concentrating trading activity at specific exchange sites would enhance overall market liquidity, permitting a wider array of deferred delivery dates. Product innovation would not be stifled but, rather, would be designed to facilitate exchange trading.

To adherents of the first view, lack of regulatory oversight has hidden benefits associated with the reduced costs of making transactions and ability to tailor contracts to the specific needs of market participants. To adherents of the second view, exchange trading forces marking to market, leading to practical market value accounting and a system wide failsafe mechanism to prevent excessive leveraging by individual market participants. The arguments supporting either side are persuasive, making it difficult to formulate and implement policy changes. Whether such policy changes are needed at all is debatable. Yet, warning signals abound, from the crash of 1987 to the collapse of LTCM, to the high-tech stock bubble of 1999-2000, certain systemic and unexplained bouts of market volatility occur that seem out of proportion to the underlying fundamentals. As George Soros observed, this volatility could be exacerbated by the growth of financially engineered products that has increased the usage of dynamic delta hedging strategies that tend to amplify market movements.

1.2 History of Derivatives

Due to a significant number of high profile and expensive losses, trading of derivative securities attracted considerable attention during the 1990s (see Figure 1.2). The list of companies involved is striking, as is the size of the losses. From Barings Bank to Gibson's Greetings to Sumitomo Corporation, from Long Term Capital Management to Proctor and Gamble to Orange County, losses ranging from hundreds of millions to billions of dollars have been reported. Such events induce a state of uneasiness among policy makers, corporate managers, investment professionals, even academics. While it is tempting to draw glib generalizations about the apparent misunderstanding of risk management practices, closer inspection reveals a decidedly more complicated battlefield. In some cases, the relevant lessons that could be learned cannot be convincingly determined, due to the veil of corporate secrecy surrounding specific events. In cases where the activities and motivations of the participants

Figure 1.2 **Some Recent Corporate Losses arising from Derivatives Trading**

Time	***Company***	***Losses***	***Transactions***
1979	Minpeco S.A., Peru	$100 million	silver futures
1980	The Hunt Bros. Cos.	$1.1 billion (est.)	silver futures
1988	Hammersmith and Fulham	£500 million	swaps
1993	Showa Shell Sheikyu	¥165 billion	currency options and forwards
1993	Metallgesellschaft	$1.3 billion	energy derivatives
1994	Codelco, Chile	$200 million	Copper futures
1994	Kashima Oil	$1.5 billion	currency derivatives
1994	Proctor and Gamble	$157 million	leveraged swaps
1994	Piper Jaffrey Cos.	$700 million	mortgage derivatives
1994	Sears	$237 million	swaps
1994	Orange County, CA	$1.8 billion	reverse repos
1995	Barings Bank PLC	£900 million	stock index futures and options
1996	Sumitomo Corporation	$1.8 billion	copper futures
1998	Yokult Honsha, Japan	$523 million	stock index futures and options
1998	Long Term Capital Mgmt.	$4.4 billion	numerous positions in different mkts.
1999	Ashanti, Ghana	$570 million	gold exotic derivatives

Source: Chance (1998), Jorion (2000), Williams (1995), McCarthy (2000).

can be precisely determined, it seems that different debacles raise different types of quandaries. Upon closer inspection, it seems that some so-called debacles were not debacles at all.[21]

Large losses associated with derivative security trading are not unique to the 1990s. Even though the largest losses in absolute terms have happened more recently, this is consistent with the increasing use, availability and complexity of derivative products. This has produced an evolution in the types of problems that are arising. Since the early 1970s, there has been a progressive relaxation in the US of a range of restrictions on derivative security trading, many of which had originated in the anti-speculation atmosphere of the post-Depression era. In conjunction with this relaxation, there has been an almost bewildering expansion in the variety of derivative securities being traded, both on the OTC markets and on the futures and options exchanges. From financial commodities to energy to equities to currencies, it is difficult to keep track of the rapid progress that has been and is being made in the development and application of derivative securities.

This modern Renaissance of derivative securities trading is somewhat anomalous. Historically, derivative

security trading has been subject to prohibitions and restrictions, aimed largely at preventing the abuses that are at the root of many past derivative debacles. Such abuses have been present almost from the beginning of bourse trading in forward and option contracts in the early 16th century.[22] The early emergence of exchange trading is significant because the contracting process was securitized and, to a certain extent, transferable. This permitted the introduction of speculative trading to a degree that had not previously been possible. In turn, speculators enhanced market liquidity, facilitating the exchange process for a wide range of commodities. The importance of speculators in providing market liquidity has become even more important in modern derivative markets. However, the enhanced ability to use derivatives has meant that increased speculation in derivatives has been accompanied by ongoing attempts to use derivatives to manipulate markets.

Forward contracting, the process of setting a price today for a delivery that is to take place in the future, is inherent in the exchange process and can be traced to ancient times. Due to the difficulties of transport and communications, some form of forward contracting was essential to early markets. While there was some haphazard speculations, those involved in the process were usually direct producers and consumers of the goods being traded. Lack of transferability meant that speculations often involved delivery of goods. Aided by the enhanced liquidity of bourse trading, derivative security trading reached an almost modern state of development by the 17th century, when the Amsterdam bourse featured both forward and option contracts on commodities that included foreign stocks and shares. Gains and losses on these contracts could be settled by the payment of differences at a quarterly *rescontre*, much like the modern clearinghouse doing daily marking to market.

With the growth and accessibility of derivative security trading came attempts at manipulation. An important early manipulation was a "bear raid" conducted around 1608 by Isaac le Maire and a group of eight other traders on the Amsterdam bourse (van Dillen 1930, 1935). The bear ring led by le Maire used short forward contracts as part of a larger strategy to depress the price of Dutch East India Company (VOC) shares. The trading activities of le Maire's group were apparently successful in holding down the price of VOC shares. The potential impact of the bear ring on share prices attracted the attention of the VOC Directors and other politically connected investors. The result was a period of political debate that included some of the first writings on stock market structure and performance. The debate ended in February 1610 with the passing of the first substantive legislation designed to limit stock market manipulation. Selling of shares *in blanco*, also known as the ‘windhandel’ or ‘wind trade’, was prohibited. More precisely, short selling of securities, defined to mean the sale of securities not owned by the seller, was banned. This ban covered both cash sales and forward sales. In addition, it was required that shares which were sold had to be transferred no later than one month after the transaction. Private sanctions included the expulsion of le Maire as a VOC shareholder.

Unlike modern securities laws, many earlier prohibitions imposed on derivative security trading activities did not have criminal sanctions. Rather, edicts such as the 1610 prohibition on short selling removed the protection of the courts for the purpose of enforcing contracts. The inability of the edict to control the ‘wind trade’ speculation in shares was evident with the establishment of the Dutch West India Company in 1621, when shares were sold on a ‘when-issued’ basis, prior to the initial subscription. This prompted the issuance of another edict reinforcing the ban on selling shares not owned by the seller. Any trader seeking to repudiate a short sale could find refuge in the courts. Similar edicts in 1630 and 1636, during the time Frederick Henry held the office of Dutch Stadholder (Prime Minister), led to the use of the term ‘appeal to Frederick’ to refer to a trader invoking the protection of the prohibition on short sales to avert payment on a losing position.

Glossary of Some Early Security Market Terms

'To arrive' contracts: the development of exchange trading for future delivery in 16th century Antwerp began with 'to arrive' contracts that, typically, involved goods in transit and required cash settlement upon arrival of the goods.

Puts and Refusals: Common usage for options, starting in late 17th century England, e.g., Houghton (1694). Barnard's Act (1733) makes specific reference to puts and refusals when referring to option contracts. A refusal was a call option. Reference to option contracts as ***privileges***, common in mid-19th century America, was not common in 18th century English security markets.

A deal for 'ready money' or 'money': a transaction for immediate delivery, to be settled within no less than two days, e.g., Mortimer (1761). Also called a deal for **cash**.

A deal for 'time': a transaction for future settlement, effectively a forward contract in the security. Where a *rescontre* settlement system was in place, the transaction would typically have the next *rescontre* as the settlement date, e.g., Mortimer (1761). Time contracts required delivery at a more deferred delivery date than to arrive contracts, e.g., Hieronymous (1971, p.74). Reference to 'time bargains' was common in the 17th and 18th century, though this term could be used in a more general sense to describe trading in both option and forward contracts.

Stocks and Shares: Though this term could apply to securities listed as stocks, that appeared with price quotes in the public newspapers and on brokers' lists, this general category included the government funds, joint stock of public companies, and the various debt securities issued by the public companies (Mortimer 1761). Usage of the term evolved during the 18th century. Houghton (1694) still uses the European term '*Actions*', a term that for Houghton lumps joint stocks and lottery tickets together with a range of commodities such as copper, coal, lead and saltpetre. Following Mortimer, 'shares' can refer to either 'stocks of the public companies of England' or to shares in government debt issues, such as 'shares in annuities'. This usage was still conventional in the late 19th century, e.g., Castelli (1877). This interpretation of 'shares' differs from Baskin (1988, p.207, n.29).

Heavy horse and Light horse: Subscriptions to 18th century English government debt issues could be paid by instalment, with the first deposit generally being 15% (Mortimer 1761, p.137), with further payments of 10 or 15% being required each month until the balance was paid. The full amount of the subscription could be paid in advance, with credit being given for the associated interest. During the period in which subscriptions were being paid, secondary market trading had to account for the unpaid balances on a specific security. Heavy horse referred to a security that was fully paid, while light horse had a balance remaining to be paid. Stockjobbers preferred to deal in the light horse, which required a smaller invested capital for the same notional principal, 'they have an opportunity for sporting with, and gaining profit on, a nominal thousand, for the same money, that it would cost to buy a hundred, heavy' (Mortimer 1761, p.138).

Around the time of the Glorious Revolution (1688), active trading in derivative securities appeared in London. The abuses of forward and options contracting soon became associated with stockjobbing. Almost from the beginning of English stock trading, attempts were made to severely restrict stockjobbing. Following the first English stock market debacle in the mid-1690s, the first important piece of English legislation was passed, the 1697 Act 'To Restrain the number and ill Practice of Brokers and Stockjobbers'. From the preamble to the Act (Morgan and Thomas 1962, p.23):

> whereas divers Brokers and Stock-Jobbers, or pretended Brokers, have lately set up and on most unjust Practices and Designs, in Selling and Discounting of Talleys, Bank Stock, Bank Bills, Shares and Interests in Joint Stocks, and other Matters and Things, and have, and do, unlawfully Combined and Confederated themselves together, to Raise or fall from time to time the Value of such Talleys, Bank Stock, and Bank Bills, as may be most Convenient for their own private Interest and Advantage: which is a very great abuse of the said Ancient Trade and Imployment, and is extremely prejudicial to the Public Credit of this Kingdom and to the Trade and Commerce thereof, and if not timely prevented, may Ruin the Credit of the Nation, and enndanger the Government itself.

Stockjobbers were seen as interlopers in the legitimate trade of brokerage. As a consequence, the Act specifically restricted the trade of brokerage to those brokers licensed by the City of London. The Act then limits the number of licensed brokers to one hundred.

Options were a particularly onerous aspect of the early stock trading in London. By the 1690's, an organized options market had emerged in London in support of the increasing number of joint stock issues.[23] Morgan and Thomas (1962, p.24) observe:

> The complaints with which the (1697) Act was designed to deal cover three main points: promoters of companies were encouraged to sell their rights at a profit to inexperienced persons, so that the management of companies suffered, and they failed to fulfil the functions for which they had been granted privileges. Dealers "confederated themselves together" to raise or lower prices to their own profit and the injury of their clients. And options dealings were abused and became a means of fraud.

There was considerable disagreement in the broker community about whether options transactions were reputable. While potentially useful in some trading contexts, reputable brokers felt that options contributed to the speculative excesses common in the early financial markets. While trading in options and time bargains did contribute to the most important English financial collapse of the 18th C., the South Sea Bubble of 1720, this event was due more to the cash market manipulations of "John Blunt and his friends" (Morgan and Thomas, ch. 2). In any event, dealing in time bargains and, especially, options were singled out as practices that were central to "the infamous practice of stock-jobbing". In 1721, legislation aimed at preventing stock-jobbing passed the Commons but was not able to pass the Lords. It was not until 1733 that Sir John Barnard was able to successfully introduce a bill under the title: "An Act to prevent the infamous Practice of Stock-jobbing." This Act is generally referred to as Barnard's Act.

The abuses associated with stock-jobbing were due, at least partly, to the standard market practice of a significant settlement lag for some purchases of joint stock.[24] In effect, stock was sold but the short could have a considerable lead time to deliver the security. The separation of pricing from settlement and delivery leads to the immediate creation of time contracts or "time bargains". Similar settlement lags also applied to new stock issues. Initial trading involved establishing a price and paying a small deposit against the future delivery of stock. In cases where the selling broker did have possession of the underlying stock when the transaction was initiated, there was little or no speculative element in the time bargain. However, this was not the case when the seller did not possess the stock. In addition, the purchaser did not usually have to take possession of the stock at delivery but, rather, could settle the difference between the agreed selling price and the stock price on the delivery date.

Barnard's Act (1733) was designed to regulate those features of stock dealings associated with excessive speculation. The main provision of the Act was that:

> All contracts or agreements whatsoever by or between any person or persons whatsoever, upon which any premium or consideration in the nature of a premium shall be given or paid for liberty to put upon or deliver, receive, accept or refuse any public or joint-stock, or other public securities whatsoever, or any part, share or interest therein, and also all wagers and contracts in the nature of wagers, and all contracts in the nature of puts or refusals, relating to the then present or future price or value of any stock or securities, as aforesaid, shall be null and void.

There was a penalty of £500 on any person, including brokers, who undertook any such bargain. All bargains were to be "specifically performed and executed", stock being actually delivered and cash "actually and really given and paid", and anyone settling a contract by paying or receiving differences was liable to a £100 penalty (Morgan and Thomas, p.62). It was further provided that "whereas it is a frequent and mischievous practice for persons to sell and dispose of stocks and securities of which they are not possessed", anyone so doing should incur a penalty of £500. However, despite the Act making options trading illegal, options trading continued to the point where, in 1820, a controversy over the trading of stock options nearly precipitated a split in the London Stock Exchange. A few members of the Exchange circulated a petition discouraging options trading. The petition passed, and members formally agreed to discourage options trading. However, when an 1823 committee of the Exchange followed up on this with a proposal to implement a rule forbidding Exchange members from dealing in options

(that was already illegal under Barnard's Act), a substantial number of members voted against. A dissident group even began raising funds for a new exchange building. In the end, the trading ban rule was rejected because options trading was a significant source of profits for numerous Exchange members who did not want to see that business lost to outsiders.

The Development of US Derivative Markets[25]

The use of contracts involving the purchase or sale of a commodity for future delivery was, almost certainly, carried over by the early European colonizers of North America. To arrive contracts, time bargains and options were all in use by the end of the 18th century. During the 19th century, derivative security trading experienced both revolution and counter-revolution. The revolution can be attributed to the subtle impact that American culture had on specific business practices. Writing in 1896, Emery (1896, p.7) captures the main theme: "The American people are regarded by foreigners as the greatest of all speculators." This drive to speculate facilitated American innovations in derivative securities. "It was not until the (19th) century ... that the system (of dealings for time) became widely developed and not until the great expansion of foreign trade in the last fifty years that it became of great importance."

An important theme in progress of derivative security trading during the 19th century is the enhanced participation of speculators. Among other benefits, enhanced speculation increases market liquidity. Yet, speculative activity has decided disadvantages, such as the increased incentive and ability to manipulate markets. This and other pressures ultimately led to the introduction of futures contracts. Though there was time dealings being conducted in a number of centres throughout the 19th century, the beginning of trade in futures contracts is usually traced to mid-19th century Chicago, a city that was first incorporated as a village in 1833 growing into a city of 4,107 by 1837. In order to promote commerce, the Board of Trade of the City of Chicago was founded on April 3, 1848 with 82 members. This event, in itself, was not particularly noteworthy. The usefulness of boards of trade in promoting had been recognized for quite some time. For example, around 1700 John Law of the infamous Mississipi scheme promoted the creation of a board of trade for the city of Edinburgh (Mackay 1852, p.4).

The Chicago Board of Trade initially served as a marketplace for members of the grain trade. A system of wheat standards was developed together with a system of inspecting and weighing grain. In 1859, the Board of Trade was authorized by Illinois state to engage in the measuring, weighing and inspecting of grain, effectively corn and wheat. As Hieronymous (1977, p.73) observes: "The development of quality standards and an inspection process and the substitution of weighing for the measurement of grain greatly facilitated trade. The substitution of weight for volume measures made the development of grain handling machinery possible. Increase in physical efficiency was important in the development of Chicago as a great grain terminal." These developments facilitated the handling of grain in bulk, through the use of grain elevators. This permitted interchangeable warehouse receipts to be introduced, instead of having to deal in unstandardized, specific lots.

The grain trade of that time typically involved merchants at various points along major waterways such as the Illinois-Michigan canal purchasing grain from farmers that was then held in storage, often from fall or winter into spring. In this operation, the merchants' capital investment involved: paying the farmers for their crops at delivery; costs of building and maintaining storage facilities; and, providing funds for shipment of grain when required. In order to avoid the risk of price fluctuation and to satisfy bankers, merchants started to go to Chicago and make contracts for future, spring delivery of grain, at prices which were determined that day. The first such "time contract" was made on March 13, 1851 calling for delivery of 3000 bushels of corn in June at one cent below the March 13 cash price. The contracts called for delivery of a standardized grade at a later delivery date. Similar contracts for wheat appeared in 1852. However, while there were similarities to modern futures contracts, other terms and conditions were specific to the original parties to the transaction making the time contract similar to a forward transaction.

The development of futures markets in Chicago was significant because, in the years immediately following the introduction of time contracts, individuals not connected to the grain trade became interested in taking positions. The resulting contracts often changed hands numerous times before being purchased by a market participant

actually interested in taking delivery of the grain. This marks the introduction of a fundamental feature of futures markets, the essential participation of speculators not directly concerned with the ownership of the underlying commodity. Exchange trading and purely speculative participants were characteristics not associated with trading in 'to arrive' contracts and 'privileges' that had characterized American commodities trading previously (Williams 1982). This trade was concentrated primarily in flour and, in keeping with use of such contracts in Liverpool, in cotton. To arrive contracts in wheat, corn, rye and pickled hams were also conducted with activity centring on New York. In contrast to time bargains, to arrive contracts typically featured short delivery dates and the expectation that delivery would be completed. While there is some evidence of limited speculative dealings in these 'to arrive' contracts and 'privileges' associated with the flour default of May 1847, participants to these transactions usually involved merchants directly in the commodity business.

The increasing interest in time contracts led the Board of Trade to introduce a number of resolutions to curb abuses. Many of the abuses were consistent with speculative participation and longer delivery dates. "It seems that when time for settlement arrived some of the contracting parties were difficult to locate" (Hieronymous 1977, p.76) Out of this process came the beginnings of formal trading rules for futures contracts. In 1863, the Board adopted a rule that suspended the membership of anyone failing to comply with a contract, either written or verbal. On Oct. 13, 1865 the General Rules of the Board of Trade explicitly acknowledged futures trading and adopted rules that included all the essential elements of a modern futures contract including: standardized contract terms; restriction of futures contract trading to exchange members; margin deposits to guarantee performance; and, standardized delivery procedures. Prior to this date, individual traders had been responsible for establishment and enforcement of the terms of the contract. This development followed a similar move in 1864 by the Liverpool Cotton Brokers' Association introducing formal regulations for 'to arrive' contracts in cotton.

Trade in futures and forward contracts has progressed dramatically since the first corn futures trade on the Chicago Board of Trade in 1865. Many other futures exchanges emerged in the period between the Civil War and World War I. In 1874, the Chicago Produce Exchange was formed by dealers trading in produce of various kinds. In 1898, a subgroup of the produce exchange known as the Produce Exchange Butter and Egg Board withdrew from the Produce Exchange and formed the Chicago Butter and Egg Board. This group is of present interest because it had established an active trade in time contracts for eggs, even though such trade was only a small proportion of the Butter and Egg Board's activity. When margin rules for time contracts were finally written in 1911 there was considerable controversy among the members. Finally, in 1919, a complete set of futures trading rules were written and the mandate of the Butter and Egg Board was changed to include futures trading. The end product was the emergence of the Chicago Mercantile Exchange, which started trading butter and eggs on Dec. 1, 1919. (Presently, the CBOT and CME are still the two most important futures exchanges in the world.)

