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The Economic Role of Financial Futures

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Background

Before 1972, futures trading was dominated by agricultural commodities. The introduction of foreign currency futures in 1972, interest rate contracts in 1975, and stock index futures in 1982 has shifted the industry from the almost exclusive province of agricultural interests to an integral component of the financial sector. The spectacular growth in trading of financial futures during the first decade of their existence—they now account for approximately 50 percent of all futures trading—has focused attention on the purposes and functions of this segment of the futures industry.

There is little doubt that futures markets for agricultural commodities provide important economic benefits. Trading standardized agricultural commodities for future delivery on organized exchanges permits an efficient mechanism for hedging and provides a forum for establishing and disseminating price information. These so-called risk-transfer and price-discovery functions of futures markets are now well documented in the academic and public policy literature.[1]

The main reason for special treatment of financial futures is that, in most cases, highly visible and well-functioning markets already existed for the underlying financial instruments, such as stocks, bonds, and foreign currencies, before the introduction of futures trading. Questions naturally arise under such circumstances: Are financial futures markets merely redundant or, worse, have they supplanted or will they supplant the "real" markets to the public's detriment? Although the spectacular growth of financial futures trading within a freely competitive market system should normally have been sufficient evidence of their economic contributions, the history of legis-

lative concern surrounding futures markets forces more careful consideration of the issues.

With this background, the discussion proceeds as follows. First there is a brief review of the risk-transfer and price-discovery functions of futures markets. Next these concepts are applied to financial futures, showing that their main contribution is a reduction in transactions costs and an improvement in market liquidity, the ultimate benefit being a reduction in the cost of capital to business firms. Practical evidence on the centrality of transactions economies to the success of financial futures is then presented, focusing primarily on how various institutions actually use financial futures. Additional evidence is offered within the framework of the success and failure of specific futures contracts. Finally some of the policy issues that have surrounded financial futures are discussed, including questions of contract proliferation, the consequences for the underlying cash markets, and the role of speculation and cash settlement in stock index contracts.

To anticipate the results somewhat, the discussion will show that although financial markets are highly liquid and visible institutions, futures markets on financial instruments are even more transactionally efficient than these underlying markets. Therefore, although price discovery and hedging could be accomplished in the cash markets, it is cheaper and more efficient for most participants to utilize financial futures for many of these objectives. Thus the main contribution of financial futures stems from a reduction in costs that permit transactions, such as hedging, and information transfer, such as price discovery, to occur more efficiently. To set the stage for these discussions, a brief review of the financial futures contracts currently in existence is offered along with a short sketch of market participants.

Contracts and Participants. Table 2–1 lists the major financial futures contracts in existence during 1984, including the year they were introduced and the exchange on which they are traded. For convenience, financial futures are divided into three groups: (1) foreign currencies; (2) interest rate contracts; and (3) stock index futures. Within each of these categories are various specific contracts that differ from each other with respect to the precise instrument used to settle contractual obligations. For example, under foreign currency futures are contracts on the German mark, Swiss franc, and the British pound. Within the interest-rate category are futures on long-term Treasury bonds, Treasury bills, and Eurodollar time deposits. Finally, the stock index group includes contracts on Standard and

TABLE 2–1

MAJOR FINANCIAL FUTURES CONTRACTS, 1972–1984

Contract	*Exchange*	*Began Trading*
Foreign currencies		
British pound	IMM	1972
Canadian dollar	IMM	1972
Japanese yen	IMM	1972
Swiss franc	IMM	1972
West German mark	IMM	1972
Interest rates		
Treasury bills	IMM	1976
Bank CDs	IMM	1981
Eurodollars	IMM	1981
GNMAs	CBT	1975
Treasury bonds	CBT	1977
Treasury notes	CBT	1982
Stock index		
Major Market index	CBT	1984
NYSE composite	NYFE	1982
S&P 500	CME	1982
Value Line	KCBT	1982

NOTES: CBT = Chicago Board of Trade; CME = Chicago Mercantile Exchange; IMM = International Monetary Market (Division of CME); KCBT = Kansas City Board of Trade; NYFE = New York Futures Exchange; and NYSE = New York Stock Exchange.
SOURCE: *Wall Street Journal* listing of futures contracts.

Poor's 500 index, the New York Stock Exchange Composite index, and the Value Line index.

As can be seen in the table, the first financial futures contracts on foreign currencies were introduced in 1972. They were soon followed by interest-rate futures in 1975, while stock index futures did not arrive on the scene until 1982. The late arrival of stock index contracts can be traced, in part, to their use of cash settlement to satisfy contractual obligations as opposed to traditional physical delivery. Extensive regulatory review was required to approve the cash settlement procedure primarily because of concern over the superficial similarity of the cash settlement process to gambling. The success of the stock index contracts and the Eurodollar contract has made the cash settlement procedure the likely source of continued innovation in financial futures.

The variety of specific contracts in table 2–1 reflects the innovative activity of the various futures exchanges combined with the

natural selection process of the marketplace. In particular, contracts that attract significant hedging and speculative interests succeed, while those that do not fall by the wayside. That separate contracts on the German mark and the British pound should succeed appears sensible; however, no compelling a priori reasoning explains why contracts on long-term Treasury bonds (more than fifteen years to maturity) and Treasury notes (six to ten years to maturity) were both successful, while four-to-six-year Treasury notes and two-year Treasury notes failed. As is described below, the comparative advantage of specific contracts in providing transactionally efficient hedging services is an important part of the story and helps pinpoint the contribution of financial futures contracts to economic activity.

Describing the variety of financial futures contracts is far easier than identifying the specific participants in the marketplace. Economic agents participating in a futures market are often divided into hedgers, speculators, arbitragers, and market makers. Hedgers are usually members of the commercial trade who use futures contracts to offset risk exposure in the cash market; speculators consist of public participants who voluntarily assume risk when entering a futures contract in anticipation of potential gains; abritragers simultaneously operate in cash and futures markets to take advantage of pricing discrepancies; and the market makers in futures buy and sell continuously throughout a trading session to take advantage of temporary imbalances in order flow. Except for the last group, which consists primarily of individual floor traders on a futures exchange (sometimes referred to as scalpers), many of the larger financial institutions frequently act in all capacities. For example, commercial banks use Treasury-bond futures to hedge their portfolios of government securities, they may speculate on the course of monetary policy using the Treasury-bill contract, and they could act as arbitragers between the foreign exchange markets and foreign currency futures. In a similar vein, pension funds might hedge, speculate, and arbitrage in the stock index and Treasury-bond contracts; savings and loan associations and mortgage bankers have done the same in Government National Mortgage Association (GNMA) futures; while investment bankers have the flexibility to operate in all markets and in all capacities. Precise data on the extent of these activities are scarce,[2] but the incentive for these activities will become clearer below.

Purposes and Functions

The two most frequently cited economic contributions of futures markets are hedging and price discovery. Both are listed in "Guide-

line No. 1" of the Commodity Futures Trading Commission (CFTC) as required for newly proposed contracts,[3] and both appear in the academic literature on futures.[4] In fact, "Guideline No. 1" of the CFTC offers simple definitions of each of these concepts; it states that the price-discovery function of a futures market will be satisfied if "prices involved in transactions for future delivery in the contract . . . are . . . generally quoted and disseminated as a basis for determining prices to producers, merchants, or consumers of such commodity." The hedging use of a futures market is indicated when "transactions are utilized by producers, merchants, or consumers engaged in handling such commodity . . . as a means of hedging themselves against possible loss through fluctuations in price."

Price discovery is an information-based contribution of futures markets, whereas hedging implies a transactions role for futures contracts. In both cases the main contribution appears to lie in establishing prices for the future delivery of a commodity and for providing a forum for transacting at such prices. This is an obvious contribution to those dealing in the cash commodity who need prices to plan production and consumption decisions. Moreover, merchants and consumers who want to avoid the risk of future price fluctuations can eliminate that risk by buying or selling a futures contract today. Although these benefits of futures markets appear obvious, more careful consideration of the issues is required for all storable commodities and for financial futures in particular.

