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Over-the-Counter Financial Derivatives: Risky Business?

Peter A. Abken

Their continuing rapid growth—and some spectacular, well-publicized losses by a few users—has gained financial derivatives a lot of attention in recent years. In late 1993 a U.S. subsidiary of the German conglomerate Metallgesellschaft AG lost $1.8 billion in oil futures and forward contracts. Its poorly conceived derivatives hedges nearly bankrupted the company. In 1992 senior managers at Showa Shell, the Japanese affiliate of Royal Dutch/Shell, wiped out 82 percent of shareholders' equity by taking a $6 billion position in yen/dollar futures, effectively wagering five dollars for every dollar they hedged. Their futures position turned out to be a disastrous bet when the yen sharply appreciated against the dollar (Richard C. Breeden 1994 and William Falloon 1994). Several major so-called hedge funds, which are private investment partnerships that leverage their investments using derivatives of all kinds as well as bank loans, lost enormous sums through derivatives positions. One lost $600 million speculating on the yen in two days, and another, $1 billion—a quarter of the funds under its management—since the beginning of 1994 (Michael R. Sesit and Laura Jereski 1994; Brett D. Fromson 1994). (On the other side of the coin, these funds made billions in 1992 speculating on European currencies.) The rapid, huge sales of bonds in order to cover derivatives losses and reduce exposures reportedly roiled bond markets around the world, causing concern about the disruption of financial markets from their trading.[1]

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Also a source of anxiety are derivative instruments more exotic than these examples generally involve. A large consumer products firm recently announced a $157 million pretax loss on some leveraged swaps designed to bet on the direction of change in U.S. and German interest rates (Steven Lipin, Fred R. Bleakley, and Barbara Donnelly Granito 1994). This and other recently reported cases of losses have focused attention on the risks of these more complex derivatives. Aside from their complexity, the largely unregulated character of the over-the-counter (OTC) derivatives markets sets them apart from other financial markets, as has their extremely rapid growth and fast pace of innovation. This article examines the current structure of the OTC markets and recent recommendations for improved monitoring and perhaps broader regulation of their operation.

Over-the-counter derivatives are financial claims that derive their value from the level of an underlying price, price index, exchange rate, or interest rate. Some of the more common of these instruments include interest rate swaps, forward rate agreements, caps, collars, floors, options, and their foreign exchange equivalents. In recent years OTC derivatives have become a mainstay of financial risk management and are expected to continue growing in importance as more financial managers become more familiar with their use.

Exchange-traded derivatives, such as futures contracts, are similar to OTC instruments in terms of their risk management applications. They differ in a number of important respects, however—a key difference being that OTC instruments are intermediated by financial institutions, which design or tailor an instrument to the needs of the end user. OTC contracts are negotiated bilaterally—between two counterparties—and thus are essentially private transactions, unlike exchange-traded instruments, which are arranged openly through an organized futures or options exchange. Another key distinction is the largely unregulated nature of OTC derivatives trading, whereas exchange-traded derivatives are extensively regulated by federal government agencies.

The history of derivatives in the United States is long and checkered. Derivatives trace back to the founding of the Chicago futures exchanges in the mid-nineteenth century. The markets' modern history starts with the trading of financial and foreign exchange futures on the International Monetary Market of the Chicago Mercantile Exchange (CME) in 1972 and with standardized stock option contracts on the Chicago Board Options Exchange in 1973. With the emergence of the interest rate and currency swap market in the early 1980s, over-the-counter derivatives gained prominence.

Activity in derivatives markets is often characterized by a somewhat overly simplistic dichotomy between speculators and hedgers. Speculation and its putative association with excess price volatility have been a rationale for regulation both historically and currently.[2] However, concerns about derivatives today extend beyond price stability to market stability. In particular, financial regulators want to minimize systemic risk—the possibility that the failure of one firm as a result of derivatives trading would trigger the failures of other firms.

Most observers would agree that the use of derivatives carries risks, both to individual firms and to financial markets. From an economic perspective, it is the proposition that the derivatives markets do not internalize the social costs of their activities that supports the case for (further) regulation. Even when firms safeguard themselves individually in conducting derivatives operations, such measures may be inadequate to insulate the public from picking up the costs of a systemic crisis that could spread from the failure of one or more key derivatives players. The threat of such a so-called market failure, in which private and social costs diverge, is a classic reason for regulatory intervention (Stephen Schaefer 1992, 3). For U.S. depository institutions engaged in derivatives transactions, a further concern is that misuse of derivatives—for example, taking large speculative bets on interest rates—could endanger the deposit insurance safety net. Regulations span a wide array of actions and costs.[3]

Because of their perceived riskiness and their relatively unregulated status, the OTC derivatives markets have been under increasing scrutiny. Industry organizations as well as government regulators have conducted several comprehensive studies of the markets. The salient observations and recommendations of these studies are considered below.