The period from the Civil War to the First World War also saw the emergence of other exchanges trading a range of different commodities. The New York Cotton exchange was formed in 1870 and the New Orleans Cotton Exchange in 1871, though time contracts did not play an important role on the latter exchange for almost a decade. The Coffee, Sugar and Cocoa Exchange was initially founded in 1882 as the Coffee Exchange of New York City with the specific intent of trading in time contracts for coffee. Initially founded in 1872 to trade in butter, eggs and cheese, a decade later the exchange acquired its current name, the New York Mercantile Exchange (NYMEX).[26] Other lesser exchanges such as the San Francisco Chamber of Commerce, Kansas City Board of Trade and the Minneapolis grain exchange also have their origins in this period. Even the COMEX, which was formed in 1933, was the result of merging four small exchanges for raw hides, metals, raw silk and rubber that had histories originating in that period.

Yet, this later 19th century Renaissance for derivative securities trading was accompanied by a neo-Luddite attack from agrarians and Populists, e.g., Cowing (1965), Hicks (1931). The focus of the attacks was futures contracts. The anti-speculation reasoning behind the attacks has been described by Cowing (1965, p.5):

> The seemingly orthodox futures contract, occasionally used before the Civil War and an outgrowth of earlier "to arrive", and "forward delivery" agreements, began to receive unprecedented attention from speculators. Persons not previously connected with the commodities business had been attracted, and were buying and selling futures contracts in the central markets, especially in Chicago and New York. The number of bushels and bales traded on the exchanges exceeded the

> annula production from 1872 on and in several years toward the end of the century amounted to sevenfold the annual crop. Prices had moved widely before the war because of weather, economic instability, and imperfect crop information, but it appeared that the new volatility was due to maneuvers by speculators with large purses. Thus "speculator" became more than ever a term of opprobrium; the physiocratic bias against those who produced no primary products was more bitterly asserted as the agrarian population shifted consciously to the defensive. The mysterious and remote commodity speculator seemed more of a parasite to the farmers than the local physician who was holding land for appreciation. Farmers identified the commodity speculator as the villian responsible for erratic price changes in Chicago, Minneapolis, and New York, especially around harvest time. The stage was set; the national crusade against the exchange speculator was about to begin.

The decline in agrarian conditions following the post-1886 droughts generated sufficient political will to produce the Hatch-Washburn bill of 1892. Instead of outlawing futures trading, this bill aimed to impose a prohibitive tax on speculative dealings in futures.

The Congressional debate on the issue surrounding the Hatch-Washburn bill is an essential primary source on 19th century views on derivative securities. The committee meetings leading up to votes on the bill included testimony from important agrarians, such as J.H. Brigham, Master of the National Grange and C.W. Macune of the Farmers' Alliance and Industrial Union. Not only farmers were in favor of the bill, the testimony also included statements from millers, such as Charles Pillsbury, as well as grain and hog merchants. Pillsbury held that "neither grower nor miller had as much influence over prices as a few men around the wheat pit in Chicago. Short selling by these few made prices erratic and unstable; opinions based upon supply and demand were worthless in the face of this manipulation" (Cowing 1965, p.7). Pillsbury also maintained that the use of futures to hedge would not be necessary if price volatility due to speculation was eliminated.

In 1893, the Hatch-Washburn bill successfully passed the House, 167 to 40, and passed the Senate, 40 to 29, though there were some amendments that had to be returned to the House for approval.[27] However, this placed the bill too far down the calendar to be dealt with before the end of the session. A suspension of House rules was required for the bill to become law. However, suspension of rules requires a two-thirds majority and the vote, 172 to 124, fell short by 26 votes. The gradual return of prosperity dampened, but did not eliminate, the drive of the anti-speculator forces. However, it was not until after WWI that sufficient legislation, such as the Grain Futures Act (1922), was in place to curb the alleged abuses of the middlemen and speculators using the exchanges. By this time, the extreme anti-speculator position of the agrarians had faded. Though the Act did contain provisions against manipulation these were largely ineffective. The Act was successful in bringing the futures exchanges under federal supervision and in providing for "continuous fact-finding and supply of continuous trading information" (Hieronymous 1977, p.314).[28]

A Canadian Perspective

In contrast to the development of organized commodity exchanges in the US,[29] the development of derivative securities trading in Canada has a different flavor. As expected, much of the agrarian discontent observed in the US in the late 19th and early 20th centuries found similar expression in Canada. In some respects, the agraian views were even more extreme in Canada, the distrust of monopoly elements and speculators on the grain exchange even more deep rooted. Yet, despite this sympathetic undercurrent, the marketing solutions chosen in Canada differ dramatically from those in the US. In the end, a government sanctioned and controlled monopoly emerged to dominate the marketing of Canadian wheat.

After an initially unsuccessful attempt to establish a grain exchange in 1883, a group of local grain merchants and farmers successfully combined to form the *Winnipeg Grain and Produce Exchange* in 1887. While initially trade on the Winnipeg exchange was for cash market grain, by 1904 futures trading in wheat, oats and flaxseed had begun. The exchange was reorganized in 1908 as the Winnipeg Grain Exchange. Not without sufficient reasons, this increasing sophistication of grain marketing was generally viewed with suspicion and contempt by farmers: "By the beginning of the...century, disparities of bargaining power in the markets in which western farmers disposed of their produce served as the focus of agrarian protest in western Canada....these disparities were attributed by the farmers to a deliberate and increasing curtailment of competitive action among grain buyers and warehousemen at local market centres....It was, moreover, clear from the start that the activities of local elevator

operators and of most grain buyers were controlled by the head offices of their respective companies in distant places. These offices were centrally located in Winnipeg" (Fowke 1957, p.118).

The Canadian grain trade during this period was dominated by the production of wheat, primarily for export. This trade involved farmers transporting wheat to the local shipping point, at which there was typically more than one elevator. However, because the elevator and transportation activities were dominated by a small number of companies, there would be no price competition. One price would be quoted for a particular grade, based on the price on the Winnipeg exchange. In combination with a number of marketing practices such as the mixing and substitution of grains by local elevators, by the of time of WWI there had emerged in the farm community "the conviction that monopoly elements dominated the grain trade." This conviction "had become so deeply and so generally rooted in the minds of western grain growers that they pressed strongly for the socialization of the elevator system at both its local and terminal levels. For many farmers there was every readiness to replace private monopoly with public monopoly; for others it would be sufficient to provide an adequate network of government-owned country and terminal elevator companies" (Fowke p.123) Given that wheat had become the main source of income for the prairie provinces, considerable public and private efforts were expended to provide an alternative marketing systems for grain.

The exigencies of the War effort provided the first opportunity for alternative marketing systems for Canadian grain. The Grain Export Company was created by the Allies in 1916 to provide North American wheat supplies for the War effort. In early 1917, the company's large wheat purchases led to a "corner" in the May time contract on the Winnipeg exchange. "This led to a panic situation and the closing of the futures market on 4 May. In June the Dominion government suspended all trading on the exchange and established the Board of Grain Supervisors. This board fixed the price of wheat and directed the marketing of all wheat from the elevators to the Allies' purchasing agents. The duties of this Board were suspended following the end of the war in 1919 and futures trading resumed. However, when it became evident that postwar conditions were far from normal, the first Canadian Wheat Board was established. It was to be the sole marketing agent of the entire 1919 crop.... Although the Wheat Board did not establish the final price, the farmers received the highest price they had ever received for wheat. They lauded the success of the Wheat Board and naturally saw cause and effect. The federal government declared the emergency at an end and dropped the Wheat Board in 1920; prices immediately fell. Farmers attributed this decline to the removal of government marketing and the reinstatement of open market systems" (Ankli 1982, p.273-4).

The failure to reestablish the Wheat Board laid the foundation for the birth in 1923 of the cooperative Wheat Pools as a marketing alternative to the Exchange. Pooling was a system where "farmers voluntarily signed an agreement to deliver all their wheat to the pool for five years and would receive, in return, an initial payment per bushel and the remainder in interim and final payments based on the actual return for that grade."[30] In addition to providing an alternative marketing channel, the pools were also intended to implement a system of "orderly marketing" in which grain would be marketed more uniformly over the full year to adjust for typically lower prices in autumn when the crop is delivered. However, in practice, the orderly marketing strategy was not successful. Farmers did not, as a rule, receive a more favourable price from the pools than would have been paid by the Exchange. Despite this, from 1924-29 the pools experienced incredible success, handling over 50% of Canadian grain during that period, as much as 70% in 1927. While attempting as much as possible to market grain outside the Exchange, the pools did use the Exchange for selling wheat. The pools also made considerable progress in the acquisition of local and terminal elevators. By 1929 the Pools controlled almost half of the elevator capacity in western Canada.

The success of the pools ended abruptly in 1929 when the pool price for the initial payment was set too high. The collapse of wheat prices in 1930 had first the Prairie provincial governments and then the federal government intervening to prevent the collapse of the Pools. In July 1931, the Pools were restructured by separating the elevator operations from the marketing agency. Following this, the pools terminated the delivery contracts of their members and established voluntary pools that did not attract significant deliveries. The social and political need to fill the void in marketing services left by the pools led to the establishment of the Wheat Board. The Canadian Wheat Board Act of 1935 "empowered the Board to accept deliveries from producers at a minimum price. Excess receipts above this amount would be distributed to producers at the end of the crop year, and any losses would be

assumed by the Dominion government. The Board was encouraged to make use of the open market system whenever possible" (Ankli, p.275) In following years, when crops were short and prices were high, the Wheat Board accepted no deliveries. However, when supplies were plentiful, the Wheat Board price tended to be too high, and almost all wheat deliveries were made to the Board.

The demands of providing wheat for the Allied war effort proved incompatible with allowing farmers to market wheat through the Exchange when prices were favorable. In September 1943, the Wheat Board was made the sole buyer of Canadian wheat and trading in wheat on the Winnipeg Grain Exchange was discontinued. The Wheat Board monopoly on the marketing of Canadian wheat for export continues to the present. This outcome is consistent with the historical resistance of Canadian wheat farmers, especially the representatives of farm organizations, to the open marketing system of the Winnipeg Exchange. The political importance of wheat producers was sufficient to produce pressures that led to the creation of the Canadian Wheat Board monopoly, that made the Canadian government a central part of the Canadian grain trade. "The existence of the Wheat Board has rendered inoperative traditional price discovery mechanisms such as futures and cash markets in Canada" (McCalla and Schmitz 1979, p.205) This left only the lesser grains, such oats and barley, for marketing by the Winnipeg Grain Exchange. It is ironic that the three interwar Royal Commissions that considered farmers' complaints all found that cash prices, as determined on the Exchange, were fair. As for futures trading, the *Report of the Commission to Enquire into Trading in Grain Futures* (1931, p.72), concluded: "...futures trading, even with its disadvantages of numerous price fluctuations, is of distinct benefit to the producer in the price which he receives".

The US Experience with Options

In considering the history of options trading in the US, it is useful to make a distinction between stock and commodity options. Though there were instances of earlier trading, early US trade in *commodity* options is usually associated with the beginnings of the Chicago Board of Trade (CBT), where options were known as "privileges". Bid and offer privileges roughly corresponded to modern day puts and calls. The similarity of privileges to gambling, as well as the prominent use of options in a number of market manipulations, led to numerous attempts to halt options trading. As early as 1865, the CBT introduced a rule that denied the protection of the exchange to privilege traders. This rule was found to be both unpopular and ineffective and was withdrawn in 1869. Various legal challenges were launched to privilege trading, including an Illinois Supreme Court ruling that found privileges to be illegal. In 1890, the US Congress attempted to ban commodity options but was unsuccessful in getting the legislation passed.

The social resistance to commodity option trading during this period was propelled by farm based "populist" political movements that associated erratic price behavior with excessive speculation. These views were not without foundation. The limited amount of regulation of commodity and stock markets in the pre-WW I period permitted numerous corners and other market manipulations. Charles Taylor (1917) relates one of the more "outstanding of these (corners) had to do with oats, and was operated by Mr. Chandler, a prominent merchant. He peddled 'puts' about the city, inducing speculation on the part of a large number of people not ordinarily in the market. Chandler and his friends did not count on a large inrush of oats attracted to Chicago by the high prices and the corner failed. Many people lost money and there was much public indignation" (Hieronymus 1977, p.85). There was a prevailing belief among populists that brokers were using the exchange process to extract money from farmers. The social importance of many of the underlying commodities meant that commodity options received substantially more scrutiny than stock options.

Following the introduction of taxes on privilege earnings in 1921, the Grain Futures Act (1922) represented a significant step in curbing market abuses associated with derivative security trading. This Act required commodity exchanges and their members to maintain and file privilege trading reports. Combined with the authority of the Secretary of Agriculture to investigate exchange operations, this led to a substantial curtailment in commodity options abuses. However, some commodity options trading still continued and, following the collapse of agricultural prices associated with the Great Depression, pressure from farm lobbies led to the outright ban on commodity options trading, in selected commodities, legislated in the Commodity Exchange Act (1936). Included in the restricted list were wheat, cotton, rice, corn, oats, and barley. However, despite the restrictions, considerable

trade continued in unlisted commodities such as coffee, silver, copper and platinum, together with commodity options trading offshore, especially in London.

The Sinclair Option Pool of 1929

One of the most profitable pools was the Sinclair Consolidated Oil option pool of 1929. While Sinclair stock was selling in the $28 to $32 range, a contract was obtained from Sinclair granting the pool an option to buy 1,130,000 shares at $30 per share. The pool then purchased 634,000 shares in the open market to bid up prices. The pool exercised its option, then liquidated all its holdings while the stock was selling in the $40 range. The pool also sold 200,000 shares short as the price fell. The pool's total profit was approximately $12.5 million from the following sources: $10 million profit from optioned shares purchased at $30 per share, $500,000 profit from shares purchased in the market, and $2 million profit from the short sales.

"Stock Exchange Practices," Senate Report 1455, 73rd Congress, 2nd Sess., p.63, quoted in Teweles and Bradley (1985).

In the US, trading in *stock* options began as early as 1790. Kairys and Varerio (1997) discuss the state of the options market during the 1870's when there was an “active market” among numerous brokerage firms in New York City. Much as with commodity options, stock option trading also played a significant role in market manipulations. As early as the 1890's, option pools were in operation. "A pool is a temporary association of two or more individuals to act jointly in a security operation of a manipulative character. There is no inherent reason why manipulation should be carried out through the use of pools; many such manipulations have been carried on with great financial success by single operators, such as Drew, Little, Vanderbilt, Gould and Keene. During the 1920's, however, the pool developed a high degree of popularity. The possibility of combining capital, trading skill, experience and corporate connections into one cooperative venture appeared so attractive that it became the typical organization procedure of manipulators of that era. There was no particular size of the pool of the 1920's and early 1930's. The Radio pool, one of the largest, had about 70 members, the first Fox pool had 32, and the second 42. The profitable alcohol pool of 1933 had only eight participants." (Teweles and Bradley, p.269)

Two general types of pools were present in the 1920's: trading pools and option pools, with the latter being the most common. While trading pools acquired stock on the open market, option pools would acquire all or most of its securities by obtaining call options contracts to purchase stock at favorable prices. These options were acquired from various sources, such as the corporation, where the options took the form of warrants, as well as large stockholders, directors, officers, large speculators and banks. While there was considerable diversity in the maturity of the options granted and the types of schemes involved, the primary objective of the option pool was to benefit through manipulation of the common stock price. The option pools were symptomatic of the types of abuses that contributed to the 1929 stock market collapse. The regulatory response implemented in the 1930's, culminating in the Securities Act (1934) was to prohibit all activities aimed at manipulating market prices and trading on insider information.

Franklin and Colberg (1958, p.29-30) illustrate the importance of options trading in the 1929 market collapse:

> Testimony before the Senate Committee on Banking and Currency in 1932 and 1933 disclosed that many of the financial abuses of the 1920's were related to the use of options. A favorite device of large stockholders was to grant options without cost to a pool which would then attemp to make these profitable by "churning" activities designed to bring the general public in as buyers of the stock. In addition, long-term and even unlimited-period option warrants were issued frequently in connection with new stock issues.

During the wave of securities market reform following the market collapse of 1929-33, considerable attention was given to terminating option trading all together.

Franklin and Colberg (1958) on the US Options Market in the 1950's

The Brokers

Practically all the Put and Call business in the United States is handled by about twenty-five option brokers and dealers located in New York City. These brokers operate through an association. All the contracts in which they deal are guaranteed or indorsed by member firms of the New York Stock Exchange. This indorsement guarantees the performance of the contract and makes options negotiable bearer instruments. The owner of the option may sell to anyone he chooses and the terms of the option remain unchanged. The purchaser of the option is not required to know anything about the maker of the option or about his financial standing because of this indorsement. Put and Call options can be bought and sold through a local broker, or one may place an order directly with a Put and Call broker.

The Seller of Options

Options can be, and sometimes are, sold by small investors. Most Puts and Calls originate, however, with large individual stockholders, particularly those who hold a "continuous portfolio." Such stockholders are in a position quickly to write most of the options for which a demand may arise because they are able to furnish stock which may be called for and to purchase stock which may be put to them. Institutional investors in stocks participate in writing options, but not to a large extent.

The Buyer of Options

Since no reports are required by, or rendered to, the Securities and Exchange Commission on this subject, and since brokers and dealers in Puts and Calls are likely to guard closely the source of their business, one may only speculate as to the geographic location, financial size, and other characteristics of the purchaser of options. However, an examination of available information permits some inferences regarding the nature of the purchaser.

The evidence indicates, therefore, that Puts and Calls are bought mainly for speculative purposes. Usually the options themselves are not the main vehicle in speculation; instead, actual purchases and sales of stocks ordinarily take place when options are worth exercising. Their use permits speculation with limited capital, with the potential loss restricted to the cost of the option plus commission and taxes. This inference is consistent with the remark of one veteran broker, as reported by *Barron's*, that speculation accounts for probably 80 per cent of option trading[2]. It appears that the emphasis usually placed by the Put and Call brokers on the "protection" which can be afforded by the use of such options is designed to secure for the trade the public acceptance generally enjoyed by commodity hedging and by many types of insurance.

In the process of developing a regulatory response to the market abuses that contributed to the financial market turbulence of 1929-33, it was accepted that the abuses associated with option pools would become illegal. However, in addition to the use of options in pool operations, there were other, more legitimate reasons for stock option trading. In the end, the brokerage industry was able to avoid the outright ban associated with commodity options. While initial legislation aimed at regulating the securities markets, the Fletcher-Rayburn bill (1934), called for a total ban on stock options, the brokerage industry was able to prevent this result. Instead, the Securities Act (1934) empowered the newly created Securities and Exchange Commission (SEC) to regulate the market and introduced the Put and Call Brokers and Dealers Association (1934) that was designed to act as a self-policing agency, working closely with the SEC and other agencies to avoid further direct government regulation. It was member firms of the PCBDA that formed the basis for the OTC market trading of options that took place in the period leading up to the creation of the CBOE.

To appreciate the major advance that the CBOE represents, it is necessary to consider the state of equity option trading prior to the CBOE. Franklin and Colberg (1958) describe the general state of equity option trading at the end of the 1950's:

> Practically all of the Put and Call business in the US is handled by about twnty-five option brokers and dealers in New York

> City. The brokers operate through (the PCBDA). All the contracts in which they deal are guaranteed or indorsed by member firms of the New York Stock Exchange ... The Put and Call business is largely self-regulated, but a great deal of the aura of secrecy which surrounds this activity seems to stem from the early 1930's when the threat of strict regulation or even legislative extermination haunted the entire options trade. Testimony before the Senate Committee on Banking and Currency in 1932 and 1933 disclosed that many of the financial abuses of the 1920's were related to the use of options.

At this time, the options market was relatively small. Self-regulation, both by the exchanges and by the PCBDA, coupled with the ability of the SEC to require reporting of options trading, were sufficient to prevent the abuses of previous years.