The Case of Perfectly Storable Commodities. For perfectly storable commodities such as precious metals and most financial instruments, a well-defined relationship exists between cash market prices and futures prices. More specificially, as long as the underlying commodity is in ample supply, so that spot market holdings can be carried forward into the future, the futures price equals the spot price plus carrying cost, where carrying costs are primarily the net interest cost of holding the cash commodity from the current date until the settlement date on the futures contract.[5]

This so-called arbitrage carry model holds because arbitragers will act to reap riskless profits when the model is violated and, in the process, will drive cash and futures prices back into line. If the futures price is above the spot price plus carrying cost, for example, arbitragers find it profitable to buy the cash commodity, sell the futures contract, and deliver the cash commodity on the settlement date of the contract. The arbitrager earns the difference between the (higher) futures price and the spot price plus carrying cost. Sales of the futures contract by arbitragers and their purchases of the cash

commodity drive futures and spot prices together so that they do not differ by more than carrying costs. If the futures price were lower than the spot price plus carrying costs, arbitragers would buy the futures contract, sell the cash commodity, and stand for delivery. This procedure forces up the futures price and brings down the cash price until they differ by exactly the cost of carrying forward the cash market position.

The integration of the cash and futures market through the behavior of arbitragers is crucial for the hedging function of futures markets. Hedgers rarely buy or sell a futures contract and hold until the delivery date of the contract. Rather, hedgers use the futures contract as a temporary offset for a cash market position and rely on the comovement in cash and futures prices (guaranteed by the arbitragers) to validate the hedge. A pension fund that anticipates a cash inflow at the end of the month and must buy bonds at that time, for example, can hedge its anticipated needs by purchasing a Treasury-bond futures contract for one month and then selling it. If the cash price of bonds rises during the month, the long futures position generates a gain to offset the higher cash bond price the pension fund must pay at the end of the month. Similarly, if cash prices fall, the decline in futures prices generates a loss that offsets the lower cash bond prices the pension fund will pay. Thus comovement of cash and futures prices is essential for the hedging use of futures markets.

Although the integration of cash and futures markets is crucial to hedgers, the effectiveness of the process appears, at first glance, to erase the price-discovery and risk-transfer contributions of futures markets. As far as price discovery goes, if the futures price equals the cash price plus carrying costs, with the latter measured by an interest rate, then price discovery requires nothing more than a cash market and a credit market. Once the cash price is given by the spot market and the relevant interest rate is derived from the credit market, the futures market price seems redundant.

A similar argument appears to make the hedging function of the futures market redundant as well. Instead of the pension fund buying a futures contract in anticipation of buying bonds at the end of a month, the pension fund could borrow money now, buy bonds in the cash market, and repay the borrowed funds with the cash inflow one month hence.

Thus, although risk transfer and price discovery are important functions, they are not uniquely provided by futures markets. In particular, for perfectly storable commodities, the effective integration of cash and futures markets through arbitrage seems to render

futures markets completely redundant economic institutions. Although this perspective seems plausible, it will become obvious shortly that it is much too narrow and simplistic to evaluate properly the economic contribution of futures markets.

Efficient Price Discovery and Hedging. For most storable commodities—like gold, silver, and most financial futures—the main contribution of futures markets is not that they provide unique opportunities for risk transfer and price discovery but that they offer risk-transfer facilities at lower cost and provide more reliable price information compared with the relevant cash markets. First the improved price discovery process is discussed and then the more efficient risk-transfer facilities are examined.

The cash markets for most commodities are fragmented among numerous commercial dealers and endless varieties of product. Forward markets for such commodities are similarly fragmented among alternative delivery dates and locations. Price information is not easily uncovered, especially by the nonprofessional public, in a market dominated by secretive dealers and confused by gradations of products. A futures contract specifies a homogeneous variety of product and designates a unique delivery date for settlement. This standardization is designed to permit third-party transfer of contracts and to reduce the search cost of locating potential buyers and sellers. By centralizing order flow to a unique location—the pit on the floor of a futures exchange—a single price emerges for the variety of the product specified in the futures contract. Thus a single price emerges for gold, silver, wheat, and corn (all highly storable commodities) as well as for Treasury bonds, Treasury notes, and certificates of deposit (CDs) to replace the multitude of cash market prices quoted for specific items by numerous dealers. Moreover, these prices are widely disseminated by the futures exchanges, so that price information is easily uncovered by the interested public.

A second component of the price-discovery role of futures markets emerges from the fact that futures prices combine the spot price with the cost of funds between the current date and the settlement date of the futures contract. The futures market quotes a combined price—for the spot commodity plus carrying cost—that reflects marginal carrying cost and the simultaneous execution of the spot market purchase or sale and related credit terms. This "bundling of price quotes" is a special contribution of futures markets (and forward markets) that cannot be directly inferred from spot markets as long as simultaneous execution in cash and credit markets is costly and requires skill.

Perhaps the most important outcome of the standardization of contract terms in futures markets is the liquidity that emerges as a result of the increased participation of hedgers and speculators in the marketplace. Although liquidity is defined in detail below, it can be identified for now with the ability to transact quickly without unduly influencing price. Most evidence shows that liquidity is positively related to the volume of trading.[6] Moreover, because of the large number of participants in liquid markets, transactions prices more accurately reflect the judgment of all potential traders, bringing transactions prices closer to true equilibrium prices compared with less liquid markets.[7]

The lower transactions costs of futures markets permits commercial hedgers a more efficient mechanism for transferring risk compared with cash markets. Selling out a cash market position on short notice might require substantial search efforts to locate buyers; entering a forward contract for delivery at some future date might be equally time consuming or impossible. Moreover, only a subset of potential transactors is usually uncovered through such efforts, leading to transactions prices that may not accurately reflect equilibrium prices. Under such circumstances, hedgers will have to sell at price discounts from the true equilibrium price, while long hedgers must pay excessive premiums. One of the main advantages of transacting in futures markets, therefore, stems from the greater volume of trading that generates transactions prices that more accurately reflect underlying supply and demand forces of the entire market.

Transferring risk by selling short in the futures market is often considered a special contribution of futures markets. In fact, this contribution requires more careful scrutiny than it is usually given. Selling short in the cash market usually requires that the seller borrow the commodity for the duration of the short sale (in order to deliver it). In executing a short sale in the cash market, one may have difficulty uncovering potential lenders of the commodity or be unable to borrow the specific grades needed to deliver to consummate the sale. Futures markets permit short sales without such complications because the underlying commodity does not have to be delivered as part of the sale.

The problem with such a simplistic view is that while short sales can occur in futures markets without borrowing the underlying asset, the price at which those sales take place will reflect transactions costs in the cash market. For example, if arbitragers cannot sell short easily and cheaply in the cash market, they will not turn around and prop up the futures price with their puchases. Futures prices will then be depressed relative to cash prices, with the discount reflecting the

costs associated with selling short. Thus only if short selling is easily accomplished in the cash market will futures markets offer cost-effective short-selling facilities. But in that case where is the special benefit of short sales in futures markets?

The answer is that futures markets can effectively transfer the short-selling capabilities of some market participants (such as arbitragers) to other market participants. In particular, when an institution that does not have the credit arrangements to sell short in the cash market sells futures instead, those who can sell short easily in the cash market will arbitrage between the two markets and prevent futures prices from falling relative to cash prices. Thus these arbitragers allow the short sales in futures markets to occur without excessive price discounts (and the implicit costs they imply). This transfer of transactions services among market participants is a crucial aspect of the contribution of financial futures, and will be discussed more fully below.

Transactions Efficiency of Financial Futures

For all of the financial futures markets listed in table 2–1, well-organized and highly liquid cash markets existed prior to the introduction of futures trading. Commercial banks have always acted as dealers in foreign currencies, quoting bids and offers to each other and to corporate customers. Commercial banks and investment bankers form an active dealer network for trading Treasury securities, CDs, and other money market instruments; and, of course, the various stock exchanges provide a centralized market for equities trading. In comparison with agricultural and other commodity markets, the cash markets for financial instruments are well organized and highly liquid. At first glance, therefore, it appears difficult to argue that the dominant contribution of financial futures rests with the traditional price-discovery and liquidity advantages of futures markets compared with cash markets.

Nor does the answer seem to lie with the absence of forward contracting in financial markets. Foreign currencies, the first financial futures introduced, trade in an active forward market. The same holds for GNMAs, the first of the interest rate futures. Even for Treasury bills, the first short-term debt futures contract, transforming cash transactions into forward contracts by combined purchases and sales of different maturities is relatively easy.[8] Thus, while the "bundling of cash transactions with credit agreements for deferred delivery" might be important to the success of some financial futures, it cannot form the foundation for the success of the earliest contracts.

Even the provision of short-selling facilities cannot be cited as the cornerstone of the success of financial futures. While some cash markets do not provide any facilities for short selling (such as the markets for CD and Eurodollar time deposits), the most successful of all financial futures, Treasury bonds, has a cash market where selling short is easily accomplished. In fact, for some participants in the marketplace, selling short cash Treasury bonds is preferable to selling short Treasury-bond futures.[9]

One can argue that while none of these advantages holds for all financial futures, each financial futures contract succeeded for a somewhat different reason. For example, foreign currency futures and GNMA futures added liquidity to organized forward markets, and short-sale restrictions were overcome by the Eurodollar contract and stock index futures. In both of these cases, more effective risk-transfer and hedging facilities were added to the marketplace. Similarly, futures markets added a new dimension to price discovery in the cloistered dealer markets for Treasury securities and money market instruments by providing a single market price for a specific standardized security.

Each of these points accurately describes the contributions of specific financial futures contracts. But the common denominator permitting improved risk transfer and price discovery in each of these cases is the lower transactions costs of futures markets compared with cash markets. After all, each of these underlying cash markets permits risk transfer and price discovery, but futures markets improve substantially on these services, especially for nondealers. Futures markets bring the low cost of transacting faced by dealers to the rest of the financial community. As shown below, this "democratization of efficient transactions services" underlies much of the success of financial futures.

Improved Liquidity for All Participants. Transactions costs consist of two elements: (1) a commission paid to an agent executing a purchase or sale; and (2) the price discount or premium incurred to get the trade done. The latter is often measured by the spread between the best bid and offer in the market or by the spread quoted by a market-making dealer. The bid price represents what a public seller will get from an immediate sale while the higher offer price is what a public buyer must pay. The spread represents the costs of a *round turn*, an immediate purchase and sale.

Measuring liquidity costs seems fairly straightforward under these circumstances. Securities with narrow bid-asked spreads are more liquid than those with wider spreads, given that commissions for

agent executions are fairly similar. If the quoted spread for a corporate bond is ½ point, it costs $5 per $1,000 to buy and sell immediately, while if the quoted spread on a government bond is ⅛ point, it costs $1.25 per $1,000 to buy and sell. Thus the government bond market would be more liquid than the corporate bond market.

An important dimension to liquidity that is often overlooked but is crucial to market traders is the size of trade that can be done at the prevailing spreads. If the bids and offers are good for $20 million of securities, the market is much more liquid than if the quotes are good for only $1 million. An attempt at selling $20 million in a market where the prevailing quote is good for only $1 million is likely to force the price lower than the prevailing bid to complete the trade. Similarly, the cost of buying $20 million will be higher than indicated by the offer in the market.

Although quoted spreads are usually good in specific markets for standard-sized trades, they can vary between different customers and with market conditions. Comparing the liquidity of futures markets with cash markets is, therefore, much more complicated than simply evaluating the respective bid-asked spreads. Care must be taken to identify precisely what is being measured. Thus the quoted spread on active long-term Treasury bonds is ⅛ per $100 (for example, a bid of 100–5/32 and an offer of 100–9/32) based on dealer quote sheets or *Wall Street Journal* listings, while the usual spread in the Treasury-bond futures market is 1/32. Even when commission costs are added to the latter, the nominal cost for a standard $1 million trade in bond futures would be substantially less than the comparable trade in the cash market.

Of course, preferred institutional customers of a government bond dealer can almost always expect a narrower spread than ⅛. Many actively traded bonds are quoted to customers on a 1/16 spread. Even with this narrower spread, however, the cash market for governments is at a disadvantage to futures because a customer is never certain that a dealer's quote is the best available at a particular time. In the futures market, the highest bid and lowest offer are automatically uncovered because of centralized order flow to the futures pit. In the cash market, however, the customer must search among several dealers to get the best bid and offer.

Medium-sized financial institutions that are not preferred dealer customers must be especially diligent in searching for the lowest offer and the highest bid when executing in decentralized dealer markets. Kenneth Garbade and William Silber showed that price dispersion among government securities dealers leads to higher execution costs for public traders in Treasuries.[10] Thus, nondealer

financial institutions have multidimensional cost incentives to execute in the bond futures market rather than in the cash markets.

The only reason for trading in the cash market is that futures contracts are standardized instruments, implying there is basis risk (see note 9) when futures are used to hedge any particular cash instrument. For example, the price of a newly issued twenty-year government bond may not move that closely with the Treasury-bond contract because the latter prices off the cheapest deliverable long-term Treasury security (which may be a 7 ½ percent coupon bond with seventeen years to maturity). Thus, if an institution owns a recently issued Treasury issue, a better hedge may be simply to sell the bonds, especially since the cash market for recently issued Treasury bonds is quite liquid. For most other bonds, however, the liquidity advantage of futures markets dominates all other considerations.

For professional dealers in Treasuries, the advantage of futures markets is less clear. The cash markets in certain active issues can frequently dominate the futures market. Interdealer quotation screens offered by brokers in Treasury securities permit dealers to execute on much better terms than are available to the public. Moreover, in the cash markets one has no mark-to-market settlement and associated cash flows to worry about.[11] Thus dealers sometimes find the cash markets more cost effective than futures. The other side of the coin is that dealers frequently use the futures market to hedge inventory over short time intervals. The ability to execute quickly and in substantial size, without searching for the other side of the trade, is crucial to a market-making dealer. In contrast with the cash market, the futures market in bonds always has bids and offers of at least 1,000 contracts on either side of the market (implying that about $100 million can be traded without influencing market price).

One can see that, although professional dealers are sometimes ambiguous about their preference for cash versus futures markets, nondealer institutions and the public are not. Savings and loan associations, pension funds, nondealer commercial banks, and individuals can transact at costs approaching the interdealer market only by using financial futures. The best example of this democratization of transactions costs can be illustrated with short selling. Nondealer institutions usually do not have the credit lines for directly borrowing securities as part of a short sale. Thus they would have to execute such a transaction through a dealer, with the associated middleman's markup. The ability to sell short in futures markets without delivering securities is a clear reduction in costs to nondealers. These short sales do not depress futures prices relative to cash prices (which would be an implicit cost to short sellers) because dealers arbitrage between

cash and futures markets and because *they* can sell short cheaply. Thus the futures market transfers the low-cost short-selling facilities of dealers to the nondealer public.

An extreme example of this transfer occurs in markets in which short selling is impossible (costs are infinite) because securities are not negotiable and hence they cannot be borrowed. Eurodollar time deposits are the best example of such an instrument. The only institutions that can sell Eurodollar time deposits are banks. A nonfinancial corporation with borrowing rates tied to the Eurodollar time deposit rate might like to sell short Eurodollar time deposits so that if rates go up (prices go down) the firm's higher borrowing cost will be offset by its short sale. The corporation can sell Eurodollars short in the futures markets, thereby hedging its future borrowing cost. The short sale will not depress futures prices relative to the spot market because banks would buy the relatively cheap futures contracts and offset the purchase by issuing (selling) Eurodollar time deposits (and investing the proceeds). Thus, even though short selling is impossible, issuers can always issue securities, and that has the same effect on price. Futures markets thus deliver short-selling facilities to the nondealer segment of the market through arbitrage, even when short selling per se is impossible.