Among other significant regulatory changes introduced by the Securities Act, the SEC required all options sellers to post margins. Unscrupulous activities such as granting brokers options for touting a stock were banned together with the use of options to trade on inside information. In addition to the increased government regulation, self-regulation by the PCBDA also played on important role. Despite the success in reducing market abuses, the options traded in the OTC market were often illiquid, making it difficult to resell or transfer a given options contract to another party. In 1972 this started to change with the creation of the Options Clearing Corporation, as a subsidiary of the Chicago Board Options Exchange (CBOE). In following years, the American, Philadelphia, Pacific and Midwest exchanges also introduced options trading. Trading on the CBOE commenced in April 1973 with 16 stock options. While initial interest in options trading was limited, by 1977 volume had increased substantially to the point where put options were introduced.

The implications and advantages associated with exchange trading of options are much as with futures. Strike prices and expiration dates of contracts are standardized to facilitate liquidity. The security of doing trades with the clearinghouse instead of a specific counterparty means positions are easier to unwind. Transactions and other costs are also lower. The present importance of stock option trading is reflected in the cost of exchange seats, for which the CBOE is always a leading contender for being most expensive. These successes with stock options were not, initially, matched by commodity options. The creation of the CFTC in 1974 in combination with a number of large commodity options frauds originating in London commodity options led, in 1978, to the CFTC banning all London options, dealer options and domestic exchange traded options, except under certain restrictive conditions.[31] These rules were altered substantially in 1981 when new regulations on trading in commodity options were introduced. In 1982, trading began with options on futures for gold, heating oil, sugar, US Tbonds and certain stock indices. Over time, commodity option trading has been extended to currencies, Eurodollars, and a variety of other commodities. In this environment, the SEC has jurisdiction over options on physical securities, while the CFTC is responsible for options on futures.

1.2 Recent Derivatives Debacles

The modern Renaissance in derivative securities has, not surprisingly, been accompanied by a range of disasters associated with the use of derivatives (see Figure 1.2). Some of the disasters tell stories that are all too familiar from past history, huge losses emerging from schemes to manipulate markets using the leverage inherent in derivatives contracts. Sometimes these schemes were motivated by personal or corporate greed, as in the Sumitomo copper corner or the Hunt's silver manipulation. Other disasters originated in another old way, poor judgment about the business or operational risks that were being undertaken. This is arguably the source of the losses incurred by Metallgesellschaft or Barings Bank. Yet, the modern period has also seen the emergence of a new type of event: 'market completion and replication' disasters. In these disasters, seemingly new innovations originating from the financial engineering industry result in significant and unanticipated losses. In some of these disasters, strategies are pursued with the realistic objective of replicating an untraded derivative security but are ultimately defeated by liquidity and operational risks. The stock market crash of Oct. 1987 and the collapse of Long Term Capital Management fall into this group.

The Hunt silver manipulation provides a useful starting point for illustrating the derivative disasters of the modern period. Considered in isolation from the Hunt's other business interests, the silver dealings were purely speculative. Though the Hunt's did have ownership stakes in silver production, e.g., the Sunshine Mining

Company, the purpose of those holdings seems to have been driven by the Hunt's activities in the silver futures markets, and not the other way around. The general business risk of these activities was determined exclusively by movements in the price of silver, a market risk. Yet, even though the risk management problem is quite simple, there does not seem to have been more than cursory attention given to evaluating the value at risk of the position. In the end, it seems that the losses which did emerge originated in a complex of legal risks, liquidity risks and operational risks.

The Hunt Silver Manipulation (1979-80)[32]

The impact of the activities of the Hunt brothers, Bunker and Herbert, on the silver market during June 1979 to March 1980 has been the subject of much legal wrangling and academic debate, e.g., Williams (1995). At the centre of the debate is the issue of market manipulation. Precisely what constitutes manipulation is not an easy concept to legally define. What constitutes legal activity in one situation may be illegal in other situations. These events in the silver market during 1979-80 also provide useful insight into the workings of futures markets. Playing fundamental roles in the incident were: the exchange oversight function; the crucial role of variation margin; and, the details of the delivery process. The incident is also interesting because of the considerable economic analysis that was done on the event, arising from the lawsuits that were generated by specific events.

The central characters in the story are the Hunt brothers. Though the Hunts were not the only players in the ring, the social importance their family has led attention to focus on their role.[33] The Hunts started dabbling in the silver market in 1973, beginning with trading in silver futures. Being men of substantial wealth, it was not surprising that they soon expanded their silver activities to include the taking of delivery on futures contracts. From that point, until 1979, the Hunts became involved in an expanding attempt to dominate the global silver market. These activities included an attempt to gain control of the Sunshine Mine, the largest silver mine in the US, from Sunshine Mining Company. As of 1 Jan. 1979, the Hunt's had accumulated approximately 37 million troy ounces of bullion, with an additional 25 million in futures positions, an amount equal to around $375 million at early 1979 prices (Williams 1995, p.20).

While interesting reading, the motives for the Hunts getting involved in the silver market have been told elsewhere, e.g., Fay (1982). What is relevant here is that, as speculators, the Hunts were in a situation where business profitability depended almost exclusively on the movement in the level of silver prices. Their business risk was almost exclusively a market risk. Given this large exposure to a specific commodity price, it is not surprising that the Hunt's were involved in activities designed to control the price of silver. In the process of accumulating their large silver positions, the Hunt's had also developed an intricate network of silver market players. Included in this network were two Saudis who, starting in the summer of 1979, combined with the Hunts to form the International Metals Investment Company (IMIC). This company was formed to engage in further trading in silver, especially silver futures. The Hunts also informally enlisted the participation of another group, that traded primarily through ContiCommodity Services (Conti). Despite being an American company, Conti seems to have been fronting for offshore, primarily Middle Eastern, clients, e.g., Fay (1982).

The relationship between the price of silver and the activities of the Hunts, IMIC and the Conti group has been intensely examined in a 1988 civil court case, *Minpeco v. Hunt* (Williams 1995). The plaintiff in the case, Minpeco, is a Peruvian government-owned metals marketing firm. The case against the Hunt's was successful and $192 million in damages were awarded. The six month trial produced what can only characterized as remarkable evidence. "All the legal professionals involved with the Hunt silver litigation have remarked on its exceptional complexity in regard to both laws and facts. In addition to manipulation law, the Hunt case involved antitrust law, racketeering law and fraud-on-the-market doctrine" (Williams 1995, p.xii). That the case went to trial is unusual, illustrating the complicated issues involved.[34] As the trial progressed, the various participants revealed information in detail that is not typically available.

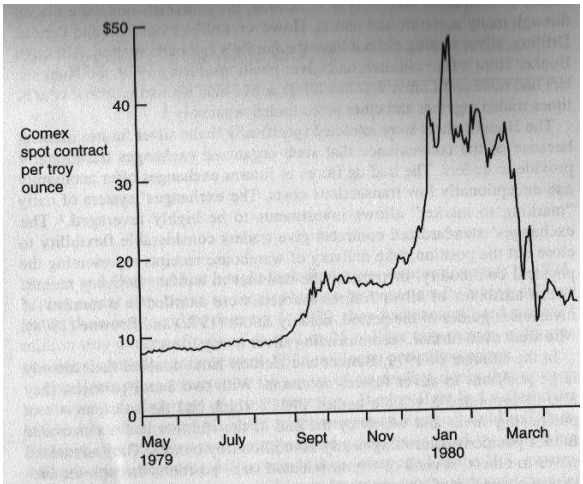


Figure 2.1. Silver prices daily from May 1979 through April 1980

The Hunt case illustrates the inherent vagueries determining what constitutes *illegal* manipulative activities. The timeline is important. Shortly after IMIC was formed, the price of silver began what is best described as a bubble (see Figure 1.3). At debate in the court case was the role of the Hunt's in any market manipulation that took place (see Section 2.3 for further discussion of speculation and manipulation). The evidence is clear that during the summer of 1979, the Conti group, in combination with IMIC, took large positions in Comex silver futures, with the Conti group targeting the Dec '79 contracts with the Hunt's focus being Feb. '80 and Mar. '80. On Aug. 31. 1979, the combined positions of the Hunt's, IMIC and the Conti group totalled 25% of Dec. '79 open interest on the Comex and CBT, with 32%,47% and 38% in the Feb, Mar and May '80 deliveries.

Williams (1995, p.32) describes the extent of the Hunt's silver commitment:

> Manipulative schemers or not, Bunker and Herbert Hunt, in the summer of 1979, had doubled their already colossal bet on the price of silver. In just their personal accounts, including their half of IMIC and their existing holdings of bullion, they had positions approaching 140 million troy ounces (a level they kept more or less until the following March). At prevailing prices, the value of the silver they controlled exceeded $1.3 billion, a large fraction of their net worth. With every $1 movement in the price of silver, they gained or lost $140 million, an amount substantial even to them.

Given the size of these positions, the Hunts made considerable gains from the runup in prices that started around Aug.22 and continued to Sept. 18, a rise from $9.537 to $15.90.

Not unlike the Cargill grain case over four decades previously, this abrupt price change surrounding a contract delivery triggered the oversight bodies within the futures exchanges. On Sept 4, the first of a number of initial margin increases was announced. In early October, the Comex set up the Special Silver Committee to monitor the market and set rules as needed. Pressure was exerted on the visible longs, primarily Conti, to facilitate an orderly liquidation of the Dec. contracts. However, until the Dec '80 contract deliveries started to weigh on the market during the delivery month, the principal shorts were not having difficulty locating bullion for delivery. What did start occurring was a substantial decrease in market liquidity. The principal commercial shorts were exiting the market, many using an *exchange for physicals* (EFP) transaction.

An EFP is an off-exchange transaction in which the futures contract is settled by delivery of a non-standard grade of the underlying commodity. An EFP is usually motivated by a commercial transaction, e.g., a scrap copper producer can do an EFP with a scrap supplier, where both are hedging using copper futures contracts. The futures contract offset is bundled with the commercial transaction. During October there were a number of large EFPs where major silver dealers (Mocatta Metals; Sharps, Pixley; J. Aron) seemed to be delivering a large portion of physical silver inventories to IMIC and others in exchange for cancellation of futures contracts with maturities covering Dec. '79 through Apr. '80:

> IMIC's EFPs which supplanted most of its futures contracts, were perfectly consistent with its avowed business purpose of acquiring physical silver. Coupled with the deliveries already taken in September and October, IMIC had acquired 35.3 million troy ounces by mid-December, 27.8 million of that as bullion. Bunker and Herbert Hunt themselves took delivery of 6.425 million troy ounces during the fall of 1979. For the two Hunts, taking delivery afforded sizable tax advantages, given the increase in price since the summer. According to US tax laws then applicable, a liquidation of a futures position, including a rollover into a later month, triggered a taxable event, upon which any gain would be taxed. In contrast, deliveries taken were not a taxable event; the gain, if it existed, would be taxed only when the silver was ultimately sold.

By November, the principal longs had accumulated a sufficiently large enough position in deliverable physical

supply that the stage had been set for a squeeze on the shorts.

The price increases for spot silver during December and January were dramatic. From $20 on Dec. 1 to $38.85 on Jan. 1 the price increase was more than worrisome to Comex officials. The December delivery had finished without failed deliveries but only with considerable exchange oversight. What transpired over the next three weeks was a remarkable series of Comex decisions aimed at stabilizing the market. On Jan 7, position limits of 2000 contracts were imposed, with the proviso that those with current aggregate positions in excess of 2000 contracts be given a year to comply providing for at least a 10% reduction in position size per month. Deliveries were also limited to 500 contracts per month. Commercial firms making hedging decisions with transparent connection to physical stocks were exempted from the limits. The impact of this on the principal longs can be seen by recognizing that Bunker Hunt alone had long 13,055 contracts for Mar '80 delivery. The restrictions combined with the intense variation margin pressure being imposed on the commercial shorts, triggered another round of EFPs with Engelhard Mineral and Chemical (Philipp Bros.), Bunker Hill Co., Swiss Bank Co. and others.

Faced with the bankruptcy of major commercial shorts, the end of the silver bubble came on Mon. Jan 21, 1980 when the Comex announced that all trading in silver futures would be limited to liquidation only. This unprecedented step effectively closed the silver futures market. (The much smaller silver futures market on the CBT followed suit the next day.) This action precipitated a drastic fall in the spot price of silver. Having traded briefly above $50/oz. in the week prior, the close on Tues. Jan. 22 was $34, a level that was maintained until mid-March when prices again fell precipitously to the $17 level. In the interim, the Comex deemed that the pressure on the market had eased sufficiently, that the liquidation only restriction on silver futures trading was lifted. The price behavior had reversed the pressures on the commercial shorts placing the burden of variation margin squarely on the longs. The underlying strategy of taking profits in bullion, through EFPs and standing for deliveries, turned on the longs with a vengeance. The bullion, that could be used to secure financing, is declining in value and can only be partially leveraged. Considerable cash on hand has been expended to settle the EFPs.

Variation margin rules at the Comex and on most exchanges provide for daily limits on the payments that have to be made to the account. This caps the daily cash flow pressures, leaving a longer period of time for payment and the possibility that prices will recover. Nonetheless, given a long enough time frame, the payments will eventually be made. Englehard Mineral, an important commercial short, was reported to have paid $1.3 billion in variation margin on silver futures up to mid-January. Though the notional variation margin was over $1 billion in mid-March, the actual payments required from personal sources was some $60 million per day for the Hunt's. The cash flow pressure was such that on Mar. 13 the Hunt's and IMIC defaulted on variation margin payments to their brokers. After a brief period during which the brokerage houses covered unpaid variation margin balances, on March 27, 1980 the final phase of the bubble took place with brokers liquidating various cash and futures positions.

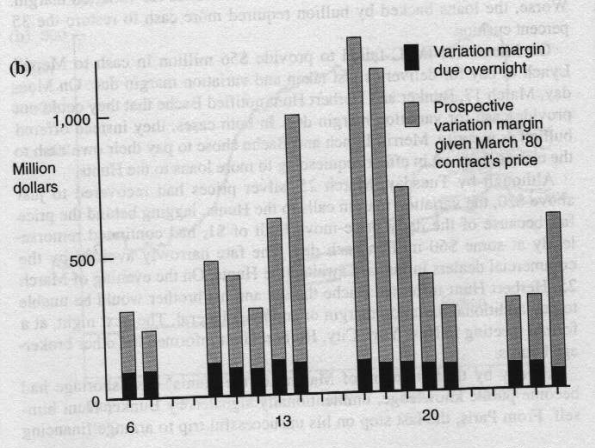


Figure 2.5. The price decline during March 1980 and the Hunts' and Conti group's variation margin payments

Under the selling pressure of the brokerage house liquidations, the price of silver reached $10.40/oz. The bubble had completely burst and new longs were entering the market. The Hunts were forced to mortgage key assets in the family portfolio, particularly Placid Oil that secured a loan of $1.1 billion. By the end of April, the outstanding balances for the Hunts at various brokerage houses had been paid. Though the court cases dragged on for years, the immediate crisis was over. The usual array of House and Senate subcommittees, regulators reports and academic studies followed. One key finding of the regulators was that the key brokerage houses acting for the longs, Bache and Merrill Lynch, both acted imprudently by making large loans backed by bullion. The solvency of the firms could have been put in jeopardy. Yet, like the Cargill case, there is a strong case to be made regarding the lack of fairness from the exchanges regarding the Hunts.

Portfolio Insurance and the Stock Market Crash of October 1987

The Hunt silver market manipulation was a very old story being played in modern times. A group of traders, acting in concert, attempt to use a derivative contract delivery mechanism to allegedly manipulate prices for personal gain. As both the Hunts and Cargill discovered, a real risk in this type of activity is that the regulator may change the rules in midstream. Though the Hunt silver manipulation took place at the beginning of the modern Renaissance in derivatives trading, coming after the start of the CBOE and the beginning of trade in selected financial derivatives, the whole affair still has an old flavor. By comparison, the role of delta hedging and portfolio insurance in the stock market crash of October 1987 is an identifiably modern event. This event was not generated by the desire for unwarranted gains but, rather, as fallout from the desire to innovate, to apply the techniques of financial engineering in pursuit of enhanced portfolio management outcomes.

An excerpt from the transcript of testimony given by George Soros to the United States House of Representatives Committee on Banking, Finance and Urban Affairs, 13 April 1994.

The trouble with *derivative instruments* is that those who issue them usually protect themselves against losses by engaging in so-called delta, or dynamic, hedging. Dynamic hedging means, in effect, that if the market moves against the issuer, the issuer is forced to move in the same direction as the market, and thereby amplify the initial price disturbance. As long as price changes are continuous, no great harm is done, except perhaps to create higher volatility, which in turn increases the demand for derivative instruments. But if there is an overwhelming amount of dynamic hedging done in the same direction, price movements may become discontinuous. This raises the spectre of financial dislocation. Those who need to engage in dynamic hedging, but cannot execute their orders, may suffer catastrophic losses.

This is what happened in the stock market crash of 1987. The main culprit was the excessive use of portfolio insurance. Portfolio insurance was nothing but a method of dynamic hedging. The authorities have since introduced regulations, so-called "circuit breakers", which render portfolio insurance impractical, but other instruments which rely on dynamic hedging have mushroomed. They play a much bigger role in the interest rate market than in the stock market, and it is the role in the interest rate market which has been most turbulent in recent weeks.

The causes of the stock market crash of October 19-20 1987 have been debated *ad nauseum*. The analysis includes: reports by the exchanges, e.g., the CME and the NYSE; the regulators, e.g., reports by the SEC, the GAO, the CFTC and the Brady Commission; and academic studies, e.g., Edwards (1988), Tosini (1988). For sheer attention and regulatory impact, the crash of 1987 could be the disaster of disasters. Incremental reforms were made to market practices, ranging from the introduction of trading circuit breakers triggered by large market moves to rules impacting the capitalization of specialists on the NYSE trading floor. Physical hardware changes were also made to the execution system for processing orders on the NYSE. As reflected in the comments of George Soros, another fallout from the crash was the drastically reduced use of stock markets for dynamic trading strategies designed to achieve replication of an untraded option payoff. Such schemes had been actively promoted to institutional investors by a number of the leading finance academics, including Fischer Black and Mark Rubinstein.[35]

In retrospect, the crash of 1987 still has many lessons for the present, if only these lessons could be adequately understood. Too often, it seems, analysis of the crash has the flavor of an apology for the current method of oversight. Tosini (1988, p.35), a director at the CFTC at the time of the crash, is an excellent example: "there are many profound, complex and far-reaching issues before the CFTC, as well as other federal agencies and the Congress, concerning stock market and derivative market activities and performance during October ... the call for 'further research' has hardly ever been more timely." The various reports made some key observations, e.g., the Brady Report (1988) recognized that the markets for stocks, stock options and stock index futures were actually one integrated market "linked by financial instruments, trading strategies, market participants and clearing and credit mechanisms." Despite this integration, the regulatory and institutional structure that was designed for separate markets was unable to deal with "inter-market" pressures. The Brady Commission recommended a

number of reforms designed to provide for a more integrated approach to market oversight.

The crash of 1987 speaks directly to the problems raised by the systemic change in financial markets brought on by the modern Renaissance in derivative securities trading. Various events were replayed in the 1990s because some lessons were not fully understood. This happened because the analysis of the event, on the whole, focussed on the specific events and did not adequately account for the singularity of the event. Katzenbach (1987) details the chain of events. As measured by the Dow Jones Industrial Average (DJIA), the US equity market had achieved a peak of 2722 in August of 1987. P/E ratios for the S&P 500 were averaging 23, relatively high considering the potential for negative market sentiment. In modern parlance, the equity market was due for a correction. On Wed. Oct. 15, 1987 there was a news release reporting an unexpectedly large US trade deficit, banks raised prime rates and there was considerable downward pressure on equity prices. The S&P 500 fell from over 314 to below 306. Despite a calming statement by Treasury Secretary Baker on the Thursday, the S&P 500 fell again to 298. When some negative PPI and industrial production numbers hit the market at the open on Friday, the stage was set. Significantly, even though things were gloomy, none of this was a shadow of events about to unfold. This leads to a key observation about the crash: it was an severe event that was not associated with a correspondingly severe negative information inflow to the market.