This example points up another dimension to the transactions efficiency of futures markets. A nonfinancial corporation with future borrowing costs tied to the rate on Eurodollar time deposits can hedge these borrowing costs by selling short the Eurodollar contract. A straightforward alternative is to borrow funds immediately and invest the proceeds in other money market instruments until the funds are needed. Only if the futures market hedge is more efficient than this direct hedge will the futures contract be employed. The main considerations in favor of the futures market hedge are (1) it avoids cluttering the firm's balance sheet with unneeded current borrowings; (2) it leaves open the firm's bank credit lines; (3) it avoids the necessary financial expertise involved in continuously reinvesting the proceeds of the borrowing at favorable rates; (4) it does not require current balance sheet evidence of creditworthiness. These advantages represent transactions efficiencies for the futures hedge because that mechanism accomplishes the objective of offsetting price-risk exposure without requiring associated evidence of credit or special institutional relationships.

The Special Case of Index Futures. Although all financial futures offer transactions efficiencies compared with their respective cash markets, financial futures that are based on market indices have

special advantages. So far the only index futures are stock market products, including Standard & Poor's 500 index, the NYSE composite index, the Value Line index, and the Major Market index. All index futures are cash settlement contracts, although the reverse is not true (to wit, the Eurodollar contract). Garbade and Silber emphasize that index products require cash settlement because the transactions costs associated with delivering the components of an index effectively prohibit physical delivery.[12] For example, 500 individual stocks make up Standard & Poor's 500 index. If physical delivery were required, then shorts would have to deliver to longs each of those 500 different securities (including fractional parts of some). The huge transactions costs incurred when assembling these securities would prevent arbitragers from forcing convergence between the cash prices of the component securities and the weighted average represented by the index. Without convergence, the hedging use of the contract would be severely hampered.

Cash settlement permits shorts to settle their obligations to longs through a cash payment determined by the market value of the index. Thus the futures contract will converge, on settlement date, to the weighted average of the prices of the securities included in the index. This arrangement creates a product in the futures market that exists in the cash market only as a market basket of various component securities. The cash settlement stock index contracts permit investors to buy and sell this market basket of securities without transacting in each of the component securities.

From this perspective, the stock index contract simply reduces the transactions costs associated with assembling the market basket of securities in the index. Alternatively, the contract can be viewed as creating a generalized "dollar value equity product" for which no corresponding cash commodity exists.[13] Although these alternative perspectives appear largely semantic, they suggest different ways of measuring the transactions economies of the stock index contracts. If the "dollar value equity approach" is taken, then one compares the cost of buying and selling a stock index contract with the cost of a similar dollar transaction in some particular equity. For example, the cost of buying and selling one Standard & Poor's 500 contract (equivalent to about $90,000 of equities) is about $50.00 ($25.00 for commissions to a discount futures broker plus $25.00 for the one tick bid-asked spread in the futures market). The cost of buying and selling $90,000 of a representative $50.00 stock is about $1,300.00.[14]

The cost of assembling a market basket of equities to replicate the weighted combination of securities in the index exceeds the estimated $1,300.00 cost. Numerous individual transactions, many of

them in odd lots of stock, render a precise calculation difficult and an exact duplication of the index nearly impossible. Alternative strategies, such as buying and selling a diversified mutual fund or a subset of stocks that track the index, are somewhat cheaper. Once the time required to assemble a representative portfolio of securities is taken into account, however, the conclusion that the stock index contract creates a unique new product seems a more accurate characterization than the purely transactions-cost view.

Liquidity and the Cost of Capital. The contribution of financial futures can be summarized in the following way. The foundation is a reduction in the cost of transacting and an associated increase in market liquidity. These advantages accrue primarily to financial institutions and public traders who did not have access to the low transactions costs available to professional dealers. Moreover, the reduced transactions costs allow financial futures markets to deliver hedging and price-discovery facilities more efficiently than even the well-developed cash markets in financial instruments. In some cases the price-discovery role of financial futures is most important—as might be true of Treasury-bond futures—while in other cases the improved hedging facilities are the dominant contribution—as with the stock index contracts. In all cases the contribution of financial futures starts with reduced transactions costs.

The next step is to evaluate whether liquidity costs and transactions economies are sufficiently important in the economy to warrant the diversion of scarce resources to the financial futures industry. Although a free market approach allows the marketplace to answer questions, to provide some intuitive evidence on the importance of liquidity to the economy as a whole is useful. To do so puts the contribution of financial futures into proper perspective.

One of the most important groups of institutions in the financial sector is secondary markets in which existing securities are traded among investors. The New York Stock Exchange and the over-the-counter markets in equities, government bonds, money market instruments, corporate bonds, and municipal bonds are all examples of secondary markets. Significant amounts of technological equipment (for example, computers and electronic communications devices) are utilized in these markets. Moreover, highly skilled professional traders are employed as market makers. Thus secondary markets utilize expensive physical and human resources. The most important product of secondary markets is the liquidity inherent in the bids and offers quoted by dealers. The value of these liquidity services to the economy as a whole is measured by the returns earned by

the capital and labor employed in secondary markets. Although no industry breakdown for these data exists, casual observation suggests that these resources are highly remunerated.

A more specific indication of the value of liquidity provided by secondary markets is as follows. If AT&T, IBM, or another company issued a ten- or twenty-year bond that could not be sold before maturity, the interest rate the company would have to pay would surely exceed its current cost of funds. Investors accept a lower yield on a ten- or twenty-year bond because they know they can change their mind and sell even a few days after purchasing it. This flexibility is provided by the liquidity services offered by market-making dealers in secondary markets.

A specific estimate of the value of liquidity to investors is suggested by Garbade.[15] A comparison of yields on Treasury bills and Treasury bonds with less than six months to maturity shows that bonds often yield almost ½ percent more than Treasury bills with the identical maturity. The only difference between the two securities is that Treasury bonds with only six months left to maturity have virtually no secondary market, while Treasury bills are perhaps the most liquid of all instruments. Investors apparently place a value of ½ percent on the flexibility offered by secondary markets over a six-month horizon. Quite possibly for longer-term securities the value of liquidity is even greater.

This discussion implies that the liquidity provided by financial markets clearly adds to economic welfare by reducing the cost of capital to potential real investments, with the associated benefits for capital formation.[16] Since the major contribution of financial futures is an improvement in the liquidity of financial markets, one can conclude that financial futures add to real investment and capital formation. Although this may seem a somewhat circuitous route to uncovering the ultimate economic contribution of financial futures, it is in fact no more roundabout than the economic contribution of popular secondary markets such as the New York Stock Exchange and the government bond market. More specific examples of how financial futures contribute on a microeconomic level can be illustrated by examining how financial futures are used in practice.

Financial Futures in Practice

Many of the major financial institutions use financial futures in some capacity. Commercial banks, thrifts, and other lending institutions hedge their portfolios of securities with interest rate futures. Investment bankers and other securities dealers use stock index and interest

rate futures to hedge their market-making activities; and pension funds, trust companies, and mutual funds use the stock index and interest rate contracts for market-timing and hedging purposes. Rather than tediously reviewing each institution's approach, it seems more fruitful to provide some illustrations on a functional level.

Market Making. Many large commercial banks act as dealers in government bonds, municipal bonds, and mortgages. Most investment banking firms are market makers in all of these securities as well as in corporate bonds, and in over-the-counter stocks. In addition, major investment-banking firms also specialize in block trading in equities; that is, they make markets to institutional investors (such as pension funds) who trade in large blocks of stock (for example, 10,000 shares or more) listed on the New York Stock Exchange. All of these market makers quote bids and offers to investors and wind up buying and selling securities at the public's initiative. In the process of providing these liquidity services, they make extensive use of futures markets to hedge their inventory on a temporary basis.

A securities dealer will make a better market to a customer—that is, quote a narrower bid-asked spread for larger volume—if it can lay off some of the risk exposure of the inventory in the futures market. The most important characteristic of liquidity to a dealer is the ability to buy or sell immediately, without searching for the other side of the transaction. If early one morning a bank buys $500 million of long-term Treasuries and it has considerable inventory left over by 11:30 that morning, it is likely to sell Treasury-bond futures to protect itself during the 11:30–12:00 o'clock period when the Federal Reserve might intervene with open market operations. The government securities dealer cannot afford the time to search for a buyer of the specific Treasury issues. It must hedge against general price movements in Treasuries immediately. In this case the hedge might last only a short time—until the Federal Reserve's intervention period has passed.

If the dealer did not have the option of offsetting the position in the futures markets, it would have quoted a wider spread for less size to its original customer. In fact, most institutions know that the cash market in government securities becomes much less liquid after 3:00 P.M. New York time, when the Treasury-bond futures market closes in Chicago.

The equity-trading desks of investment-banking firms that are market makers in blocks of stock routinely use the stock index contracts to hedge their inventory exposure. A block desk will quote bids and offers for specific equities to large pension funds and mutual funds.

During the course of a trading day it might hold 50,000 to 100,000 shares of thirty or forty different equities. The block desk protects itself against price movements of the market as a whole by selling stock index futures if it is long equities or buying stock index futures if it is short equities. In fact, these hedges may be put on and taken off several times during a trading session as the block desk's position changes.

One of the problems inherent in market making with specific equities is the risk that a buyer or seller has information that will affect the specific price of a stock. The trade is then information based rather than liquidity motivated. A dealer will make a better market for a package of equities rather than one or two individual stocks because it is then less concerned about inside information. Such buy-or-sell progams for groups of large blocks of stock are ideally hedged in the stock index futures market.

One should note that the essence of market making severely hampers dealers from using the specific cash market as a hedging vehicle. Although one of the alternatives to hedging in the futures market is to sell out the position in the cash market, a dealer who has just bought specific equities or corporate bonds, usually cannot hedge by immediately selling out that position because the seller came to the dealer precisely to find a market maker who would inventory the securities. The only market in which hedging easily in the cash market is possible is in Treasury bonds. Recently issued Treasuries are sufficiently liquid to accommodate large-sized purchases and sales. Yet even here, after the futures market closes, the Treasury-bond market is not as liquid as it is when dealers can lay off risk in futures.

This discussion of how market makers use financial futures adds still another dimension to the liquidity contribution of financial futures. Not only are financial futures markets more liquid than the underlying cash markets, with the associated transactions economies, but financial futures also make the cash markets themselves more liquid. Thus the discussion has come almost full circle in tracing the effects of financial futures: they bring improved liquidity services to those who are not professional dealers in cash markets and simultaneously allow dealers to make more liquid cash markets. These effects stem from the transactions economies that attract a larger number of participants to the marketplace.

Portfolio Management and Timing. Pension funds, insurance companies, trust departments of banks, and mutual funds all manage large sums of money. Unlike market makers, these institutions are

concerned with buying securities and earning returns over longer time horizons. In particular, they must realize a rate of return on assets under management that covers the returns promised on liabilities without exposing themselves to excessive risk.

Portfolio managers frequently use financial futures for purposes of market timing. Inflows of funds may be temporarily held in cash equivalents such as money market accounts until the appropriate package of specific equities and bonds is identified for puchase. To avoid the price uncertainty associated with the delayed purchase of securities, the portfolio manager would buy a combination of Treasury-bond futures and stock index contracts as an anticipatory hedge. When the specific stocks and bonds are actually purchased, the financial futures are sold. Market-related price movements will be offset by the long futures position.

Financial futures are also used by money managers as a temporary sale of a package of securities. Suppose the governing board of a pension fund views the next two months as undesirable for stocks. It recommends that assets invested in equities should be reduced by 20 percent as an interim measure. Rather than selling individual stocks, which may be difficult to repurchase without paying significant transactions cost (especially as a result of market maker's fears of information-based trading), the portfolio manager can neutralize market-related price movements by taking a short position in stock index futures. After the excessive price uncertainty has passed, the manager buys back the stock index contracts, with the gains or losses offsetting the price movements on the basket of equities.

In all of these cases, portfolio managers use financial futures as temporary substitutes for cash market transactions (where temporary can mean months rather than the one or two hour horizon of the market maker). An alternative description of the process is that the portfolio manager is hedging a cash market position in futures markets. From either perspective, the ultimate advantage of financial futures is that they are more transactionally efficient than the cash market. In each of these examples, the portfolio manager has the option of using the cash markets as an alternative to futures markets. Moreover, these cash market transactions frequently require the active participation of market-making dealers. Futures markets permit the portfolio manager to bypass the middleman if doing so is transactionally efficient.

Gap Management and Interest Rate Risk. Commercial banks and thrift institutions have always been confronted with the problem of managing the gap between the maturity structure of their assets and

liabilities. One of the main sources of difficulty for savings and loan associations during the 1970s was that they borrowed short term and loaned funds long term. When the level of interest rates skyrocketed during the late 1970s and early 1980s, the cost of funds to savings and loans jumped while their assets showed severe capital losses. Thus a large gap between the maturity structure of an institution's assets and liabilities exposes the firm to significant risk when the level of interest rates changes.

One solution has been to develop a more flexible asset and liability structure so that these institutions can more easily match interest rate commitments on each side of their balance sheet. Matching risk exposure in this way is constrained by customer preferences, however. Borrowers from depository institutions may prefer six-month fixed-rate loans, while lenders to these institutions (the public) prefer weekly adjustments in deposit rates; or the reverse may be true. Financial futures offer depository institutions a mechanism for managing the gap between the maturity structure of their assets and liabilities that does not depend exclusively on customer preferences. If a savings and loan institution has a preponderence of three-month CDs outstanding but has committed loans with six-month maturities, it can hedge the rate it will pay when renewing its CDs by selling short CD or Eurodollar futures. If rates rise (CD prices fall) and they pay more for funds, there will be an offsetting gain on the short futures position. Although this strategy could have been replicated in the cash market by borrowing for six months rather than three, the use of financial futures permits savings and loans to satisfy their customer preferences at the same time as managing risk exposure.

Lending institutions have been especially attracted to the Eurodollar futures market, which is a cash settlement contract based on the London interbank offer rate (LIBOR). Many loans to corporations use LIBOR as a reference point for pricing. A firm will be charged LIBOR plus 1 or 2 percent, as credit ratings vary. An ideal offset to the risk exposure of the loan is the Eurodollar futures market. Although some banks have the alternative of borrowing directly in the London market through affiliates, not all domestic banks do. Moreover, a bank might not want to increase its presence in the Eurodollar market because it does not want to impair its own credit standing. By using the Eurodollar futures market to hedge its lending exposure, it effectively minimizes its risk without suffering elsewhere in its balance sheet. Thus futures permit the institution a more precise risk management tool, one that links an asset with its risk offset without additional complications.

In a broader sense, financial futures permit institutions to decen-

tralize the task of risk management. Matching maturities on the asset and liabilities sides of the balance sheet has the advantage of a global view of the firm's risk exposure. Financial futures can be used at the micro level by individual decision makers. It is sometimes useful to allow risk adjustments at that level, with only the residual exposure passed on for corporate level adjustments.

International Risk Exposure. Multinational industrial corporations that receive and make payments in foreign currencies can hedge the risk of exchange rate variability by matching their foreign assets and liabilities directly. Over short time horizons, however, normal inflows and outflows of foreign currencies are likely to expose the firm's income to fluctuations in foreign exchange rates. Some of these risks can be offset in the dealer market in foreign exchange that is operated by major international banks. Futures contracts on foreign currencies permit multinational corporations to deal directly with one another, rather than hedging exclusively through financial middlemen.