The crash actually started on Friday October 17, 1987. In the face of the somewhat negative sentiment, the DJIA fell a record 108 points. The S&P 500 started the day at 298 and fell to around 282. These were significant market moves that, all things considered, may have presented some buying opportunities. Over the weekend, there was some chatter about a dispute between the US and Germany over interest rates, leading to speculation that the US might let the dollar fall, an event that would be negative for US equities. There was the usual carry over on foreign markets, such as Tokyo and Australia, though the wave of intense selling had not yet hit international markets. The New York market opening was confronted with news that the US had attacked Iranian oil platforms in the Persian gulf, that almost surely added to the rush of sell orders. At the open the DJIA was down 67 points. The S&P 500 futures contract on the CME fell 18 points at the open. At a time when 100 million share volumes were uncommon events, the NYSE processed 50 million shares in the first half hour. Despite the market turbulence, a 10 am meeting of NYSE officials and major brokerage houses did not feel a trading halt was needed.

The sequence of events that was to follow was structured around two institutional procedures. The first concerns the method of executing stocks on the NYSE. Historically, stocks trades on the NYSE involved a floor broker for a member firm to walk the order to NYSE trading post for that stock and execute the trade directly with the specialist or with another broker using open outcry. At the time of the 1987 crash, this was still the case for block trades involving 10,000 or more shares. This manual method of trading was inefficient and costly for trades involving large bundles of stocks that have to be sold at once. Such trades were not only being done by index arbitragers, but also by a wide range of market participants. To improve market performance for these traders, the NYSE introduced the Designated Order Turnaround (DOT) in 1976. This system permitted the computerized execution of small trades. Effectively, brokers with member firms could enter trades into a computerized order system, permitting trades to be entered in brokers' offices. Upon receiving the order, the DOT system would automatically route the trade to the appropriate NYSE specialist, where it would be executed. The whole process takes a matter of minutes.

The success of the DOT system led to a new and improved version, the Super-Dot, being implemented in 1984. This new system enhanced the execution times and access. This remarkable progress in information technology created its own demand from a growing legion of program traders. This category includes a range of trading strategies, including portfolio insurance and index arbitrage. Program traders could enter the exact weights for a portfolio of stocks that could be executed simultaneously by computer entry. Prior DOT and Super-Dot execution risk in such strategies was an important deterrent. Yet, the interaction between the progress in information technology and the ability to introduce new financial engineering products were not well understood at the time. Hints of the crash of October 1987 were observed on Sept. 11-2, 1986 and on Jan. 23, 1987 when 'excessive' stock market volatility was observed. These preliminary tremors attracted some attention, and efforts were made to track the activities of program traders through the DOT system. A poll by NYSE of specialists and floor traders found that, almost without exception, program trading was done through the DOT. On average, in the year leading up to the crash, DOT orders from program traders were found to average around 18% of all DOT

trades with over 28% of all order on Oct. 19, 1987 being due to program traders.

In addition to the DOT, the other essential institutional feature to consider in evaluating the crash of 1987 is the short sale rule. More precisely, the SEC Act prohibits short selling of securities, except when the short sale either: takes place below the last sale price of that security; or, at the last price, if that price is above the preceding price. Like the SEC Act, this rule has origins in the anti-speculator atmosphere of the post-Depression era. The idea is that the rule prevents excessive and accelerating downward pressure on prices during a market downturn. However, there is no such rule on futures markets. As such, dynamic portfolio insurance strategies could be implemented by shorting stock index futures, instead of attempting to short the underlying stocks. In addition, the single digit percentage margins on futures contracts were only a small fraction of the 50% margins on stocks. These substantive differences across markets can be attributed to the regulatory competition between the CFTC, that regulates futures, and the SEC, that regulates securities markets.

Portfolio insurance is a category that includes a range of trading strategies. One important strategy involves dynamically trading stock index futures in order to replicate the payoff on a portfolio composed of the underlying index and a put option. The reason that dynamic trading was used is associated with the relatively limited array of path independent option products available. Exchange traded option maturities were a maximum 9 months, not all stocks had traded options, index options were relatively illiquid and the OTC market lacked sufficient liquidity to provide options with the exercise price variation and longer term maturity dates that many institutional investors desired. Even though absence of arbitrage requires that cash -and-carry arbitrage conditions apply to the spot and futures markets, the sheer volume of trading on Oct. 19 meant that a wide spread between the stock index futures and the stock index was seemingly inevitable. What emerged was much worse: an information technology breakdown. The rush of sell orders effectively crashed the DOT system. At 11:45 am the ticker was approximately 1 hour behind and a number of stocks had yet to open because of the lack of an orderly market. By 2 pm volume had reached 400 million. The final numbers for Oct. 19 were 603 million shares traded, with a drop of 508 points (23%) on the Dow and 80.75 points on the S&P 500, a loss of nearly 30%. At the bell the ticker was approximately 130 minutes behind.

This slaughter on the stock exchanges led to a flurry of overnight activities. As the US market collapse spread overseas, there was complete or almost complete trading halts on Tokyo and Hong Kong. There was an unprecedented drop on the London FT Index. The opening of the New York market was preceded by reassuring statements and actions from the FRB, major banks were lowering prime rates and the NYSE shut down the DOT system to prevent the execution of program trades. A temporary and partial trading halt just after 11 am as the market approached 180 on the S&P futures, while the cash market was trading just below 220. This seemed to spell the end of the crash. Prices recovered and by 2 pm the spread between cash and futures narrowed close to normal levels, though the spread did widen as the close approached. At the end of the day, the DJIA was up 102 points on volume of 608 million shares. Due to actions taken to combat the crash, there was strong recovery of the dollar and a decline in interest rates. The low prices combined with the sudden brightening of the economic picture led to a buying spree, both in the US and offshore. By the close Thurs. Oct. 20, the market had recovered about half of what was lost on Monday.

The crash of 1987 was an unprecedented security market event. It exposed serious weaknesses in a regulatory system that was designed to fight the battles arising from old technology. Unlike the Hunt silver manipulation, this was not a story with good guys and bad guys. The problems originated from an inability to assess and structure the rapid changes in securities markets. This was a debacle that was created by a well intentioned need to innovate, to improve portfolio management of large financial institutions. As it turns out, the portfolio insurance programs based on dynamic trading were generally unable to deliver the protection that was claimed *ex ante*. The situation for which the insurance was most important, the protection of losses in the event of a market collapse, led to preconditions that prevented the outcome from being achieved. The programs could only get so big and it was not possible for more than a small fraction of market participants to successfully pursue such strategies. In addition, there are numerous untold stories of other strategies, such as delta hedging by option traders, that also contributed to the crash. Undoubtedly, such traders also contributed to the selling via the DOT and floor trading that only added to the downward pressure on prices.

Metallgesellschaft AG and Rolling Stack Hedges (1993)

Circa 1994, Metallgesellschaft AG (MG) was the 14th largest corporation in Germany, involved in a range of activities, including mining, engineering and financial services. In December 1993, MG reported immense losses on positions in energy futures and swaps incurred by its US affiliate, MG Refining and Marketing (MGRM). These losses were later determined to be around $1.3 billion, the largest derivatives losses by any firm up to that time. It took a $1.9 billion rescue package from 150 German and international banks to maintain the solvency of MG. While initial press reports attributed the losses to speculating in energy derivatives by MGRM, it turned out that MGRM was actually engaged in a sophisticated long term marketing program for gasoline and heating oil. The saga of how a firm engaged in hedging activities could incur such losses has been told and retold, often brilliantly, by Culp and Miller (1994, 1995), Mello and Parsons (1995), Kuprianov (1995), and Edwards (1995). Culp and Miller (2000) collects the relevant readings and provides an overview.

Mello and Parsons (1995) outline the background to the MGRM saga:

> Metallgesellschaft's US subsidiary was reorganized in 1986 with equity capital of $50 million and net sales of $1.7 billion from trading in US government bonds, foreign currency, emerging markets instruments, and various commodities. The US subsidiary's oil business, organized under MG Refining and Marketing (MGRM), grew significantly between 1989 and 1993. In 1989 the company obtained a 49% stake in Castle Energy, a US oil exploration company, whose transformation into a refiner MGRM helped finance. MGRM contracted Castle Energy to purchase their output of refined oil products -- approximately 46 million bbl. per year -- at guaranteed margins for up to 10 years, and assembled a large network of infrastructure necessary for the storage and transport of oil products. During 1992 and 1993, MGRM succeeded in signing a large number of long-term contracts for delivery of gasoline, heating oil, and jet fuel oil to independent retailers. By late 1993 MGRM had become an important supplier. In addition MGRM ran large trades in energy-related derivatives. Its portfolio included a wide variety of over-the-counter forwards, swaps, and puts, and it did large amounts of trading in futures contracts on crude oil, heating oil, and gasoline on a number of exchanges and markets.

As stated, MGRM was involved in intermediating the spot market for oil products with the long term forward market. For this business strategy to work, MGRM had to be directly involved in sophisticated risk management. Though some of the risk could be captured with longer dated OTC products, to accurately handle the risk it was assuming for customers, MGRM also had to use oil complex futures contracts. Due to limited liquidity in longer dated delivery dates, MGRM had to implement a rolling stack hedging strategy, involving short dated futures contracts.

As discussed in Section 6.1 and demonstrated in numerous sources, e.g., Culp and Miller (1995), a rolling stack hedge can have a sizable basis risk. For the MGRM story, this basis risk was dramatically compounded by variation margin costs and certain peculiarities of German accounting principles. As a result, a promising business plan was destroyed by inadequate execution. That MGRM had a business plan is apparent. The plan commenced with the recruitment of a management team with a track record in implementing a similar plan at Louis Dreyfus Energy Corporation. The program was featured on the cover of the annual report of the parent corporation, MG AG. Under Under the forward supply or “flow delivery” contracts MGRM had contracted to deliver approximately 160 million barrels of associated oil products, primarily heating oil and gasoline, at fixed prices under contracts stretching out ten years. These contracts had a sell-back option clause, permitting the counterparty to terminate early if the market price was some threshold greater than the fixed price at which MGRM had contracted to deliver. The counterparties in these contracts were a mix of retail gasoline suppliers, large industrial corporations and a few government bodies. The fixed price contracts written by MGRM provided for a spread over current spot market prices of from $3 to $5 per barrel, with many of the contracts being written in the summer of 1993. This was the profit margin that MGRM had to design a hedging strategy to protect. The unhedged risk to MGRM was that prices would rise and MGRM would be obligated to deliver oil products at lower than market prices. To hedge this spot position, circa late 1993, MGRM had a position of 100 to 110 million in energy swaps and 55 million barrels in heating oil and gasoline futures on NYMEX. It seems that MGRM was pursuing a long one-to-one hedge. An important complication facing MGRM was the lack of liquidity in long dated maturities for both futures and swaps. Instead of implementing a relatively riskless strip hedge (see Sec. 6.1), MGRM was

obliged to use a rolling stack hedge. Apparently, this was considered to be a benefit to MGRM, due to rollover gains implied by a one to one hedge when futures prices are in backwardation.

Unfortunately for MGRM in the later part of 1993 oil prices fell. While this would be an excellent outcome for an unhedged MGRM, the long hedge positions started losing significant amounts of variation margin. In addition, futures prices went into contango, dictating rollover losses instead of rollover gains. These negative variation margin cash flows were not matched by offsetting mark to market gains on the long term forward delivery contracts. Such was the business risk that MGRM assumed. Prices fell from the $19 level to below $15, combined with the rollover losses, meant cash flow requirements to the hedge in the hundreds of millions of dollars. As it turns out, German accounting principles, that were applicable to the parent corporation, required the classification of these variation margin payments as losses. In what can only be described as a classic case study in strategic risk management, on Dec 17, 1993 the supervisory board of Metallgesellscaft fired the management board chairman and brought in new management with a mandate to liquidate both MGRM derivative security positions and its forward supply contracts.

The end result of the supervisory board decision can be estimated at $640-$800 million on the derivatives positions alone. The cancellation of the forward supply contracts was done without penalties, thereby releasing the counterparties from what was a positive cash flow situation for MGRM, again losing value. The MGRM saga has several key questions to examine. Among these points, one stands out: what were the members of the supervisory board thinking about when they pulled the plug on the operation? Unfortunately, the deliberations of the board, such as they were, are hidden behind the veil of corporate secrecy. It is apparent that the hedging strategy that was implemented was not well understood *ex ante* by the supervisory board. As such, the Metallgesellschaft failed to follow a tenet of strategic risk management: that the risk management program is enterprise wide. Senior management needs to understand the stress test values for the various cash flows that could result from a particular risk management operation.

Index Option Straddles and the Collapse of Barings Bank (1995)

Of all the derivatives debacles of the 1990s, the collapse of Barings Bank is the closest to a true debacle. The Barings case is, arguably. also the most notorious, even inspiring a movie, *Rogue Trader*, in addition to numerous books and magazine articles. The general details are well known: in 1992, Barings Bank shipped a young clerk in its London office to its Barings Futures subsidiary in Singapore to handle settlement operations and back office accounting. The name of that clerk was Nicholas Leeson. Soon after getting settled into his job in Singapore, Leeson receives permission to take the SIMEX exams, required for floor trading. He passes the exams and begins activity as a floor trader on SIMEX, while still holding responsibility for back office and settlement, a situation that persisted when, in late 1992, Leeson was named head trader and general manager for Barings Futures (Singapore).

What transpired from the point of Leeson's assuming control of Barings Futures (Singapore) (BFS) is quite remarkable. Due to the veil of corporate secrecy, it is difficult to say precisely 'who-knew-what-and-when'. Such points have been the subject matter of numerous media speculations. It is clear that Barings's senior management did approve Leeson to engage in proprietary trading for Barings own account. The strategy that apparently was approved was inter-exchange arbitrage on two SIMEX contracts that are cross listed in Osaka. The trader follows prices on the two exchanges, seeking to purchase a lower priced contract on one exchange while 'simultaneously' selling an otherwise identical higher priced contract on the other exchange. Actual profits will depend on a range of factors, including skill at executing trades quickly and at lowest cost. There was two contracts that Leeson could arbitrage: the Nikkei-225 stock index and the 10 year Japanese Bond (JGB). There is an element of speculation in such activities, but if the program is properly executed the operation is fully hedged, not unlike a specialized hedge fund.

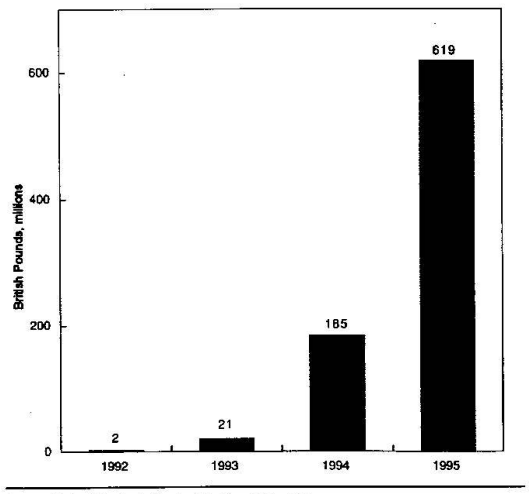
What followed on Leeson’s emergence was a BFS profit of £8.8 million for 1993, eight times the 1992 level. The first half of 1994, BFS reported profits of £20 million, a dramatic contribution to a bank with total pretax profit of £55 for the same period. These profits, occurring at the same time that profits at other investment banks were falling, due partially to a slump in global bond markets. While explainable in terms of the type of operation that

was being run at BFS, the size of the profits did attract head office attention and an auditor was dispatched to Singapore in August 1994. What the auditor reported was significant: the auditor correctly identified that Leeson was in charge of both trading and settlement, a clear breach of sound operational management procedure. This finding was discussed by the Barings board and, for whatever reason, the decision was made not to tinker. This decision ultimately doomed the bank to failure (see Figure 1.5).

It seems that, almost from the beginning, Leeson was hiding losses in the infamous Error Account #88888. Such accounts are usually used to capture settlement on floor trades that are disputed, e.g., due to an incorrect reading of hand signals. Information from such accounts is usually omitted until the dispute is resolved, as there is no ascertainable market value until that time. Using this blind, Leeson was able to instruct clerks at BFS to omit acct. #88888 when passing information along to head office. An analysis of the entrails of Leeson's activities reveals a range of oversight failures, such as a web of concealed trades, trading on proprietary account under the guise of trading for customer accounts. From an initial hidden loss of £2 in 1992, Leeson was able to limit his trading losses until October 1993 when large losses reappeared. To avert the cash flow from variation margin calls that would likely have unraveled his schemes, Leeson was able to turn to the cash flow available from writing options.

The strategy for which Nick Leeson will be forever famous is the written straddle, though Leeson was also involved in related trades such as the written strangle. In Leeson's case, this strategy involved writing matched combinations of puts and calls on the Nikkei-225 futures contract (see Sec. 7.2). In order to maximize the time premium received, such options are usually written at-the-money. Such a strategy would generate substantial premium cash inflows, that Leeson could use to disguise the actual state of affairs at BFS. During 1994, actual (unreported) losses on trading activities were such that Leeson began pyramiding options positions. By Jan.1, 1995 the size of Leeson's position was short 37,925 Nikkei calls and 32,967 Nikkei puts, combined with a 1000+ long position in Nikkei stock index futures. The exposure of this position to large moves in the underlying security is a textbook illustration of the non-linear impact of options on Value at Risk, e.g., Jorion (2001, p.215-9).

Figure 4 Concealed Trading Losses



Source: Bank of England, Board of Banking Supervision

The Kobe earthquake of Jan. 17, 1995 brought down the house of cards. How this particularly house fell is a separate story in itself. In the face of a fall of 1500 points in the Nikkei, Leeson sustained a loss of £68 million. In reaction, Leeson began taking on increasingly larger positions in futures, both long Nikkei futures and short Japanese government bond. The rationale for these trades was evident, Leeson was gambling in an attempt to recoup the losses. The next part of the story is that SIMEX permitted Leeson to execute this strategy. Kuprianov (1995, p.24) relates the details:

> By Feb 23, Leeson had bought over 61,000 Nikkei futures contracts representing 49 percent oof total open interest in the March 1995 Nikkei futures contract and 24 percent of the open interest in the June contract. His position in Japanese government bond futures totaled just over 26,000 contracts sold, representing 88 percent of the open interest in the June 1995 contract. Leeson also took positions in Euroyen futures. He began 1995 with long positions in Euroyen contracts ... but then switched to selling the contracts.

The massive margin calls from SIMEX that hit Barings following the earthquake did generate meetings between the exchange and Barings officials. Under the mistaken impression that the SIMEX positions were being hedged with offsetting positions in Osaka, the Barings officials gave assurances all obligations would be met.

In all of this, it is difficult to believe that someone, somewhere did not step in to blow the whistle on this caper before Leeson was permitted to build up the staggering positions in futures. A firm with an equity capital of approximately £440 million was exposed to variation margin losses more than double that amount. Apparently, no one was able to sit down and do some elementary calculations. In any event, the whole situation slowly

unfolded. In mid February, head office dispatched a clerk who uncovered the inevitable irregularities, one particular item for $190 million being of especial interest. After having some difficulty tracking down an illusive Leeson, the clerk was finally able to get Leeson in a dinner meeting on Feb. 23. Just after the start of the meeting, Leeson got up from the table to go to the washroom and did not return. He and his wife bolted that evening, Leeson faxing his resignation from a hotel in Kuala Lumpar. The fugitive couple was eventually taken off a plane in Germany, in a vein attempt to reach British justice. This plan, like so many others in Nick Leeson's life, was a failure. Leeson was returned to Singapore to face several years in jail.

Ultimately, Leeson's activities led to the demise of one of the most respected names in British banking qualifying the event as a true debacle. Barings, founded in 1762, could boast that the Queen of England was a client. Yet, the default of Barings revealed equally as serious cracks in process by which futures exchanges operate. Competition between SIMEX and Osaka seems to have adversely impacted the end result. SIMEX was granting Leeson exemptions from speculative positions limits (see Sec. 1.1) on the basis of offsetting positions in Osaka. This was done without accurate monitoring of whether there were positions in Osaka. There was little or no communicate between the competing exchanges. The default of a major player, such as Barings, also triggered conflicts over margin rules and their implementation. Leeson's activities made it difficult for SIMEX to ascertain which margin deposits went with which client accounts. The whole question of legal claim to margin is complicated in the presence of a defaulting firm operating in so many jurisdictions.