The advantage of lower transactions costs in futures markets is offset, somewhat, by the fact that the futures market in foreign currencies is open for only about five hours a day (8:30 A.M. to 2:20 P.M. New York time), while the need for foreign currency protection emerges throughout the day. Thus, although a nonfinancial corporation could easily ignore the dealer market in bonds, making exclusive use of interest rate futures, it cannot do the same with foreign currency futures, in which the dealer market is essential for complete coverage of market risks. The Chicago Mercantile Exchange has forged a link with the futures market in Singapore precisely to provide hedging facilities around the clock. The success of this innovation will depend, in part, upon the importance of foreign currency futures to corporate hedgers.

Given the description of how financial futures are used by institutions in both the financial and nonfinancial sectors, one can reasonably conclude that each particular contract provides an important service and meets unfulfilled needs. It might be instructive, therefore, to review the success and failure of specific financial futures contracts to see whether further evidence emerges on their economic contribution.

The Success and Failure of Specific Contracts

After the success of the GNMA futures contract indicated that interest rate futures were viable instruments, numerous other specific contracts were innovated. Table 2–2 shows all of the interest rate and stock

TABLE 2–2

FINANCIAL FUTURES INNOVATIONS: 1975–1982

Contract	*Exchange*	*Date of Innovation*	*Average Daily Volume*	*Wall Street Journal Listing*	*Traded in 1985*
GNMA-CDR[1]	CBT	10/20/75	1995	Yes	Yes
Treasury bills (90-day)	CME	1/6/76	1610	Yes	Yes
Treasury bonds	CBT	8/22/77	7954	Yes	Yes
Commercial paper (90-day)	CBT	9/26/77	99	No	No
Treasury bills (1-year)	CME	9/11/78	63	No	No
GNMA-CD[2]	CBT	9/12/78	180	No	No
GNMA-CD[2]	ACE[3]	9/12/78	180	No	No
Commercial paper (30-day)	CBT	5/14/79	12	No	No
Treasury notes (4-6-year)	CBT	6/25/79	88	No	No
Treasury bills (90-day)	ACE[3]	6/26/79	52	No	No
Treasury notes (4-year)	CME	7/10/79	93	No	No
Treasury bills (90-day)	COMEX	10/2/79	286	No	No
GNMA-CD[2]	COMEX	11/13/79	47	No	No
Treasury bonds	ACE[3]	11/14/79	130	No	No
Treasury bonds	NYFE	8/7/80	867	Yes	No
Treasury bills (90-day)	NYFE	8/14/80	188	No	No
Treasury notes (2-year)	COMEX	12/2/80	290	No	No
CD (90-day)	NYFE	7/9/81	914	No	No
CD (90-day)	CBT	7/22/81	895	No	No
CD (90-day)	CME	7/29/81	5103	Yes	Yes
Eurodollar (3 month)	CME	12/9/81	2012	Yes	Yes
Value Line Index	KCBT	2/24/82	2683	Yes	Yes
S & P 500 Index	CME	4/21/82	24156	Yes	Yes
Treasury notes (6½-10-year)	CBT	5/3/82	4228	Yes	Yes
NYSE Composite index	NYFE	5/6/82	11656	Yes	Yes

NOTES: CBT = Chicago Board of Trade; CME = Chicago Mercantile Exchange; ACE = Amex Commodity Exchanges; COMEX = Commodity Exchange; NYFE = New York Futures Exchange; and KCBT = Kansas City Board of Trade.
1. GNMA-CDR = Collateralized Depository Receipt GNMA contract.
2. GNMA-CD = Certificate Deposit GNMA contract.
3. No longer in existence.
SOURCE: Deborah Black, "Success and Failure of Futures Contracts: Theory and Empirical Evidence," Unpublished Doctoral Dissertation, Graduate School of Business, NYU, 1985.

index contracts introduced between 1975 and 1982, including data on the date they were innovated, the average daily volume during the first three years of trading (or fractions thereof), the exchange on which the contract was innovated, whether the contract was ever listed in the *Wall Street Journal*, and whether it was still trading in 1985.[17]

Identifying a cutoff point for a successful contract is a subjective matter. Some observers advocate a volume of at least 1,000 contracts per day, others cite listing in the *Wall Street Journal*, while still others use a longevity measure, such as whether the contract is still trading three years after it is introduced. By any of these criteria, only a subgroup of the financial futures introduced have been successful. Treasury bonds, Treasury notes, and three-month Treasury bills are successful interest rate contracts on government securities, while the one-year bill, two-year note, and four-to-six-year note contracts on Treasuries failed. In contracts on private debt instruments, the successes include the CD and Eurodollar time deposit contracts, while the failures include thirty-day and ninety-day commercial paper. As far as stock index futures are concerned, all of the contracts have thus far been successful, although there may be a further shakeout as the industry develops.

One approach to explaining the pattern of success and failure focuses on individual contract terms and commodity characteristics.[18] Such an idiosyncratic analysis has considerable merit in financial futures as described above. A broader approach to explaining the viability of a contract, one that identifies a set of common ingredients for successful contracts, has considerable attractiveness, however. The key question is, do successful contracts provide transactionally efficient hedging facilities and do the unsuccessful ones not provide them?

The only study that offers a unified explanation of contract success is by Deborah Black.[19] That analysis focuses on interest rate and stock index contracts and uses volume of trading and open interest as measures of success. Not surprisingly, the empirical results show that high price volatility and a large cash market for the particular financial instrument increase the chances for success. A far more important indicator of success, however, is the reduction in risk offered by a newly innovated financial futures contract compared with the risk exposure of cross-hedging the underlying financial instrument with an already existing, close substitute, financial futures contract. According to Black's analysis, for example, the futures contract on Treasury bonds succeeded largely because the reduction in risk offered by the new bond contract to those hedging Treasury bonds

was significant when compared with the residual risk exposure of cross-hedging Treasury bonds with GNMA futures. Similarly, the Treasury-note contract succeeded because it offered substantially better facilities for hedging ten-year Treasury notes compared with the risk exposure remaining from hedging Treasury notes with the bond contract. The commercial paper contract, however, failed because it did not significantly reduce risk exposure below what would be accomplished by cross-hedging commercial paper with the Treasury-bill contract.

These results provide important evidence on the economic contribution of financial futures. Only if a new contract is designed to provide transactionally efficient hedging services will it trade actively. Moreover, an important reference for comparing the efficiency of a hedge seems to be an existing alternative futures contract. These results bear considerable testimony to the transactions advantages of futures contracts in general and successful ones in particular.

Some of the results reported by Black are far from intuitively obvious. The thirty-day and ninety-day commercial paper contracts did not succeed, while contracts on two other closely related private debt instruments—CDs and Eurodollars—were successful. The facts are that the reduction in residual risk provided by the CD and Eurodollar contracts were sufficiently large to attract substantial trading, while that for the commercial paper contracts was not. These results emphasize the danger inherent in predicting redundancy of a futures contract simply because similar alternatives are already in existence. The marketplace provides the most efficient process of natural selection; it does not permit inefficient contracts to survive for very long.

Two examples of financial futures that have withered after considerable early success emphasize the market's intolerance of ineffective contracts. The GNMA contract, the first interest rate future, averaged nearly 2,000 contracts per day during its first three years and traded an average of more than 10,000 per day during the last quarter of 1980. During the last three months of 1984 the GNMA contract traded an average of only 1,000 contracts per day. The main problem is that the GNMA contract no longer provides an effective hedge for GNMA securities. The futures contract prices off the cheapest deliverable cash GNMA, which in recent years has been high-coupon GNMAs that behave more like two-year securities than like thirty-year mortgages.[20] Thus mortgage bankers, savings and loans, and market makers in cash GNMAs have stopped hedging with the GNMA futures contract.

The CD contract has a similar history, averaging more than 5,000 contracts per day during the first half of 1982, while in the last three

months of 1984 it traded about 1,000 contracts per day. Here the problem seems to be the overwhelming success of the Eurodollar contract as well as the decline in domestic CDs outstanding during 1984 and 1985. Most hedging and speculation now centers around the Eurodollar contract, rather than around CDs.

Floor traders on the Chicago Mercantile Exchange, where CDs and Eurodollars trade, followed the order flow from the CD (and Treasury-bill) pits to the Eurodollar pit. If any doubt about the importance of transactionally efficient hedging to the success of futures contracts ever existed, these examples should be more than sufficient to dispel any lingering suspicion.

Policy Issues

Despite commercial and academic testimony supporting the economic contribution of futures markets,[21] some people still maintain that futures trading is more harmful than helpful. Concern with financial futures, in particular, emerged primarily over the frenzy of innovative activity that threatened to inundate the public with allegedly ill-conceived and potentially illiquid contracts. The analogy between futures and gambling, never far below the surface, emerged in full force when cash settlement was proposed as the only feasible way to specify the stock index contracts. Finally, the fear that futures contracts would dominate the cash markets of the underlying financial instruments, thereby impairing rather than improving liquidity, is a criticism that strikes at the heart of futures markets. Although the discussion thus far should have dispelled these criticisms, a brief overview is probably wothwhile.

Contract Proliferation. One of the earliest complaints concerning the unnecessary proliferation of financial futures contracts was presented in the U.S. Treasury–Federal Reserve study on futures markets.[22] Although the discussion in the previous section clearly indicates that the marketplace is an efficient processor of new futures contracts, one of the main legislative concerns with contract proliferation stems from the costs imposed on the public by a failed contract. More particularly, unsuspecting individuals may trade a contract that is doomed to failure and then find reversing the position difficult because the market is illiquid. The cost to the exchange of a failed contract is not of public concern because that is a private profit-making decision that is properly taken into account when a new contract innovation is considered. Only the social cost imposed on others—the nonprofessional public—is a relevant cost worthy of legislative concern.

Although illiquidity is the result of a failed contract, more prudent means of protecting the nonprofessional public than stifling contract innovation exist. Account executives at brokerage firms have a fiduciary responsibility to warn public participants that a new contract might not succeed and that liquidity problems may emerge. Account executives who do not carry out this responsibility should be subjected to CFTC disciplinary proceedings and be liable for pecuniary damages. This approach addresses the social cost of a failed contract without suppressing the innovative effort that leads to transactionally efficient hedging contracts.

Another argument against unrestrained new contract innovation focuses on the fragmented order flow stemming from too many individual contracts. The results will be an excessive number of illiquid contracts that will not serve hedgers well. This approach stresses that liquidity has the characteristics of a natural monopoly, hence only one contract should be authorized on any particular financial instrument.

One cannot deny that larger order flow implies narrower bid-asked spreads with larger size quoted on each side of the market, which in turn attracts greater order flow. The problem with protecting an existing contract from innovative pressure is that determining which contract will provide the most attractive transactionally efficient hedge is impossible. The example of the Eurodollar contract's surpassing the highly liquid CD contract is most instructive in this regard.

Moreover, on a theoretical level, a growing body of literature suggests that a natural monopoly need not be protected if potential competitors are not faced with large "sunk costs" that act as a barrier to entry.[23] In particular, since exchanges can easily shift resources (floor space and local traders) from trading one contract to another, no sunk costs stifle potential competition for existing contracts. Thus, even if liquidity is a natural monopoly, this situation does not imply that licensing of exclusive rights is necessary for optimal production of liquidity services. Potential competitors will keep the existing markets honest.[24] Thus the benefits of innovative contracts are gained without impairing market liquidity if unrestrained competition in new contract design is allowed.

The Cash Settlement Controversy. One of the most important innovations in the futures industry during the past decade has been cash settlement of contractual obligations. As described previously, cash settlement makes feasible futures contracts that are priced off a basket (or weighted average) of commodities rather than a single "cheapest

deliverable'' commodity. Although the circumstances under which cash settlement is the best way to proceed are complex,[25] that cash settlement creates the opportunity to introduce futures products that could not otherwise exist is hardly in doubt.

Some legislators have complained that cash settlement of contractual obligations is inappropriate because it closely resembles casino gambling. In both cases wagers are made on the outcome of an event (role of the dice or price movement of the stock market), and in both cases a cash payoff (positive or negative) depends upon the outcome. This description is accurate as far as it goes, but it ignores crucial distinctions.

In the case of a futures contract (any contract), the risk exists whether or not the futures contract is introduced. Stock prices fluctuate and portfolio managers suffer losses or earn gains irrespective of their participation in stock index futures. Not so with casino gambling, in which the risk is manufactured. Futures contracts simply permit market participants to transfer existing risks among themselves; and the process uncovers people who are more willing to take on the uncertainty in exchange for anticipated gains. Thus the analogy with casino gambling is forced at best, actually perverse if one recognizes that futures trading reduces the subjective risk exposure of society, while casino gambling increases it.

The irony is that the cash settlement feature of the stock index contract, which has been maligned with the casino gambling analogy, is in fact crucial to the usefulness of the contract as a hedging device. Hedgers require comovement between cash market prices and futures prices to use futures to offset risk. The comovement is promoted by arbitragers who buy and sell in the two markets when prices are out of line. Arbitragers rely upon the ultimate convergence between the cash and futures price on the settlement date of the contract to underwrite their activities. Convergence is forced by the ability to deliver the underlying product in satisfaction of contractual obligations. But transactions costs of assembling the 500-odd securities to deliver on the Standard & Poor's 500 index, for example, would prevent arbitragers from forcing convergence on the delivery date. Only by requiring cash settlement of contractual obligations does convergence emerge. Thus cash settlement, instead of raising questions about the hedging use of the contract, turns out to be a crucial feature for satisfactory hedging.

Dominant and Satellite Markets. The relationship between cash prices and futures prices has raised the question of which market leads in price movement. The natural order of things would suggest that cash

prices should lead futures prices because the latter derive their value from the former. In fact, futures contracts (like options) are often called derivative securities to indicate their secondary status. The issue is often raised within the context of the potential decline in liquidity in the cash market if the futures market turns out to dominate.

Although there exists a reasonable possibility that prices in futures markets lead cash prices, this is hardly a perversion of the natural order. Rather, it simply reflects the greater transactions efficiency of futures. Market makers who quote bids and offers for securities concentrate on order flow within their own markets to gauge buying and selling interests. They also watch closely related markets to extract additional information. A market maker in CDs, for example, focuses on bids and offers for those securities but also watches the closely related Treasury-bill market for information about when to alter quotes. A market maker in relatively inactive Treasury bonds (for example, those with very low coupons) may watch the bids and offers of his own securities but surely derives far greater pricing information from the bids and offers in more actively traded, recently issued Treasury securities.

The pricing process that emerges for financial instruments with active futures markets is no different. Treasury-bond dealers get price information from bids and offers coming directly to them but concentrate at least as much on the more active futures market for a continuous reading on market conditions. The market dominating the pricing process is the one that has the largest and most continuous order flow since that is where new information first gets incorporated. Arbitrage will then ensure that the less active, satellite market is priced efficiently. Liquidity is also transferred to the satellite market through the activity of arbitragers.

Since futures markets are frequently more transactionally efficient than cash markets, they are often the dominant market. Garbade and Silber have shown that cash markets price off futures markets in the agricultural commodities, while in precious metals the relationship is more symmetric.[26] The dominant-satellite relationship between cash and futures markets for financial instruments has not yet been evaluated empirically. Conversations with market participants suggest that for foreign currencies the cash markets dominate, for debt instruments there is a symmetric relationship, whereas for the equity market there is continuous competition for leadership. These relationships depend upon the relative size and the activity in the respective markets and can change over time.[27]

When stock index futures were first introduced, most participants viewed them as satellites of the stock market. Participants took their clue about the direction of price movements for equities from the price movements of large securities like IBM, General Motors, and Exxon. With the growth in liquidity in stock index futures, that relationship has changed. As hedgers turned to the futures market to offset risk quickly and efficiently, the futures market for stock index products has become a more sensitive pricing gauge than many of the underlying equities.