The Collapse of Long Term Capital Management (1998)

Long Term Capital Management, LP (LTCM) is a Delaware limited partnership founded in early 1994, though the roots of the enterprise can be traced back to early 1993 when John Meriwether began to assemble of group of principles for the fund that was to become LTCM (Dunbar 2000). Meriwether was at this time something of a Wall Street icon, having built the Salomon Bros. bond arbitrage group into an industry legend during the 1980s, only to be displaced in the aftermath of the Treasury auction scandal that hit Salomon in 1991.[36] By August 1993, seven 'principals' has been assembled. In addition to previous members of the arbitrage team from Meriwether's time at Salomon, the group also included two of the most noteworthy individuals in modern finance: Robert Merton and Myron Scholes. It is reported that the collapse of LTCM in September 1998 was a serious financial hardship for Merton and Scholes.

LTCM was a hedge fund (see Sec. 3.4). Yet, LTCM was much more than just a hedge fund, as the specifics of LTCM demonstrate (Presidential Working Group, p.15):

> Overall, the distinguishing features of the LTCM Fund were the scale of its activities, the large size of its positions in certain markets, and the extent of its leverage, both in terms of balance-sheet measures and on the basis of more meaningful measures of risk exposure in relation to capital. The Fund reportedly had over 60,000 trades on its books, including long securities positions of over $50 billion and short positions of an equivalent magnitude. At the end of August, 1998, the gross notional amounts of the Fund's contracts on futures exchanges exceeded $500 billion, swap contracts more than $750 billion, and options and other OTC derivatives of over $150 billion.

With over 60,000 trades in place when the collapse came, the scope of LTCM activities was spread over a wide range of trading activities, concentrating primarily on bond market strategies. Not surprisingly given the background of the active principles, around 80% of the LTCM balance sheet was concentrated in government bonds of G-7 countries, though this disguises the use of substantial futures positions in interest rate futures and equity futures. These positions were spread over a dozen futures and options exchanges around the globe.

LTCM was initially a very profitable venture. In 1995 and 1996, LTCM averaged, net of fees, a 40% return per year, followed by slightly less than 20% in 1997. As an appeasement to certain fund investors, the decision was made to return approximately 36% of the fund's capital at the end of 1997, leaving $4.8 billion in capital to support the underlying positions. If Dunbar (2000, p.189-90) is correct, this was a conscious decision. To support his statement Dunbar provides anecdotes from interviews with both Scholes and Miller in April 1998 as well as the following quote from Merton's December 1997 Nobel lecture:

> Non-financial firms currently use derivatives to hedge price risks. With improved lower-cost technology, this practice is likely to expand. Eventually, this alternative to equity capital as a cushion for risk could lead to a major change of corporate structures as more firms use hedging as a substitute for equity capital; thereby moving from publicly traded shares to closely-held private shares.

This decision to improve capital acted to releverage the fund, holding the size of the firm's positions constant. A similar result could have been accomplished by increasing the position sizes, without redistributing capital.

The first cracks in LTCM started to appear in May and June of 1998 when losses of -$312 and -$461 million hit the fund. Though not bound by the VaR based capital rules applied to financial institutions (see Sec. 2.2), LTCM was an active user of the techniques and the fund operated with a monthly VaR constraint that was violated in both May and June. It was immediately apparent to LTCM management that position sizes had to be reduced in order to reduce the daily VaR from $45 million to $35 million. In a fund composed of so many different 'money machines' this was a complicated task, especially as there was substantial differences in the liquidity of the various positions. The debate within LTCM over how this was to be accomplished was contentious. On one side were the wizards of Wall Street, traders with decades of combined experience running successful arbitrage operations. This group argued that the losses were an aberration, not likely to reoccur. Reducing volatility by selling off liquid positions would be sufficient to stem the tide.

In opposition to this view stood the giants of the academic world: Scholes and Merton. Dunbar (2000, p.196) captures their position using a quote from the interview he had with Scholes two months prior to the deliberations about reducing LTCM position sizes:

> Suppose you have a hedged book, and then you have to reduce the size of your balance sheet due to adverse hits to your capital. There's always a tendency to reduce or sell your more liquid securities first. If things continue to go against you, then you're left with the more illiquid securities, and a very unhedged book. So that's a very bad strategy. You should reduce your book proportionately – liquid and illiquid together.

The difficulty with this position was that it would be painful, and possessed a range of risks. For example, the process of unwinding some of the illiquid positions, e.g., market maker positions in Russian bonds or long dated equity options, could unsettle markets and generate further possible losses. In addition, the most liquid positions had nowhere near the profit potential of the least liquid. Ultimately, this Meriweather sided with the traders and the decision was made to liquidate the most liquid positions.

Much like the Kobe earthquake decimated Nick Leeson, the Russian devaluation of the ruble and declaration of a debt moratorium on Aug. 17, 1998 hit LTCM. Though LTCM did have some direct exposure to Russian debt, the impact of the Russian devaluation hit hardest through its impact on market liquidity and risk spreads in markets throughout the world. As the Report of the Presidential Working Group (1999, p.15) points out:

> The size, persistence, and pervasiveness of the widening of risk spreads confounded the risk management models, estimated during more stable periods, suggested were probable. Moreover, the simultaneous shocks to many markets confounded expectations of relatively low correlations between market prices and revealed that global trading portfolios like LTCM's were less well diversified than assumed. Finally, the 'flight to quality' (generated by the Russian devaluation) resulted in a substantial reduction in the liquidity of many markets, which, contrary to the assumptions implicit in their models, made it difficult to reduce exposures quickly without incurring further losses.

During the month of August 1998, LTCM lost $1.8 billion. This reduced capital to $2.3 billion and triggered a wide range of counterparty difficulties. Credit became difficult to obtain, haircuts were raised, OTC trades were difficult to execute, the list is endless. To add insult to injury, the fund became the source of intense media speculation during the early part of September 1998.

The end for LTCM came swiftly. On Monday September 21, it became apparent that there was a real likelihood of default on scheduled payments as early as Wednesday Sept. 23. Four principal counterparties for LTCM banded together on Tuesday and by Wednesday had put together a consortium of fourteen firms able and willing to recapitalize LTCM with $3.6 billion in new equity in exchange for a 90% equity share in LTCM, along with operational control of the funds various positions. The claims of the original investors were thereby reduced to

10%, an indication of the size of the losses in September. As a result, the LTCM episode, that had the potential for creating considerable disturbance in financial markets, passed with only a few ripples. The burden of resolving the mess fell to those entities that had permitted LTCM to grow and flourish. It is a credit to the integrity of those involved at LTCM that acted in the face of adversity, and did not give in to the temptation to attempt to recover losses, à la Leeson.

Lessons from the Recent Derivatives Debacles

It is difficult to pick a "most important" lesson from the derivative debacles of the 1990s. There are the essential lessons for regulators. How the growth of information technology, the globalization of trading and the reliance on perceived creditworthiness in assessing complicated counterparties all are outstanding issues that threaten the *ad hoc* fabric of industry self-regulation and multiple national regulators. The are the lessons for corporate risk managers: business plans that depend fundamentally on risk management using derivative securities needs to be adequately stress tested and evaluated; and, senior levels of management have to be an integral part of the risk management decision process. These lessons apply for both financial firms, such as Barings, and non-financial firms such as MGRM. There are also the lessons for end users: risk management products can get so complicated that end users are unable to accurately price the derivative products being used, e.g., the leveraged swaps undertaken by Proctor and Gamble (Smith 1997) or the tear-up and rollover swaps of Gibson Greetings (Overdahl and Schachter 1997). Another lesson is that risk management products can be used as a guise to mask speculative activities, e.g., Orange County (Jorion 1997, Miller and Ross 1997).

One of the most important lessons from the recent derivatives debacles is an old story: strategic risk management is important. While the precise meaning of strategic management will be discussed in Section 2.4, it can briefly be described as identifying, implementing and monitoring the risk management philosophy of the firm. Both MGRM and Barings had a risk management philosophy that was fundamentally unsound. The process within which risk management decisions were being made did not provide for adequate integration of senior management into the decision making process. Communication between senior managers and line operators was corrupted. As the unnecessary losses sustained when unwinding the positions indicates, senior managers also did not have the analytical systems in place to fully appreciate the nuances of the decisions that had to be made when damage control was required.

In a corporate setting, risk management has to be approached in an integrated manner. Developing such an integrated approach is an essential feature of strategic risk management. Many, many firms are able to do this successfully. Yet, there are numerous cases where risk management has not been properly implemented. In some cases the consequences are devastating. In Barings case, giving Leeson line control for audit and trading was the result of not having systems in place to identify *and rectify* such situations. Strategic risk management is a process. Sometimes the risk management philosophy is well designed but the firm still fails due to the misjudgment about the inputs to the risk management process. LTCM had a sophisticated risk management philosophy, but was defeated by misjudgments about business and liquidity risks. In the end, it seems that strategic risk management is a necessary but not sufficient condition for a successful risk management program.

Another essential, if often overlooked, lesson is also another old story: accounting for derivatives is important. In some cases accounting played a direct role, such as in the MGRM case where German accounting rules for the variation of margin payments on the rolling stack hedges triggered decisions by senior management that, ultimately, cost over $1 billion. In other cases, accurate risk management accounting was required. As discussed in Section 2.2, the need for such accounting systems in financial firms produced, during the 1990s, the Value-at-Risk (VaR) methodology for risk measurement. VaR is well suited to assessing market risk situations and financial firms have embraced the technique. However, the extension of VaR to risk management for non-financial firms is, at best, exploratory, e.g., Godfrey et al. (1998). Even for financial firms, there are inherent difficulties with VaR. For example, it is not clear that VaR, which is associated with 'normal reasonable loss', would have been much help to LTCM in assessing the risks that were being assumed.

There are also some new stories included in the debacles. One new lesson was made possible by the bewildering array of risk management products available. The immense risk management industry now produces a vast range

of products which end users have to assess and integrate, if needed, into risk management planning. This creates the possibility of over managing the risk. There are dangers as well as benefits in sophisticated risk management. Some products seem to be little more than gambling vehicles for risk managers, e.g., Orange County. Various debacles, such as MGRM, Proctor and Gamble (PG), Gibson's Greetings and others, involved firms that undertook derivative positions or strategies which were not adequately understood. In the case of Gibson's and PG, the firms apparently fell victim to an aggressive investment banker that over priced the products which were being marketed. In the MGRM case, the mechanics of the relatively sophisticated strategy of hedging a long term forward oil delivery contract with a short term rolling stack hedge in oil futures was not well understood.

All lessons considered, it is possible to conclude that derivative debacles are not homogeneous events. There is a range of factors that can contribute to a specific debacle, including attempted manipulation, fraud, and miscalculation. Through it all, the financial system has experienced some severe turbulence almost certainly associated with derivatives trading, such as the US stock market crash of 1987 and the run up in silver and other metal prices in 1980. Fortunately, turbulence over the last decade has not been too significant, though the strength of the American economy during the 1990s could be masking fundamental weakness in the system within which risk management activities are regulated. In the face of the explosion in products and usage, the regulation and oversight of derivatives markets still remains ad hoc and unstructured. How was LTCM, a hedge fund operating in the US under exemptions in securities law capable of leveraging a capital of a few billion into over a trillion in principal value of derivative positions? The story, together with the cast of characters ranging from Meriweather to Merton and Scholes, is the stuff of market legends. Through it all, not a regulator in sight.

Derivative securities pose real public policy problems. The LTCM collapse revealed many holes in the patchwork of US regulators and regulation. That the event was contained is a tribute to the integrity of the players, and speaks to the viability of the self-regulatory incentives inherent in the market system. However, a similar set of circumstances with different players may not have produced the same result. As the Presidential Task Force on the LTCM collapse concluded:

> The central public policy issue raised by the LTCM episode is how to constrain excess leverage more effectively. As events in the summer and fall of 1998 demonstrated, the amount of leverage in the financial system, combined with aggressive risk taking, can greatly magnify the negative effects of any event or series of events. By increasing the chance that problems at one financial institution can be transmitted to other institutions, leverage can increase the likelihood of a general breakdown in the functioning of financial markets.

The abuse of leverage in market meltdowns is a story stretching back to John Law and the Mississippi scheme. Leverage played a key role in the Great Depression of 1929-1933. The associated public policy lessons are also very, very old.

1.3 Characteristics of Users of Derivative Securities

Sources of Information

Identifying users of derivative securities and their motivations presents some difficulties due to the lack of an organized system of collecting information about the relevant transactions. For the exchange traded derivatives, which includes futures, warrants, and some options, filing requirements for regulatory bodies such as the CFTC and the SEC, as well as the exchanges, provides some indication about the types of users, the size of trades and so on. However, this information, such as that contained in the “Commitments of Traders” report issued by the CFTC (see Sec. 3.1), is cursory. In addition, a wide variety of derivative instruments are traded OTC and trading activity in these markets is often considered proprietary information. Where the traders are financial institutions, reporting requirements for these institutions provide some additional information about OTC positions. As these firms are also market makers, some indication of market size can be determined. Where trading is done by publicly listed firms, some useful information can be obtained from annual reports. Though the methods of accounting for derivatives can make the balance sheet and income statements difficult to interpret, e.g., Gastineau (1995), recent

changes to accounting for derivatives, such as FAS 133, have improved this situation considerably. The annual reports of many financial institutions, e.g., the Bank of Montreal, the Royal Bank, are exemplary efforts at capturing the risk profile of the firm in the annual report.

A considerable amount of data on derivative transactions is collected by dealer organizations, such as the International Swap Dealers Association (ISDA). This is consistent with the self regulatory framework of the OTC markets. However, as the data originated from dealers, the classifications are in terms of types of contracts and does not address motives. A similar comment applies to data generated by the trade component of the financial press, such as the International Financing Review, Risk magazine and Euromoney. These are sources for hard data on certain types of transactions. There is also a wealth of stories in these sources relating to motivations of particular end users as well as market makers. Though anecdotal, such reports are valuable insights into the past and current state of the market practices. In addition, these and other trade sources occasionally report surveys of both firms using derivatives and dealers in derivatives.

In addition to these sources, there are also academic surveys of both firms using derivatives and dealers in derivatives. Over the years a number of such studies have been done. Some of the studies are aimed at specific types of risk, such as Batten and Mellor (1993) on foreign exchange hedging by Australian firms. Others are aimed at specific commodities, such as Gehr and Martell (1994) on use of derivatives in the gold market or at specific types of derivatives, e.g., Abken (1994). Finally, there are survey studies aimed at all derivative usage by non-financial firms, of which Bodnar, et al. (1995, 1996, 1998), Howtan and Perfect (1998), Berkman (1997), and Phillips (1995) are useful examples. In the following, these studies provide for an overview of the types of firms using derivatives and the instruments used to hedge (classified according to the type of commodity being hedged). Bodnar, et.al. (1995, p.111) provides the following useful conclusion about the general use of derivatives: "In marked contrast to the conclusions one would draw from reports in the press ... derivatives are not commonly used to 'speculate' on market movements. Indeed the survey indicates that derivatives are most commonly used to reduce the volatility of the firm's cash flows."

Available Information on Derivative Usage by Financial Firms

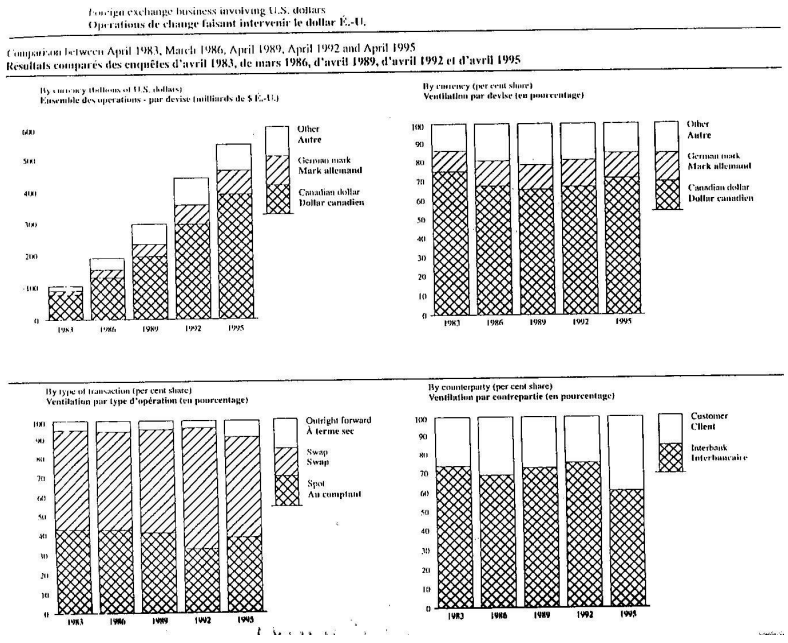
Derivative usage by financial firms is substantively different than for non-financial firms. Not only are certain financial firms the key market makers in the trading of derivatives, the cash flows and balance sheet/market value of financial firms are directly exposed to market risks. Hence, financial firms are also important end users of derivative products. This complementarity makes figures on derivative usage by financial firms particularly complicated to interpret. In addition, financial firms are subject to a wide range of regulations not applicable to non-financials. These regulations require a range of reporting requirements that do permit the derivative market activities of financial firms to be directly studied, in a way that is not possible for non-financial firms where derivative trading activities can be considered proprietary information.. Various national and international government organizations, such as the BIS, the CFTC and the Board of Governors, are useful sources of information.

Ten Holding Companies with the Most Derivatives Contracts
(June 30, 1993, Notional Amounts, $ Millions)

Rank	Holding Company Name	State	Assets	Total Derivatives	Total Futures and Forwards	Total Swaps	Total Options
1	Chemical Banking Corporation	NY	145,522	2,117,385	1,245,500	554,257	317,628
2	Bankers Trust New York Corporation	NY	83,987	1,769,947	816,740	355,597	597,610
3	Citicorp	NY	216,285	1,762,478	1,207,132	264,811	290,535
4	J.P. Morgan & Co., Incorporated	NY	132,532	1,550,680	572,897	579,219	398,563
5	Chase Manhattan Corporation	NY	99,085	1,125,075	666,150	258,086	200,839
6	Bankamerica Corporation	CA	185,466	899,783	581,034	229,926	88,823
7	First Chicago Corporation	IL	49,936	452,780	276,790	100,666	75,324
8	Continental Bank Corporation	IL	22,352	170,052	61,058	52,953	56,041
9	Republic New York Corporation	NY	36,205	164,979	81,707	45,504	37,768
10	Bank of New York Company, Inc.	NY	41,045	91,434	65,128	12,200	14,106
	Top 10 Holding Companies			10,104,592	5,574,136	2,453,219	2,077,236
	Other 205 Holding Companies			617,374	247,461	227,278	142,574
	Total Notional Amount for All Holding Companies			10,721,965	5,821,597	2,680,497	2,219,811

Note: *Table includes data for companies with total assets of $150 million or more or with more than one subsidiary bank.*
Source: U.S. Congress (1993), using data from the Board of Governors of the Federal Reserve System Consolidated Financial Statements for Bank Holding Companies (FR Y-9C).