The message from the dominant-satellite issue is that information emerges quickest in markets that are transactionally efficient. Futures markets contribute to the pricing process precisely because the cost of transacting there is low. Futures markets cannot, however, go off by themselves because arbitragers keep them properly aligned with their respective cash markets. This process, in fact, is precisely the price discovery role of futures markets that policymakers view as desirable.

Summary

Financial futures have become an integral component of the financial sector because they offer cost efficient transactions services to all types of financial institutions. Depository institutions use financial futures to adjust the risk exposure of their asset/liability mix, market-making securities dealers offset the risk of their inventory with financial futures, and portfolio managers hedge their income-earning assets with financial futures.

In most cases, the hedging and risk-transfer facilities offered by financial futures are available elsewhere. The cash markets for most financial instruments are well organized and highly liquid. Nevertheless, futures markets in financial instruments dominate the cash markets because homogenous contract design promotes greater liquidity than do cash markets. Even when some cash markets rival the futures markets in liquidity, such as with the Treasury-bill or Treasury-bond markets, that liquidity is usually reserved for market professionals. Financial futures bring those reduced liquidity costs to all market participants. This democratization of transactions services is a major contribution of financial futures.

Although the benefits of financial futures are felt most directly in reduced transactions costs in the financial sector, the consequences for economic welfare extend beyond that narrow focus. The increased liquidity and risk reduction facilities available to portfolio managers

and other investors is reflected in a reduced cost of capital to business firms. The ultimate benefit, therefore, is translated into greater capital formation for the economy as a whole.

Notes

1. See especially Commodity Futures Trading Commission, "Report of the Advisory Committee on the Economic Role of Contract Markets" (July 17, 1976); Roger Gray, "The Relationship among Three Futures Markets: An Example of the Importance of Speculation," *Food Research Institute Studies* (February 1961); Thomas Hieronymous, *The Economics of Futures Trading* (New York: Commodity Research Bureau, 1971); and Anne E. Peck, ed., *Selected Writings on Futures Markets* (Chicago: Chicago Board of Trade, 1977), and *Views from the Trade* (Chicago: Chicago Board of Trade, 1978).

2. See Board of Governors of the Federal Reserve System, Commodity Futures Trading Commission, and Securities and Exchange Commission, "A Study of the Effects on the Economy of Trading in Futures and Options," Washington, D.C. (December 1984).

3. Commodity Futures Trading Commission, "Guideline No. 1," 17 C.F.R. Part 5 (Appendix A); 1 CCH Comm. Fut. L. Rep. Paragraph 6145 (1975).

4. See, for example, Peck, ed., *Selected Writings on Futures Markets*.

5. Although all financial instruments are perfectly storable in the sense of zero physical spoilage, some are not sufficiently long-lived to satisfy the condition that they can be carried forward as inventory indefinitely. Treasury bills, for example, cannot be inventoried for more than one year because they have a maximum twelve-month maturity. Thus Treasury-bill futures could be priced as a perfectly storable commodity only within that time span.

6. See Harold Demsetz, "The Cost of Transacting," *Quarterly Journal of Economics* (February 1968); and Seha Tinic, "The Economics of Liquidity Services," *Quarterly Journal of Economics* (February 1972).

7. See Kenneth Garbade and William Silber, "Structural Organization of Secondary Markets: Clearing Frequency, Dealer Activity and Liquidity Risk," *Journal of Finance* (June 1979).

8. To construct a three-month forward contract in Treasury bills, one buys a six-month bill and sells short a three-month bill.

9. When selling short in the cash market, a government securities dealer does not have to be concerned with mark-to-market settlement. Moreover, basis risk is also avoided. *Basis* is defined as the difference between the cash market price and futures price. *Basis risk* refers to the variability of the cash price minus the futures price. High variability in the basis makes hedging difficult because the futures price cannot be relied upon to offset cash price movements.

10. The lowest offer and highest bid in the market can be uncovered instantaneously in the government bond market through the aid of broker's screens, but these are available only to government securities dealers. See

Kenneth Garbade and William Silber, "Price Dispersion in the Government Securities Market," *Journal of Political Economy* (August 1976).

11. In a short sale the dealer would have to maintain collateral at market value, but this does not entail an interest expense.

12. See Kenneth Garbade and William Silber, "Cash Settlement of Futures Contracts: An Economic Analysis," *Journal of Futures Markets*, vol. 3, no. 4. (1983).

13. Do not confuse futures contracts that have multiple delivery options with index contracts. Most futures have delivery options, for example, various coupons of government bonds can be delivered under the Treasury-bond contract or various bank CDs can be delivered under the CD contract. In these cases, the contract is priced off the cheapest deliverable cash commodity rather than a weighted average of the varieties, as would be the case in an index contract. See Kenneth Garbade and William Silber, "Futures Contracts on Commodities with Multiple Varieties: An Analysis of Premiums and Discounts," *Journal of Business* (July 1983).

14. Kling suggests the following type of calculation. A discount broker charges about thirty cents per share. Buying and selling 1,800 shares of a $50.00 stock involves the same $90,000.00 and costs $1,080.00 in commissions to the broker. In addition, if the bid-asked spread were ⅛ (.125 cents per share), this adds $225.00, for a total cost of $1,305.00. Note that the $90,000.00 value for the Standard & Poor contract is based on an index value of 180.00 and the $500.00 contract multiplier ($90,000.00 = 180 x $500.00). See Arnold Kling, "Futures Markets and Transactions Costs," Board of Governors of the Federal Reserve System, Washington, D.C. (March 1984).

15. See Kenneth Garbade, "Analyzing the Structure of Treasury Yields: Duration, Coupon, and Liquidity Effects," Bankers Trust Co. (November 1984).

16. See also Jerome Stein, "Futures Markets and Capital Formation," chapter 3 of this book.

17. The data are taken from Deborah Black, "Success and Failure of Futures Contracts: Theory and Empirical Evidence" (unpublished Ph.D. diss., Graduate School of Business, New York University, 1985). The average volume figures were calculated for the first three years of trading or until the contract stopped trading.

18. See, for example, Richard Sandor, "Innovation by an Exchange: A Case Study of the Development of the Plywood Futures Contract," *Journal of Law and Economics* (April 1973); Mark Powers, "The Effects of Contract Provisions on the Success of a Futures Contract," *Journal of Farm Economics* (November 1967); and William Silber, "Innovation, Competition and New Contract Design in Futures Markets," *Journal of Futures Markets*, vol. 1, no. 2. (1981).

19. Black, "Success and Failure of Futures Contracts."

20. High coupon GNMAs behave like two-year securities because there are rapid prepayments of principal, which shorten the duration of the security.

21. See Peck, *Selected Writings on Futures Markets* and *Views from the Trade.*

22. U.S. Treasury and the Board of Governors of the Federal Reserve System, "Treasury Futures Markets: A Study by the Staffs of the U.S. Treasury and the Federal Reserve System," Washington, D.C. (May 31, 1979).

23. See William Baumol, John Panzar, and Robert Willig, *Contestable Markets and the Theory of Industry Structure* (New York: Harcourt Brace Jovanovich, Inc., 1982).

24. The case for granting a natural monopoly license is strongest only where large sunk costs present barriers to potential competition. The best examples are local utilities such as gas and electricity.

25. See Garbade and Silber, "Cash Settlement of Futures Contracts: An Economic Analysis."

26. Kenneth Garbade and William Silber, "Price Movements and Price Discovery in Futures and Cash Markets," *Review of Economics and Statistics* (May 1983).

27. Note that the stock market itself presents an interesting example of a derivative market dominating the underlying market. Equities are nothing more than claims on the underlying firms. Price information about the value of a company is usually derived from bids and offers in the market for the firm's securities rather than from bids and offers for the company itself. The underlying market is far too illiquid to use on a continuous basis to value the firm. Of course, if the stock market's valuation differs considerably from the underlying value, this triggers an arbitrage transaction, such as the firm's buying back its shares or selling more shares to the public. In more extreme cases, transactions in the "cash market" are triggered, such as with a takeover attempt. Thus the stock market itself is an example of a derivative market that dominates pricing in the underlying market.