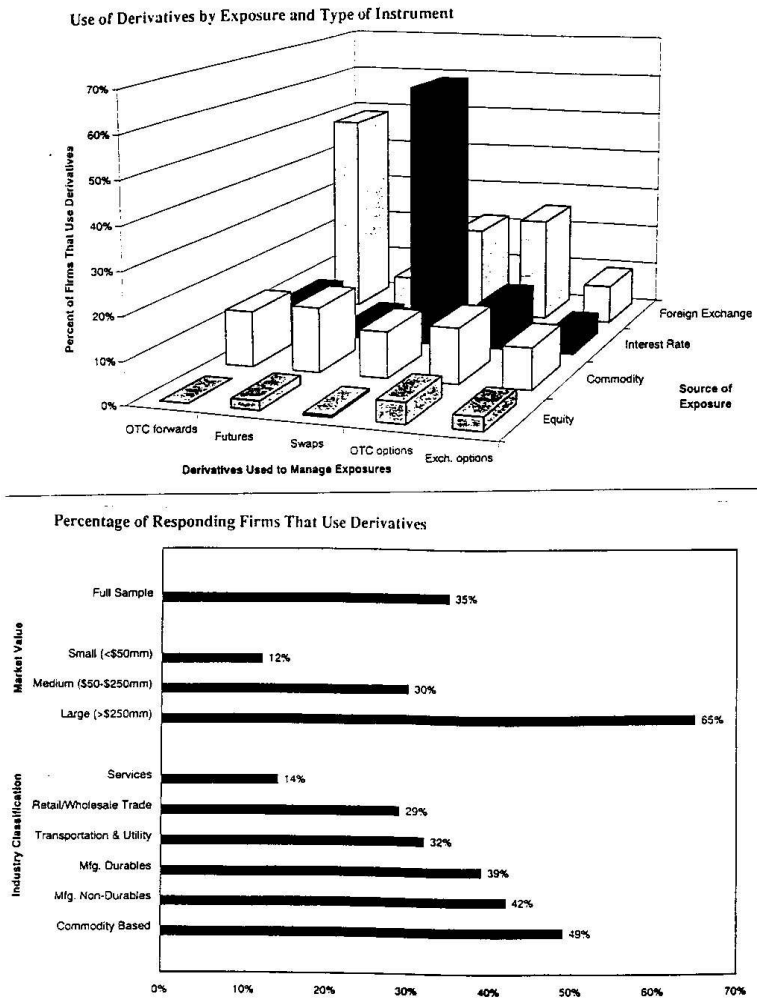
For example, Abken (1994) reports information collected from government sources about the aggregate notional values of the derivative positions of the top ten US financial institutions (see Figure 1.6). The size of the derivatives positions appear staggering. Bankers Trust, for example, has a total derivatives position of $1.76 trillion on assets of only $84 billion. This one firm had almost $600 million in outstanding options positions. Recognizing precisely how notional principal relates to cash flow volatility is the subject of Chapter 9. This data makes it apparent that the risk management problems of financial institutions, particularly those involved in making markets in derivatives, are substantively different from those of non-financial firms. With the rapid growth in derivative trading, regulators of financial institutions have reacted by making significant advances during the 1990's in determining the actual cash flow exposure of a financial institution to changes in market risk.



The Bank of Canada has for many years conducted a triennial survey of the foreign exchange business of Canadian banks. Tabulated results of these surveys appear every few years in the Bank of Canada *Review*, "Survey of the Canadian foreign exchange and derivatives markets". Using this source, the relative importance of foreign exchange swap trading relative to spot and outright forward trading in the Canadian foreign exchange market is provided in Figure 1.7. Virtually all participants in the Canadian foreign exchange market are surveyed. Examining Figure 1.7 reveals that more than half of the dollar value of trading in foreign exchange is in the form of swaps, significantly more than outright spot transactions. Trading in outright

forward exchange contracts is a relatively small part of foreign exchange trading. Swap trading is used for a range of banking activities, and not just to do covered interest arbitrage transactions. For example, banks will use swaps to balance the currency composition of deposits and investments.

The Wharton Survey of Non-Financial Derivative Users



The Wharton surveys, Bodnar et al. (1996, 1998) were motivated by a desire to create a database suitable for academic studies of risk management. Phillips (1995) is an earlier study along these lines. The Wharton survey is of particular value because of its initial motivation and its coverage. Only non-financial firms were surveyed with an initial randomly sampled group of 2000 firms covering over 40 industries. In the initial survey, 530 firms responded, a 26.5% response rate. Of these 530 firms, 35% reported derivatives usage., with large firms, having assets over $250 million being heavy users at 65% of firms in that category using derivatives. Only 12% of small firms, assets less than $50 million, used derivatives. Usage by type of firm, by industry group as well as the distribution of the usage across type of instrument used is given in Figure 1.8. Of particular interest, non-financial firms are found to be big users of OTC forward contracts. This is in contrast to the evidence for banks given above for Canadian banks. This evidence is not contradictory. Rather, it illustrates the real differences in derivative usage for financial and non-financial firms.

The Wharton survey also covers a range of other topics of interest. Regarding the motivations for derivatives transactions, of all firms reporting derivative usage 80% used derivatives to hedge a firm commitment, with 45% of firms frequently using derivatives for this reason. Hedging anticipated transactions was another important reason for using derivatives , with 76% hedging anticipated transactions with maturities less than 12 months (46% frequently) and 50% hedging transactions with maturities greater than 12 months (15% frequently). Other important reasons for using derivatives were: hedging foreign dividends, 45% of total users (25% frequently); hedging an economic or competitive exposure, 40% of total users (16% frequently); reducing funding costs through new issue arbitrage, 33% of total users (5% frequently); reducing funding costs by taking a market view, 43% of total (9% frequently); and, hedging the balance sheet, 44% of total users (22% frequently). For 67% of non-financial firms reporting derivative usage, the most important reason for using derivatives was to minimize fluctuations in cash flow, a further 28% said the most important reason was to minimize fluctuations in accounting earnings.

Putting all this information together provides a snapshot of non-financial derivative security end-users. The

typical user is a large corporation in a commodity based or manufacturing industry, using predominately interest rate swaps and foreign exchange forward contracts to hedge firm commitments and anticipated transactions. Some typical users are also using derivatives, such as interest rate and currency swaps to lower or attempt to lower borrowing costs. All this points to the predominance of a transactions approach to hedging. Only 16% of all those firms reporting derivative usage identified frequently hedging an economic or competitive exposure. Though such patterns of usage may not always reflect best usage practices for derivatives, it is usually wise to presume that users are doing the best possible to use derivatives to manage their particular exposures.

In addition to information on usage, the Wharton surveys also have information about market practices. For example, a question was asked about the lowest acceptable credit rating for a counterparty to a derivative transaction, with few firms allowing below an A rating. There were questions on the types of software used, where there seems to be limited reliance on products developed by outside vendors. Finally, the Wharton surveys examined the extent of enterprise-wide or strategic risk management. A key step in strategic risk management is the integration of senior management into risk management decisions. With this in mind, it was reported that more than half the firms did not have a regular reporting schedule for relaying information about derivatives activity to the board of directors. This is a result from those firms reporting derivative usage. This disturbing result may simply reflect the low esteem to which the board of directors is held in large corporations. There may still be active, operational channels for risk management reporting in place. However, it is more likely that the result is representative, signaling a need for non-financial corporations to pay attention to operational risks when implementing a program involving derivative securities.

Other Surveys and Studies

Academic studies on derivatives usage abound, though the results are somewhat scattered, being limited by the data available and the tendency to focus on a particular theoretical framework, e.g., Gay and Nam (1998), Berkman and Bradley (1996) and Froot et al. (1993). Sometimes the studies are focused on specific issues that can readily be addressed with the data that is available. For example, the biweekly CFTC Commitments of Traders report divides open interest into positions held by large speculators, commercial hedgers and small/unclassified traders. This data series stretches back to pre-WWII period, when the series was collected by the Commodity Exchange Authority. At least since Houthakker (1957), studies have matched changes in positions for these three trader groups with changes in prices to determine which group of traders, on aggregate, earned what. Though results reported for different time periods and commodites do differ somewhat, Houthakker's (p.159) general conclusions are still useful:

> large hedgers lost and the large speculators gained. The small traders lost in (some commodities) but did quite well in (other commodities) ... Most conspicuous in these results is the consistent profitability of the large speculators' transactions ... the traditional picture of the small speculator as an incurable bull, too ignorant to understand shortselling, is incorrect. In fact, small traders do not appear to be less inclined to the short side than the large professional speculators ... On the other hand, the small traders are rather less successful when net short than the large speculators in similar circumstances.

In comparison with studies on motivations and activities of hedgers and risk managers, there are few studies examining speculators.

Many academic studies are motivated by the desire to provide an empirical basis for the different theories of hedging behavior (see Sec. 2.4). For example, Géczy et al. (1997) explore notions advanced by Froot et al. (1993, 1994) that firms with greater growth opportunities and tighter financing constraints are more likely to engage in risk management activities, particularly hedging. The rationale for this view is that by reducing cash flow variability firms are better able to access internal sources of funds to invest in growth opportunities. Examining the use of currency derivatives for a sample of 372 of the *Fortune 500* non-financial firms, Géczy et al. (1997) find evidence in favor of the Froot et al. (1993) hypothesis. In addition, evidence was also provided that firms with either high levels of exchange rate exposure or economies of scale in hedging were also more like to use derivatives to manage currency risk. All this evidence is consistent with what is contained in the Wharton survey.

Reducing cash flow variability is unambiguously the most important reason identified for using derivatives. Whether the benefits from this reduced variability are translated into lower risk of bankruptcy or into more certain access to cheaper sources of internal financing or into enhanced profitability due to lower funding costs or whatever will depend on the specifics of the firms involved.

Tufano (1996) is an invaluable guide to sorting out the corporate motivations driving derivative usage. Tufano (p.1097) explicitly recognizes the relative absence of information about derivative usage:

> Academics know remarkably little about corporate risk management practices, even though almost three-fourths of corporations have adopted at least some financial engineering techniques to control their exposures to interest rates, foreign exchange rates and commodity prices. While theorists continue to advance new rationales for corporate risk management, empiricists seeking to test if practice is consistent with these theories have been stymied by a lack of meaningful data. Corporations disclose only minimal details of their risk management programs and, as a result, most empirical analyses have to rely on surveys and relatively coarse data that at best discriminate between firms that do and do not use specific types of derivative instruments. Case studies of individual firms, while providing greater detail on firm practices, typically lack cross-sectional variation to test whether existing theories explain behavior.

Why do firms use derivatives? The answer to this question is not easy to determine, if only because many firms view risk management practices as proprietary information and are reluctant to provide precise in-depth details about such activities. The recent implementation of FAS 133 imposes reporting requirements on publicly traded firms that will go some of the way to correcting this situation.

Tufano focuses on risk management practices of over 50 publicly-traded firms in the US and Canada "whose exclusive primary line of business is gold mining". One advantage provided by the gold mines is the relatively transparent risk management: "Quarterly reporting provides investors with extensive information on firms' use of forward sales, swaps, gold loans, options and other explicit or embedded risk management activities" (p.1098). Gold mining firms exhibit a wide range of risk management activities (p.1098):

> the gold industry has embraced risk management: over 85 percent of the firms in this industry used at least some sort of gold price risk management in 1990-1993. Furthermore, mining firms have adopted very different risk management approaches, ranging from Homestake Mining, which sold all of its production at spot prices and made vigorous pronouncements against gold price management, to American Barrick, which featured its successful hedging program on the cover of its annual report.

The wide variation in risk management practices and transparency in activities makes Tufano's sample particularly interesting.

Tufano tests for a range of theories that have been proposed to explain risk management activity and provides the following summary:

> I find that gold mining firms' risk management decisions are consistent with some of the extant theory. Managerial risk aversion seems particularly relevant; the data bear out Smith and Stulz's (1985) prediction that firms whose managers own more stock options manage less gold price risk, and those whose managers have more wealth invested in common stock manage more gold price risk. These results seem robust under a variety of econometric specifications, and using a number of proxy variables. In contrast, theories that explain risk management as a means to reduce the costs of financial distress, to break the firm's dependence on external financing, or to reduce expected taxes are not strongly supported. I also find that firm risk management levels appear to be higher for firms with smaller outside block holdings and lower cash balances, and whose senior financial managers have shorter job tenures.

This connection between a firm's usage of derivatives is not restricted to the gold industry. Shrand and Unal (1998) find similar evidence in the thrift industry. Examining a sample of thrift institutions that had converted from mutual to equity ownership, Shrand and Unal found that the level of risk management after conversion was related to the management compensation structure attained at conversion.

1.4 Regulations, Exchanges and Available Contracts

Information on the Internet

The Internet is rapidly becoming an essential source for background information on derivative securities markets, especially for the options and futures exchanges. Information on government and self-regulatory agencies is also readily available on the Web. A number of sites provide a list of pointers to other sites. One such site is the webpage for the author of this book, www.sfu.ca/~poitras, go to the links page where many such sites can be accessed, such as the National Futures Association, www.nfa.futures.org. There is also a link to a website for this book, that contains a substantial amount of supplementary material relevant to, but not included in, this book. All those interested in finding out about derivatives trading are strongly recommended to browse the exchange websites, such as the CBT, www.cbot.com , and the CME, www.cme.com. Both these are excellent industry sites. Typical information provided at an exchange Web site are contract specifications, margin requirements, recent exchange news, current and historical information on contract prices, volume and open interest, seat prices and pointers to other sites. This information is so accessible that it will be reproduced here only if essential to the presentation.

A list of some relevant sites, grouped by categories, are:

US and Canadian Futures and Options Exchanges

Chicago Board of Trade	www.cbot.com
Chicago Board Options Exchange	www.cboe.com
Chicago Mercantile Exchange	www.cme.com
(Includes International Monetary Market)	
Coffee, Sugar and Cocoa Exchange	www.csce.com
Kansas City Board of Trade	www.kcbt.com
New York Cotton Exchange	www.nyce.com
New York Mercantile Exchange	www.nymex.com
(Includes COMEX)	
Mid-America Commodity Exchange	www.midam.com
Minneapolis Grain Exchange	www.mgex.com

Foreign Futures and Options Exchanges

Blagnova Borsa	www.eunet.si
EUREX Frankfurt	www.eurexchange.com
Hong Kong Futures Exchange	www.hkfe.com
London International Financial Futures Exchange	www.liffe.com
London Metal Exchange	www.lme.co.uk
Malaysia Monetary Exchange Bhd.	www.jaring.my
Marche Terme International de France	www.matif.fr
Marche des Options Negociables de Paris	www.monep.fr
Rente Fija	www.meff.es
New Zealand Futures and Options Exchange	www.nzfoe.co.nz
Singapore International Monetary Exchange	www.simex.com.sg
The South African Futures Exchange	www.safex.com
The Sydney Futures Exchange	www.sfe.com.au
The Tokyo International Futures Exchange	www.tiffe.or.jp
The Tokyo Grain Exchange	www.tge.or.jp

Regulators

Commodity Futures Trading Commission	www.cftc.gov/cftc
NASD Regulation Inc.	www.nasdr.com
Office of the Comptroller of the Currency	www.occ.treas.gov
Securities and Exchange Commission	www.sec.gov
Bank of International Settlements	www.bis.org

Organizations and Associations

Futures Industry Association	www.fiafii.org
International Organization of Security Commissions	www.iosco.org
International Swap and Derivative Association	
Managed Futures Association	www.mfahome.com

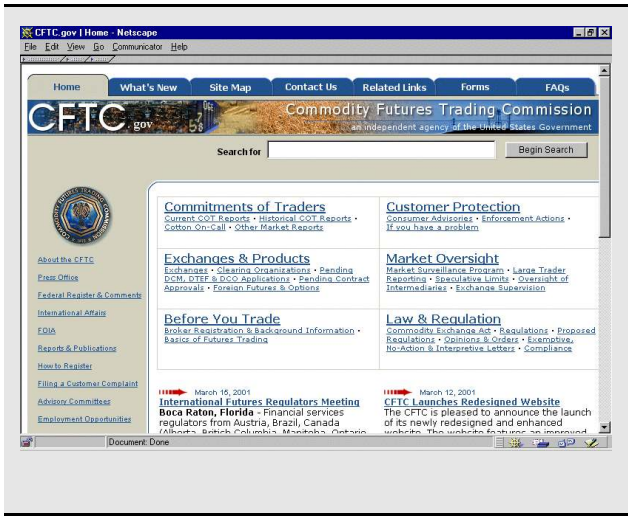
Other Exchanges (May Trade Some Derivatives)

International Petroleum Exchange	www.ipe.uk.com
Korean Stock Exchange	www.kse.or.kre
NASDAQ	www.nasdaq.com
New York Stock Exchange	www.nyse.com
Philadelphia Stock Exchange	www.phlx.com
Singapore Stock Exchange	
Tokyo Stock Exchange	www.tse.or.jp
Toronto Stock Exchange	

See Also

Sourcebook	www.futuresmag.com

Regulations



Much like information on contract specifications, margins, tick sizes, etc., the accessibility of information on the internet makes redundant a detailed discussion of current rules and regulations governing derivative securities. Both the SEC and CFTC websites have a wealth of information. For example, the CFTC website has a link to "Law and Regulation" where the following information is available: a complete listing of the Commodity Exchange Act; a downloadable copy of the most recent legislation, Commodity Futures Modernization Act of 2000 (H.R. 5660); drafts of proposed legislation; enforcement orders and complaints; and much more (see Figure 1.9). Those interested in gaining familiarity with this material are strongly directed to the regulator websites. What is of immediate interest in this section, is to overview the historical development of the regulatory framework.

In the derivative securities markets of the late 19th C., there were limited restrictions on market manipulation. "Cornering" the market was alleged on a regular basis.[37] The classic cornering strategy involved a ***short squeeze***. In this case, the manipulating group acquires a controlling position in the deliverable commodity while, simultaneously, taking on all the nearby long positions the market will allow. The short squeeze occurs when the manipulators stand for delivery. The shorts cannot get enough of the deliverable commodity, and the spot price is bid up significantly to draw new (or recycled) stocks into the market.[38] Recently, short squeezes have been associated with the market manipulations of the Hunt brothers in silver leading to the price collapse of 1980 and the Sumitomo Corp. in copper leading to the price collapse of 1996. In both of these cases, as in the Cargill case, exchange oversight played a key role in restraining questionable trading activity.

Historically, these types of abuses were compounded by the problem of contract defaults. Even though the early US futures exchanges featured clearinghouses, membership was voluntary and firms cleared their own trades. In this system, the clearinghouse acted primarily to collect and disperse funds for firms marking to market at the end of the day. The weakness in the clearing mechanism was not corrected on the CBT until 1925 when the CBT Clearing Corporation was established. While the Clearing Corp. did not initially clear trades, it did provide a guarantee. This was provided by requiring that all members mark-to-market daily and post and maintain margin accounts. From the establishment of the CBT Clearing Corp. no money has been lost due to the default of a CBT futures contract. Further complications were introduced by the presence of bucket shops, that did not actually make trades but only took the other side, "filling the order" using prices quoted on the exchange. In effect, bucket shops were betting parlors where the bets were placed on commodity price movements.

Both futures and forward trading have always been governed by some combination of government and self-regulation. The restricted access typical of forward markets makes a large degree of self-regulation practical in those markets. The general public access applicable to futures has created a need for a greater degree of government regulation. While initial government intervention attempted to target futures contracts for abolition, by the early part of the 20th C. it was generally recognized that improvements in the regulatory framework were more effective. In the US, the Grain Futures Act, passed in 1922, contributed substantially to raising standards on exchanges and improving trading practices. The Act enabled the government to deal with grain exchanges directly, instead of targeting individual traders. By providing for licensing of futures exchanges, the Act put the onus on the exchanges to be more effective in self-regulation to prevent price manipulation by member firms (and their accounts). The requirement that all futures trading take place on futures exchanges effectively finished what remained of the bucket shops. The Grain Futures Act was amended in 1936 and renamed the Commodity Exchange Act (CEA), that is still the centrepiece of US commodities regulation. The CEA (1936) extended the government's control of futures trading considerably: authority over speculative limits was established; registration requirements were imposed on floor brokers and futures commission merchants; cheating, fraud and market manipulation were made specific criminal offenses; and, restrictions were imposed on options trading.

By 1974, the growth in both volume of trade and the number of new contracts (over which the CEA had little effective control) brought a thorough reform. The CEA was amended to include the Commodity Futures Trading Act that forms the basis of current U.S. government commodities regulation. The CEA (1974) empowers the Commodity Futures Trading Commission (CFTC), the futures industry counterpart to the Securities and Exchange Commission (SEC) for equities. The CFTC is an "independent" five member commission appointed by the president, with authority to regulate all US futures trading and exchange activity. Included in the CFTC's mandate was the right to approve both the introduction of new contracts and changes in exchange bylaws. Together with these powers, the CFTC also has considerable emergency authority, e.g., assessment of large civil fines, cease and desist orders. In 1978, several amendments were made to the Act dealing with the issue of jurisdiction. In opposition to the position of both the SEC and the US Treasury, the CFTC was given exclusive jurisdiction over all future contracts, including the newly emerging financial futures contracts. Subsequent and ongoing legislative action has focused on clarifying the jurisdiction over options on futures contracts, especially for stock index futures.

Regulatory agencies in all countries impose requirements on participants in futures trading. For example, regulations about the opening and management of individual client accounts at commodity brokerage houses are

regulated provincially in Canada, and federally in the US, subject to relevant state statutes. The client deals with a registered futures representative of a securities firm. There are various categories of possible registration that can be satisfied. For example, in British Columbia, requirements are provided by the provincial Securities Commission (BCSC). In the Local Policy Statement 4-1, sec. 1.1 concerning the Commodity Contract Act Registration Requirements the BCSC states: "Commodity Contract Act section 13(1)(a) provides that no person shall trade in a commodity contract unless that person is registered as a commodity contracts dealer, as a commodity contracts salesman, as a commodity contracts trading partner or officer, or as a floor trader. Section 13(1)(b) provides that no person shall act as a commodity contracts adviser or as a commodity contracts advising partner or officer unless the person is registered as a commodity contracts adviser or as a commodity contracts advising partner or officer." The various, similar categories of registration in the U.S. are provided in Appendix V.

In Canada, the individuals typically involved making trades for client accounts are Commodity Contracts Salesman, Floor Traders and Commodity Contracts Trading Partners or Officers. Registration for these designations involves satisfying proficiency requirements that, in Canada, involve successful completion of the Canadian Futures Examination, given by the Canadian Securities Institute (CSI), and the National Commodities Futures Examination (NCFE) prepared by the Chicago Board of Trade for the National Association of Securities dealers. The NCFE is conducted in Canada by the CSI. Registration as a partner or officer also requires completion of the Partners/Directors/Officers Qualifying Examination. These individuals invariably work for securities firms that are registered to handle commodity accounts. Part of this registration process requires the preparation of a procedure manual that must describe "the policies relating to the acceptance of new accounts, including...a requirement that, prior to the opening of an account, the client is furnished with and signs copies of all applicable client information documents approved by the superintendent...[and] a requirement that the Designated Commodity Supervisor approve in writing all new accounts before they begin to trade...[as well as] the criteria used to review account applications ..." (Local Policy 4-1, p.6)

In all locales, commodity futures trading regulations require that client information documents be completed. These items, that are identified legally, include: the account application form; trading agreement; margin agreement; hedge letter; client authorization form/trading agreement for discretionary and managed accounts; and, a client information/risk disclosure statement. Representative samples of the more significant forms that must be completed before a customer can commence trading futures contracts are provided by following the links at www.sfu.ca/~poitras. In B.C., commodity contract dealers are permitted to use their own agreements and statements, subject to the prior approval of a self regulatory body or the Superintendent of Brokers. Once a client account has been correctly established, trading activity is subject to further regulation, such as position limits and filing requirements, associated with the exchange and legal jurisdiction in which the contract is being traded. In both the US and Canada, dispute resolution is divided between the exchanges and the securities regulator, the CFTC in the U.S. and the provincial securities commission in Canada.[39]

The US Exchanges, the OTC and Foreign Markets

The derivative markets can initially be decomposed into the OTC markets and the exchanges. This is a useful distinction, if only to reflect the differences in reporting requirements and rights of access. Most equity exchanges offer options, such as warrants and rights issues, but the bulk of exchange trading of derivatives takes place on the various futures and options exchanges. Though not as formalized as the exchanges, the OTC derivatives market is centrally connected to a ring of specialized brokers and a core group of dealers. Restrictions placed on access to direct trading in the OTC markets serve to further define these markets.

From the early beginnings on the CBOT in the 19th C., trading in futures and options on futures has grown to global proportions. The number of contracts offered, volume, open interest and all other measures of derivative trading have increased substantially over time. This growth has been dramatic since the introduction of financial futures. Trade in financial commodities started with currencies in 1972 on the International Monetary Market, a division of the Chicago Mercantile Exchange originally organized to trade foreign currencies and now offering

a range of financial futures contracts. The next major step in the evolution of financial futures was the introduction of a fixed income futures contract, on GNMA's, in 1975 by the CBT. Shortly thereafter, in 1976, the IMM introduced the Treasury bill futures contract. This was followed by the introduction of the Treasury bond contract on the CBT. From this point, a wide range of financial futures contracts were introduced during the late 1970's and early 1980's.[40] These contracts included stock index futures, that were first introduced in the early 1980's, starting with the Value Line Index on the KCBT and the S&P 500 index at the CME. In conjunction with the emergence of financial futures, trading of oil complex futures on the New York Mercantile Exchange also experienced dramatic growth since being introduced in the early 1980's.

Table 1.3 **US Futures Exchanges and Selected Contracts Traded**

Exchange	Contract Commodities/Instruments
Chicago Board of Trade	Corn, oats, soybeans, soybean meal, soybean oil, wheat, gold, silver, GNMA passthroughs, Treasury bonds, Treasury notes, municipal bonds, Major Market Index, 30-day interest rates, CBOE 250 Index
Chicago Mercantile Exchange	Feeder cattle, Jive cattle, live hogs, pork bellies, lumber
International Monetary Market Division of CME	Eurodollar time deposits, foreign exchange, Treasury bills
Index and Option Market Division of CME	Standard and Poor's 500 Stock Index
Chicago Rice and Cotton Exchange	Rough Rice
Coffee, Sugar and Cocoa Exchange Inc.	Cocoa, coffee, sugar, consumer price index
Commodity Exchange Inc. (Division of New York Board of Trade)	Aluminum, copper, gold, silver
Kansas City Board of Trade	Wheat, Value Line Stock Index, sorghum
Minneapolis Grain Exchange	Wheat, oats
New York Cotton Exchange	Cotton
Citrus Associates of New York Cotton Exchange	Orange juice
Financial Instrument Exchange Division of New York Cotton Exchange	European Currency Unit, Treasury notes, U.S. Dollar Index
New York Futures Exchange	CRB Futures Price Index, NYSE Composite Stock Index
New York Mercantile Exchange (Division of New York Board of Trade)	Palladium, platinum, crude oil, heating oil, propane, unleaded gasoline

Table 1.4 **Average Estimated Number of Futures Contracts Traded in all U.S. Markets Combined from FY 1997 through FY 1998**

Exchange	Volume of Trading (Number of Contracts)6		Underlying Asset of Most Actively Traded Contracts
	1996-97	1997-98	(1997-98 volume)
Chicago Board of Trade (CBT)	179,293,023	218,204,974	U.S. Treasury Bonds 114,945,293 contracts
Chicago Mercantile Exchange (CME) and International Monetary Market (IMM)	147,875,438	181,051,919	3-month Eurodollars 107,386,746 contracts
New York Mercantile Exchange (NYMEX) And Commodity Exchange Inc. (COMEX)	68,213,399	78,374,430	Crude Oil, Light 'Sweet' 28.964,383 contracts
Coffee, Sugar and Cocoa Exchange (CSCE)	9,603,495	9,813,224	Sugar No. 11 5,681,411 contract
New York Cotton Exchange & Associates (NYCE) and New York Futures Exchange (NYFE)	5,804,7749	6,539,781	Cotton No. 2 3,143,800 contracts
MidAmerica Commodity Exchange (MCE)	3,321,472	3,358,360	U.S. Treasury Bonds 1,624,354 contracts
Kansas City Board of Trade (KCBT)	2,119,263	2,155,592	Wheat 1,970,474 contracts
Minneapolis Grain Exchange (MGE)	1,074,735	1,057,893	Wheat 1,027,147 contracts
Philadelphia Board of Trade (PBOT)	35,997	6,337	German Deutsche Mark 2,992 contracts
Total. All Markets	417,341,601	500,562,510	

Source: CFTC website at http://www.cftc.gov/annualreport98/futuresexchange.htm

In the face of this surge of new futures products, traditional commodities, such as corn, sugar and soybeans (introduced on CBT in 1936), have generally prospered. New contracts have also been offered in the traditional agricultural, industrial and metallurgical commodity groups, such as the CME's introduction of frozen pork bellies in 1961, live cattle in 1964, live hogs in 1966, and feeder cattle in 1971. A number of exchanges introduced plywood futures in the late 1960's. Other important developments include the COMEX's introduction of gold and aluminum contracts and the New York Mercantile Exchanges palladium and platinum contracts during the 1970's and early 1980's. Table 1.3 provides a listing of the important US exchanges, together with a summary of many important contracts currently traded. Because new futures contracts are being introduced on a regular basis, it is not feasible to present a listing of all available contracts or exchanges. For example, the currency futures contracts on the Philadelphia Board of Trade are not listed in Table 1.3. The wide variety of contracts available is evident; futures trading occurs in commodities ranging from orange juice to Eurodollar deposits. An essential feature of almost all the commodities traded is some element of store ability. Historically important commodities such as eggs, butter and onions that were not available for many years, have made a minor comeback in recent years.

Though the same commodity is sometimes offered on different exchanges, trading activity will tend to be attracted to the exchange where volume is highest making competing contracts unsuccessful. As a consequence, there tends to be only one exchange that features a specific commodity with exchanges tending to specialize in specific commodity groups. For example, the COMEX offers gold and silver contracts and the New York Mercantile Exchange (NYMEX) offers the oil complex commodities. A notable exception to a specific commodity being traded at one exchange is provided by the MidAmerica Commodity Exchange (MidAm) that offers a range of commodities listed on other exchanges, but features contracts with smaller sizes. By conventional measures of contract activity, trading in MidAm contracts is not significant. While comparing contract significance is not obvious due to the substantive differences in commodity characteristics, Table 1.4 provides a listing of the most important US futures contracts in terms of volume and open interest. This Table reveals the leading role played by financial futures contracts, especially US Tbonds, Eurodollars and the S&P 500 Index, as well as the oil complex commodities in the rankings. Traditional agricultural commodities are relatively less important. This reflects the substantial growth and development of futures markets in the last two decades.

The growth in derivative securities trading has not been confined to North America. A list of selected foreign futures exchanges is provided in Table 1.5. Many of the foreign exchanges trading futures contracts, such as the London Metal Exchange, have long histories while others, such as the Hong Kong Futures Exchange, have been established only recently. Examining the types of contracts featured on these exchanges reveals that there are a number of contracts which are traded globally, particularly U.S. Tbonds, soybeans, Eurodollars and the currencies. There are also a large number of contracts targeted at domestic market considerations, such as the Japanese government bond contracts on the Tokyo Stock Exchange, the Barclays Share Price Index on the New Zealand Futures Exchange and the crude palm oil contract on the Kuala Lumpar Commodity Exchange. In some cases contracts are denominated in local currency and, in others, US$ contracts are traded. This can introduce an element of currency risk for certain types of transactions, such as inter-market spreading strategies. Section 3.2 examines some of the technical issues behind this problem.

The success of derivative securities trading in the last two decades has created an environment where new contracts are being, almost continuously, introduced. Recent examples are insurance futures and foreign stock indices, introduced on the CBT, and interest rate swap futures, planned but not yet introduced on a number of exchanges. Over time, in addition to the successful contracts, numerous unsuccessful contracts have also been introduced. Examples include the the commercial paper contract on the IMM and the GNMA I contract on the CBT. Sometimes contracts are successful for a period and then stop trading, one example being the gold futures contract on the IMM that at one time was almost as liquid as the COMEX gold contract. Another golden example is the gold contract traded on the Winnipeg Exchange prior to the lifting of U.S. gold trading restrictions. In addition to the failed contracts, many exchanges offer surrogates to successful contracts traded on other exchanges, such as the CBT silver futures.

Table 1.5 **Selected Contracts Traded on Foreign Futures Exchanges**

Exchange	***Futures Contract Commodities/Instruments***
Australia:	
Sydney Futures Exchange	Live cattle, wool, gold, wheat, barley, canola, Australian dollar, Australian 10-year bond, Australian 3-year bond, Eurodollar time deposit, 90-day bank- accepted bills, U.S. Treasury bonds, All Ordinaries Share Price Index, Electricity
Brazil:	
Bolsa Mercantil & De Futuros	Broilers, live cattle, live hogs, U.S. Dollar, Brazilian Treasury bond, domestic CDs, gold, Sao Paul Stock Exchange Index, coffee
France:	
Lille Potato Futures Market	Potatoes
Marche A Terme des Instruments Financiers	French government bond, French 90-day treasury bill
Paris Futures Exchange	Cocoa beans, cocoa butter, coffee, sugar
Great Britain:	
Baltic Futures Exchange	Baltic freight index
London Grain Futures Market	Barley, wheat
London Meat Futures Market	Live cattle, pigs
London Potato Futures Market	Potatoes
Soya Bean Meal Futures Assoc	Soybean meal
International Petroleum Exchange of London	Gas oil, Brent crude oil
London Futures and Options Exchange	Cocoa, coffee, raw sugar, refined sugar
London International Financial Futures Exchange	British pound, Deutsche mark, Euro-dollar TD, German government bond, Japanese government bond, long gilt, medium gilt, short gilt, sterling 3-month, U.S. Treasury bond, Financial Times Stock Exchange 100 Index
London Metal Exchange	Aluminum, copper, lead, nickel, silver, zinc
Hong Kong Futures Exchange	Soybeans, sugar, gold, Hang Seng Index
Japan:	
Osaka Securities Exchange	Nikkei Stock Average, Osaka Stock Futures 50
Tokyo Commodity Exchange	Gold, platinum, silver, rubber, cotton yarn, woolen yarn
Tokyo Grain Exchange	American soybeans, Chinese soybeans, Japanese soybeans, red beans, white beans,

	potato starch
Tokyo Stock Exchange	Japanese 10-year government bond, Japanese 20-year government bond, Tokyo Stock Price Index
Malaysia: Kuala Lumpur Commodity Exchange	Cocoa, crude palm oil, rubber, tin
The Netherlands: Financiele Termijnmarkt Amsterdam N.V.	Guilder bond
New Zealand: New Zealand Futures Exchange	New Zealand dollar, U.S. dollar, 5-year government bond, 90-day bank-accepted bills, Barclays Share Price Index
Singapore: Singapore International Monetary Exchange	British pound, Deutsche mark, Japanese yen, Eurodollar 90-day TD, Nikkei Stock Average SX 16 Stock Index
Sweden: Swedish Options and Future Exchange	

Available Contracts

For a number of reasons, the details of futures contract specifications for individual commodities will be of interest in later chapters. Summaries of the contract specifications for selected US contracts are provided on the exchange websites. While some of this information, such as the delivery month and trading units, is available in the daily financial press, the information on daily price limits and, especially, the grade standards and delivery locations is not. The practical complications associated with actual delivery on futures contracts are reflected in the descriptions. For example, the CME feeder cattle futures contract requires delivery at approved livestock yards in Omaha, Sioux City or Oklahoma City (or other approved locations with allowances). CSCE sugar contracts permit delivery of sugar from a number of countries to be delivered, f.o.b., at a port in the country of origin. Similar types of variation are permitted for the Winnipeg grain contracts.[41]

Because the delivery descriptions given are often brief summaries of the actual process, in some cases the description of the deliverable given is misleading. For example, the Tbond delivery requirements refer to bonds with at least 15 years to maturity. But there are a number of Tbonds, with a range of differing coupons, that satisfy this requirement. (A similar situation prevails for Tnotes.) This requires a method for converting a given bond value into a comparable invoice amount of the par value of the "theoretical" 6%, 15 year bond that is the conceptual deliverable commodity. For this purpose, conversion factors for each individual bond are provided based on a formula that takes account of: the bond's coupon rate, the number of years/months/days to maturity, and the base 6% yield (formerly 8%). In practice, the formula is only an approximation that tends to favour one bond over another resulting in the concept of a ***cheapest deliverable*** bond (see Appendix II). The observed futures price for any commodity is always the price of the cheapest deliverable. Due to variations in market conditions, it is possible for the cheapest deliverable to change over the life of the contract.

There are numerous significant differences that occur across the range of available futures contracts. For example, Canadian and US contracts are denominated in different currencies, with Canadian contracts using Canadian dollars. Another important difference is whether *cash settlement* or physical delivery is required when the futures contracts matures. Cash settlement dictates that a payment of the gain or loss on the position is required

at maturity, with no physical settlement. This feature is common on many financial futures contracts, such as the equity indices. Another significant difference can occur with the contract units, that can differ in size or in units of measurement. For example, the Mid-America Commodity Exchange typically features contracts that are some fraction of the contract size traded on the larger exchanges such as the CBT. Differences in measurement units occur with Winnipeg contracts being determined in tonnes with CBT contracts being measured in bushels.

Specifically on Options

Since the commencement of exchange trading of stock options contracts on the CBOE in 1973, the growth of options trading has been staggering. Both stock and commodity options have been involved in this growth. On the stock side, with the exception of the CBOE that is the only major US exchange devoted solely to options, the most important US stock options exchanges are the relevant stock exchanges: the New York Stock Exchange, the American Stock Exchange, the Philadelphia Stock Exchange and the Pacific Stock Exchange.[42] Of these the NYSE, AMEX and Pacific exchanges offer options only on individual stocks and stock indices. Philadelphia also trades options on spot currency while the CBOE includes interest rate options on Tbonds and Tnotes in addition to the agricultural commodities. As a rule, options on commodity futures are offered by the relevant futures exchange on which the underlying future is traded. Hence, in addition to the stock exchanges and OTC-based trading, the list of options exchanges is more-or-less the same as the list of US and Foreign Futures Exchanges given in Tables 1.4 and 1.5. For example, the COMEX offers options on silver and gold futures while the IMM offers options on Tbill and currency futures.[43] Hence, options are available on the array of available commodities that are traded in futures markets.

Exchange traded stock options have certain characteristic features. Option prices are usually quoted on a per share basis while ***the contract calls for 100 shares*** to be delivered. Hence, the call premium to be paid per option contract (excluding commissions, margins and other nonpremium costs) is 100 times the quoted price. Over the life of the option, this number may be adjusted to take account of factors such as stock splits. However, exchange traded options are not protected against payments in cash dividends.[44] For exchange trading, American options are conventional though there are exceptions, e.g., the SMI Index option offered on SOFFEX and selected PHILX European currency options. European options are common in OTC-traded options. In the US, available exercise prices are indirectly determined by the SEC that has authority to approve stock option design features. While there is considerable diversity across exchanges, exercise prices are usually divisible by five, and offered over 5-point intervals for stock prices up to $100, and in $10 intervals thereafter. While trading in long term stock options started on the relevant stock exchanges in the period following the crash of 1987, the traditional CBOE stock options still do not exceed nine months to maturity.

For stock options traded in the US, the last trading date would be the third Friday of the expiration month. This date is sometimes colloquially referred to as the "witching hour". At various times, this date also coincides with the expiration of associated index options and index futures creating a "triple witching hour". For the S&P 500 futures and options, there are four triple witchings corresponding to the delivery months of Mar/June/Sept/Dec. Since 1985, expiration dates for individual stock options are offered in cycles of four: Jan/Apr/July/Oct.; Feb/May/Aug/Nov.; and, Mar/June/Sept/Dec. In order to keep with the maximum nine month maturity, only the most recent three expiration dates will be offered. Rules regarding margins, commissions and execution are provided in the Options Contract Specifications on the relevant exchange websites and will not be further examined.[45] (Margins are only required for written positions.) With this in mind consider the stock option quotations given in Table 1.4. Using the IBM option to illustrate the quoting procedure, the first column gives the current stock price of 100 1/4, the next column the available strike prices, the next three columns the call option prices for the July/August/October expiration dates, and the final three columns are the put prices for the same expiration dates.[46]

The contract specifications for options on futures contracts are closely aligned with the underlying commodity futures (see options contract specifications on the relevant exchange website) where the deliverable is typically one futures contract on the appropriate commodity. Examining options for specific commodities reveals that there

are differences in the method by which the option expiration dates are determined. In some cases, e.g., currencies and stock indices, expiration takes place during the delivery month for the future. However, in most cases, option expiration is prior to the futures delivery month. As discussed in Sec. 8.4, when there is a (positive or negative) carry cost relationship between the spot and the future, i.e., carry costs are not zero, then there will be a difference between the prices for options on spot and futures. With this in mind, consider the futures options prices given in Chapter 7. With the exception of information on the current commodity price, the quoting procedure is virtually identical to that for stock options. To calculate the premium to be paid (excluding other costs), the information at the top of the quote section is used. For example, for a C$ option with Aug. expiration and 8250 strike price: (US$1.22/C$100)(C$100,000) = US$1220. While margin requirements for written options positions are somewhat more complicated than for the associated future, a useful (if not fully accurate) rule of thumb is that the written option will have approximately the same margin as the associated future.

In the US, the regulation of options is somewhat more complicated than for futures. Under the Shad/Johnson accord of 1982, options on futures are handled by the CFTC while options on securities and spot currencies are under the SEC. Much as with futures, the regulatory authority is divided between the governmental agency, the relevant exchange on which the contract is traded, the Options Clearing Corporation and the national associations, e.g., the National Association of Securities Dealers, the Put and Call Brokers and Dealers Association, the National Futures Association and the Securities Investors Protection Corporation (that provides insurance against brokerage firm failure). In the case of options on futures, in addition to exchange requirements, options traders have to satisfy CFTC registration requirements. In Canada, there is a similar situation where regulation falls to a combination of the provincial Securities Commissions, the relevant exchanges and the Investment Dealers Association. Further information on the historical development of regulatory issues can be found in Markham (1987), Edwards (1983) and Koppenhaver (1987).

Becoming a Floor Trader

All Canadian and U.S. futures exchanges have procedures for individuals to become floor traders. These procedures differ from exchange to exchange. The following excerpts are taken from the Winnipeg Commodity Exchange publication, "Membership on the Winnipeg Commodity Exchange":

In Winnipeg, floor traders are permitted to trade simultaneously as brokers and independents....The initial start up costs of a new career as a floor trader are minimal....For an annual fee of roughly $1,750, The Winnipeg Commodity Exchange provides: a receptionist, a photocopier, a bank of telephones, and live quotations from Chicago and other major markets.... The opportunities for profit come from several different sources. First, the floor trader may trade for his own account, providing his own margin money...Secondly, the floor trader may also be registered as a "futures broker" by the Exchange. This allows the trader to trade for other members' accounts for a brokerage fee. These other members are often grain companies, brokerage houses, shippers and exporters....

As a floor trader, you will find several avenues to pursue market information often unavailable to non-members. The state of the art news services located on the trading floor supply data from several of the most renowned and respected information suppliers in the world. Tick-by-tick, updating of price information from all of the major futures exchanges is at your fingertips including three major quote vendors, news wires and a wheather channel, along with supporting technical and fundamental analysis...

Individuals interested in Membership on the Exchange must complete the Application for Membership form. The Application for Membership includes such items as: references...and a business history section. The Exchange staff will verify the information included in the form and invite the applicant to complete a questionnaire on the operations of the Exchange and the commodities market. The application is then forwarded to the financial review committee and the membership committee.

The financial review committee will determine the financial eligibility of the applicant based on the Exchange By-Laws and Regulations. The membership committee will assess the details of the potential member's application during a brief interview. Upon approval by the financial review committee and the membership committee, the applicant is then eligible to purchase a seat on the Exchange.

Individuals will become eligible to trade their own account after completion of the Floor Traders Qualification Course. This course is run by a committee of several full time traders who will evaluate the applicants trading ability in a series of pit simulations. Once the floor trader's qualification committee is satisfied with the trading ability of the applicant, he will be allowed to trade.

QUESTIONS

1. Define the following:

a) futures contract b) forward contract c) open interest d) clearinghouse
e) calendar spread f) initial, maintenance and variation margin g) deliverable commodity

2. What are the fundamental differences between "time bargains" and "to arrive" contracts? What historical preconditions were necessary to the emergence of futures trading in 19th C. Chicago?

3. What are the implications of having different regulatory authorities responsible for cash and futures markets? Give some specific examples of how having different regulatory authorities led to problems in cash markets?

4. What is a short squeeze? What is a corner? What are the institutional and trading requirements needed for a short squeeze to be effective? Discuss at least two actual instances where short squeezes were used to manipulate the cash market.

5. Using Schaede (1989) discuss what features of the Osaka rice market support the claim that this was the first functioning futures market, as opposed to similar trading in joint-stocks and other commodities on the Amsterdam Bourse?

Suggestions for Essay Topics

In a one semester, three credit hour course the expectations are for a paper of not less than 10 pages, double spaced, excluding bibliography and title page. Allowing for the wide diversity among topics, a paper of more than 25 pages is probably beyond the requirement. Papers are marked equally on research content, difficulty of analysis and formatting, essentially grammar, spelling, and organization. All papers are expected to contain a bibliography that reflects the available literature on the subject under consideration. For papers of topical interest, it is essential that recent sources be included. For more analytical papers, referencing and discussion of important theoretical contributions is required. Students are expected to make additional copies of their papers as the originals will not be returned.

Topics in the Historical Development of Futures/Forward or Options Trading: Tulipmania; The 19th century History of US Market Manipulations Using Derivative Contracts; The Role of Government in the Development of Derivative Securities Markets since 1972; A Specific Instance of Market Manipulation using Derivatives such as the Sumitomo Copper Scandal or the Hunt's Silver Debacle.

Portfolio Insurance: The role of portfolio insurance in the Oct. 1987 market break; Comparison of the different types of portfolio insurance.

Covered Interest Parity: Divergences from CIP; Using CIP bounds to formulate trading strategies.

Valuation of Implicit Call or Put Options: Conversion feature for bonds; Mortgage prepayment option in Mortgage Backed Securities; Shareholders equity as a call on the residual value of the firm; Pricing of the Unbundled Options Embedded in Various Securities such as CMOs and REMICs; The Wild-Card Option and Other Options associated with CBOT Tbond Futures of Other Contracts; Option Adjusted Spread Analysis of Fixed Income Securities.

Valuation of Real Options in Physical Assets: The Waiting or Mothball Option in Capital Investment Decisions; the Option Component of Real Estate Prices; Scheduling of Freighter Traffic.

Other Practical Topics: Hedging Strategy for a Specific Type of Entity such as a financial institution, global airline, an oil producer or a Metal refinery; The Clearinghouse; Interest Rate Swaps and/or Currency Swaps: Motivations for Engaging in Trade (e.g., are swaps a zero sum game?); Swap Pricing.

Accounting Issues for Derivative Securities: Tax Treatment of Futures and/or Options; Marking to Market versus Book Value in Hedge Accounting; The Implications of FAS 133 (FASB 1998)and FAS 138 (FASB 2000); Currency Translations Rules-- FASB 8 vs. FASB 52.

Comparison of Specific Types of Options Pricing Formulae: Roll-Geske versus Black-Scholes; Cox's CEV versus Merton's jump diffusion; Restricted and Unrestricted Arithmetic Brownina Motion; Exotic Options-- Pricing, Application and Types Available.

Study of a Specific Speculative Futures or Options Trading Strategy: Turtles; Tandems, such as the TED; Soy Crush; the Crack Spread; The Spark Spread; The Box Spread; Creating Interest Rates Caps (and/or Floors) with Options .

Other Theoretical Topics: Optimal Hedging; The Unbiasedness of Futures Price Forecasts; Distributional Properties of Futures or Options.

An Issue of Recent Current Topical Interest: The crackdown on illegal trading activities on the CBOT; The development of new trading instruments; Regulatory Issues Associated with Futures and/or Options; The Collapse of Long Term Capital Management; Derivative Debacles of the 1990's.

NOTES

1. Numerous historical sources, for example, Barbour (1950), Posthumus (1929), Neal (1990b), make reference to trading 'futures' contracts, instead of using the more correct reference to trading of 'forward' contracts, for example, Hieronymus (1977, ch. 3). The term 'futures contracts' has a precise modern meaning that the contracts of the 15th-18th centuries did not satisfy, though the Japanese rice market did come close to trading contracts that could qualify as futures contracts.

2 Another problem posed by derivatives is the ability to replicate a derivative payoff using dynamic trading in cash securities. For example, portfolio insurance replicates the payoff on a put options by actively trading a portfolio of stocks and bonds.

3. There are numerous instances of explicit and implicit call or conversion provisions in 15th to 18th century security issues. For example, the Venetian *prestiti* had a call provision that allowed for principal value to be repaid at par, as finances permitted. Various 18th century government debt restructuring plans involved the introduction of conversion provisions. For example, there was the conversion of English government life annuities, issued under William III and Queen Anne, into long annuities, or John Law's Mississippi scheme which introduced conversion provisions for exchanging French government debt obligations into *Compagnie des Indes* stock.

4. The notation selected to designate Americans with the ***subscript*** A should not be confused with the general notational convention used to identify subscripts with partial derivatives.

5. This terminology can create confusions. For example, the bulk of options traded in Europe are actually American options. While European options are not as commonly traded, this form is often used for the analytical simplifications provided. Another confusion is the use of "cash settlement" to refer to satisfaction of the option exercise requirements with a net dollar value transaction. In effect, the use of "cash" here does not refer to the spot commodity, but rather to actual cash.

6. While exchange traded stock options contain provisions for adjustment in the face of stock splits, mergers and stock dividends, ***these options are not adjusted for cash dividends***. In other words, exchange traded stock options are ***not*** cash dividend payout protected.

7. Another important group of options is concerned with the various conversion features and callable features that are attached to a firm's debt issues. It is also possible to consider all the firm's securities as options, e.g., the common stock is an option on the unlevered portion of the firm's value while the outstanding debt is an option on the levered portion of firm assets.

8 The specific proceeds for rights issues various across jurisdictions, e.g., Bae and Levy (1994), Hietala (1994), Poitras (2001a).

9 The length of the period between the rights issue date and the exercise date is determined by a number of factors, including local stock exchange rules and firm preferences, e.g., Poitras (2001).

10. This follows because of the value associated with immediate exercise of the right. The stock can be purchased and immediately sold at a higher price. The terminology ***intrinsic value*** is often used to refer to that component of an option's value that is associated with the immediate exercise value. However, even when the intrinsic value is zero, the option can still have a non-zero ***time value*** component.

11. Telser and Higinbotham (1977) provide a discussion of a number of the issues raised in this Section.

12 The use of Eurodollar strips as a method of implementing or pricing interest rate swaps has received considerable attention. Klein (2001) provides a review of the pricing literature. Dubofsky and Miller (2000) has a textbook discussion of strips.

13 In certain cases, the forward position is transferable and the position can be sold to a third party that will be responsible for delivery. The status of the seller to default by the third party illustrates the difficulties of forward contracting.

14. Brinkman (1984) provides a useful overview of clearinghouse operations. While clearinghouse members must also belong to the exchange, not all exchange members belong to the clearinghouse. There is a screening process to ensure that financial integrity and other requirements are satisfied. In turn, clearinghouse membership can be profitable for a number of reasons. For example, on most exchanges clearing members post margin on the **net** clearing position, often using stock in the clearing corporation as collateral. This permits margin money from client accounts to be used for other purposes.

15. Silber (1984) provides a useful analysis of the role of scalpers. The final group of speculators is the position traders, effectively professional speculators involved in taking large positions held for at least several days. These individuals provide a portion of the market for exchange seat rentals. The final group of pit traders is the employees of the large commercial firms using the futures market for hedging and speculation.

16. Commodities with bi-monthly delivery dates, e.g., metals, usually require an active delivery month contract. In this case, a set number of months (3 for COMEX contracts) prior to the final delivery date for the alternative months, a contract for delivery is initiated so that there is always a delivery contract for any given month.

17. In contrast, many of the early interest rate swaps and forward (interest) rate agreements were not standardized. However, with the explosive growth of the swap market in the 1980's, the International Swap Dealers Association (ISDA) was formed by important market participants. The ISDA has contributed significant to the standardization of swap agreements.

18 The discussion of margins focuses on futures. There are numerous studies on the impact of changes in futures margin requirements on cash price volatility, e.g., Goldberg and Hachey (1992) and Telser (1981). For forward contracts, margins can appear in various guises, often as a 'haircut' requirement that requires the posting of some fraction of the principal value of the contract. However, there is substantial variation of margining practices in the forward market, both across commodities and, in some cases, for forward contracts traded on the same commodity.

19. Spreads also receive favorable execution cost treatment. The commission cost structure parallels that for margins, i.e., clearinghouse commissions are negligible, exchange member transactions fees are nominal and commission house fees (brokerage) are highest and vary from customer to customer. Because scalpers and day traders do not carry positions over night, these traders do not usually have to worry about posting margin.

20. Examples of such associations include the International Swap and Derivatives Association, the Counterparty Risk Management Policy (CRMP) Group and the Derivaties Policy Group (DPG). The DPG "was formed by six major Wall Street firms in August 1994, to respond to the public policy issues raised by the OTC derivatives activities of unregulated affiliates of SEC-registered broker-dealers and CFTC-registered futures commission merchants. The DPG is a voluntary framework designed to provide the SEC and CFTC with information and analyses that would permit them to more systematically and rigorously evaluate the risks associated with OTC derivative products" (PWGFM 1999, p.76-7). The CRMP is described in PWGFM (1999, Appendix F).

21 References to debacles, high profile failures, and great disasters abound, e.g., Kuprianov (1995), Marshall and Siegel (1996), Smith (1997), Culp and Miller (1998), Jorion (2000). The various events have become part of conventional wisdom. Yet, the Oxford Dictionary (1986) defines a debacle to be a sudden disasterous collapse. This is a modern progression on earlier English usage, as in the Oxford Dictionary (1931), which defines a debacle to be a sudden deluge or violent rush of water, which carries before it blocks of stone and other debris. Figurative usage of debacle defines a debacle to be a sudden breaking up or a confused rout. In the 1990s, Barings Bank and LTCM both involved a sudden disasterous collapse of a corporate entity. Though there were some tense moments, in the end there was only minimal disruption to other businesses. Other events, such as Sumitomo Corp, Procter and Gamble, and Orange County, were sudden but did not lead to a substantive collapse. Hence, there seems, at the outset, to be considerable overstatement surrounding the topics to be studied.

22 The relevant early history can be found in Poitras (2000), together with the sources cited there. The beginning of bourse trading can be traced to early 16th century Antwerp (van der Wee 1977). The history of corners and other manipulative practices on the Antwerp bourse are well documented, e.g., de Roover (1949). That such techniques would be known in late 16th century Amsterdam is expected, if only due to the exodus from Antwerp in the last quarter of the 16th century.

23. The early history of options trading in England can be found in Morgan and Thomas (1962) and Dickson (1967). An early discussion can be found in Duguid (1901). Barnard's Act was repealed in 1860.

24 The process of purchasing joint stock was considerably different than the modern purchase of common stock, e.g., Dickson (1967). Transfers had to be effected at the company offices. Deals could be and were made for cash at the company offices, with more or less immediate transfer. Deals made at venues such as Exchange Alley or the Royal Exchange usually had to involve final settlement and delivery at a later date.

25 There are a number of excellent older sources on this material, including Emery (1896) and Cowing (1965).

26 In 1999, the NYMEX merged with the COMEX to form the New York Board of Trade.

27 The Senate debate included a vote on the George amendment which aimed to ban futures trading altogether. This amendment was prompted by the concern of Southern members about the use of tax-to-destroy as a method of dealing with the anti-speculation arguments of the agrarians and Populists. This amendment was defeated by 51 to 19. However, as it turns out, the Southern supporters of the George amendment held the balance in the House vote to suspend rules that lead to the defeat of the Hatch-Washburn bill.

28 Stassen (1981) is an excellent account on the restrictions that have been imposed on derivative security trading in the US since the passage of the Grain Futures Act.

29. The early history of derivative security trading in Canada is not well documented, though it is reasonable to assume that practices common in England and the US would also be used in Canada. This implies the use of bills of exchange to extend credit in the early fur trading and fishing period. The use of 'to arrive' contracts for various commodities, particularly in the 19th C. in the flour trade, also is likely.

30. The quote is from Friesen (1984, p.337). A considerable amount of historical research has been done on the pools and related farmers movements, e.g., Wood (1975) and MacPherson (1979).

31. Wolf (1982) provides background on the specific events that were associated with the CFTC options ban. Since the creation of the CFTC in 1974 to replace the Commodity Exchange Authority that had been part of the USDA, changes to commodity futures and options regulations have usually been associated with the regular four year reauthorization of the CFTC. For example, the 1982 reauthorization contained the Shad/Johnson Accord Index Act that specifies the authority of the SEC and CFTC for stock related products. This Act gave the CFTC exclusive jurisdiction over stock index futures and options while the SEC was given control over options on securities and currencies.

32 Fay (1982) and Williams (1995) are excellent sources on this topic. The Sumitomo copper corner is similar in many ways to the Hunt silver dealings, though there were some significant differences, e.g., the the Sumitomo losses were the result of a trading operation within a larger corporate entity.

33 The Hunt family fortune was founded by the eccentric H.L. Hunt, who left three sets of children (Hurt 1981). Bunker and Herbert were from the first of H.L. Hunt's families. This first family also includes Lamar Hunt, owner of the Kansas City Chiefs. Circa 1980, the centrepieces of the Hunt family fortune were Penrod Drilling, an oil drilling company, and Placid Oil, the holder of large oil reserves and leases. The two companies, together with the family's other assets, were controlled through an elaborate network of over 200 companies and trust funds (Williams 1995, p.20).

34 Johnson (1981, p.97) reports: "In fact, its quite rare for their to be manipulation cases. There are, perhaps, not more than a half dozen manipulation cases of any true significance that have been reported in the courts."

35 Katzenbach (1987) gives a partial listing of key players implementing portfolio insurance strategies for large institutional investors as: Leland O'Brien Rubinstein Associates, Aetna Life and Casualty, Putnam Adversary Co., Chase Investors Mgmt., JP Morgan Investment Mgmt., Wells Fargo Investment Advisors, and Bankers Trust Co. This list does not include the wannabes at Goldman Sachs, Salomon Bros., Nomura and other firms seeking to gain status in this area. Goldman Sachs was the firm that employed Fischer Black at this time.

36 The Salomon Bros. Treasury auction scandal is delightfully examined in Lewis (1990).

37. Further background on the market manipulations that took place during this period can be found in Hieronymus (1977) who refers to the three volume work by Charles Taylor, History of the Board of Trade of the City of Chicago (1917).

38. A modern example of the short squeeze occurred in the late 1970's in the silver market when a group led by the Hunt Bros. attempted to acquire a controlling interest in the spot silver market. Long futures and forward contracts were used to squeeze the shorts and force up the spot price of silver. Markham (1987) provides a more detailed discussion.

39. There are a range of other regulations associated with derivative security markets. For example, there are regulations governing the legal uses of derivative securities by pension plans, insurance companies and other financial institutions (TSE 1990).

40. A considerable number of the new products were introduced on the International Monetary Market (IMM) division of the CME. With a few major exceptions such as the development of the Tbond contract, much of the CBOT's energy during the 1970's was dedicated to developing the CBOT Options Exchange.

41. In Canada, the Winnipeg Commodity Exchange features seven contracts: flaxseed, canola, domestic feed wheat, rye, oats and two domestic feed barley contracts that depend on delivery points. Contract sizes are listed in **tonnes**, not bushels as for US contracts. Prices are quoted in Canadian dollars. Variation in the deliverable grade and delivery location is permitted, consistent with contract delivery being used to facilitate cash market activity. A similar comment applies to delivery dates. For example, on the last business day of the contract, delivery is permitted at points other than Thunder Bay or Vancouver.

42. Because the CBOE trading floor is integrated with the CBOT futures trade, it is not completely accurate to refer to the CBOE as a purely options exchange.

43. For the IMM and other exchange, this statement is not technically correct because a different part of the exchange is responsible for trading options on commodities. In the IMM case, it is the Index and Options Market (IOM) Division of the Chicago Mercantile Exchange.

44. Because exchange traded stock options typically do not adjust options prices to account for cash dividends, this can create an early exercise trading opportunity. This point is discussed in later Chapters.

45. Material on commission costs, trading rules and so on can be obtained from various sources, such as the exchange web sites or from the various introductory texts on derivative securities. In addition to material provided by the exchanges and commission houses, Cox and Rubinstein is another useful, and more detailed, source for this material. In addition, Cox and Rubinstein and Kramer (1987) also have the relevant information about the US tax implications and associated tax strategies for options trading.

46. The letter "r" indicates that this particular option did not trade on this specific day. The letter "s" indicates that this specific option has not been opened for trading by the exchange.