An Overview of Derivatives Markets

Derivative instruments fall into four basic market groups: interest rate contracts, foreign exchange contracts, commodity contracts, and equity contracts. The first two groups are the dominant and older segments of the market. The instruments themselves consist of two basic types, those with linear payoffs and those with nonlinear payoffs.[4]

Linear payoff contracts are those whose value at maturity moves one-for-one with the level of the underlying price, price index, exchange rate, or interest rate (hereafter simply referred to as price). Forward contracts and swaps, which are sequences of forwards with successively longer maturities, are the primary linear payoff contracts. Forward contracts fix a price on an asset for delivery at a specified future date. These contracts are typically priced so that they cost nothing to initiate, but as the underlying price fluctuates away from the price that prevailed at initiation, they become assets or liabilities to the counterparty. This one-for-one movement makes these contracts well suited for hedging the underlying asset or liability because the future appreciation of the derivative can offset the loss on the asset or liability, or vice versa.

As an example, consider a simple, "plain vanilla" interest rate swap. A typical use of such a swap is in converting interest rate payments on floating-rate debt into fixed-rate payments. The swap obligates a counterparty to pay a fixed interest rate payment, determined by the stipulated swap rate, at semiannual intervals and simultaneously to receive a floating interest rate payment, typically indexed to LIBOR.[5] Only the net difference between the fixed- and floating-rate payments is exchanged. The combination of floating-rate debt and swap synthesizes a fixed-rate bond. As LIBOR rises above the fixed swap rate, the net swap payment offsets higher payments on the underlying debt; conversely, as LIBOR falls below the swap rate, interest saving on the debt is forgone as the counterparty makes a net swap payment to the other swap counterparty. Thus, a swap locks in a fixed interest rate, analogous to a forwards' fixing a price or exchange rate.

Nonlinear payoff contracts have payoffs that do not move one-for-one with the underlying price at expiration. Option contracts have the simplest and most common type of nonlinear payoff. For example, if the price is above a call option's strike price (the price at which the optionholder is entitled to purchase the asset), the payoff moves one-for-one, but if it is below the price, the payoff is zero. Prior to expiration, the value of an option is a smooth, convex function rather than a kinked function of the underlying price. As another example, a digital or binary option—a type of exotic option—has a payoff at expiration that jumps from zero to a fixed amount if the underlying price falls within a specified range. (In general, exotic options have relatively complicated contingencies that determine their payoffs. See William C. Hunter and David W. Stowe 1993a, 1993b.) The key point in the context of derivatives regulation is that nonlinear payoff contracts are more difficult to value than swaps and forwards. Regardless of type, options are assets to their purchasers and liabilities to their sellers or writers.

Size of the Markets. The standard way to judge the size of OTC derivatives markets is by reference to the notional amount outstanding for particular types of derivatives. The notional amount is the face value of the principal of the underlying contract on which a derivative instrument is based. (With the important exception of currency swaps, principal is usually not exchanged in a swap transaction.) Notional principal is a misleading indicator of the size of derivatives transactions because most cash flows arising from such transactions are small compared with notional principal. However, notional principal is useful as a measure of the relative importance of one type of derivative compared with another or as a measure of the growth in activity for one instrument.

One of the difficulties in studying OTC derivatives markets is that data on market activity are somewhat sketchy. Interest rate and currency swap activity has been surveyed by a trade association, the International Swaps and Derivatives Association, since the mid-1980s. Chart 1 shows the worldwide growth in notional principal for interest rate and currency swaps from 1987 to 1992. Interest rate swaps denominated in a single currency grew at a compound annual rate of 33.4 percent to a year-end 1992 notional amount of $3.9 trillion; currency swaps grew at 29.4 percent to a year-end notional amount of $860 billion over the same period. During this period, the notional value of exchange-traded interest rate and currency futures in the United States rose at a 22.0 percent compound annual rate, reaching a year-end 1992 combined level of $1.35 trillion (Commodity Futures Trading Commission [CFTC] 1993a, 24).

With the exception of forward foreign exchange contracts and forward rate agreements or FRAs (essentially one-period interest rate swaps), the other segments of the OTC derivatives markets are much smaller than the swaps market. Year-end 1992 dollar and nondollar caps, collars, and floors were $468 billion, and options on swaps (swaptions) were $108 billion.

The volume of new swaps originated during 1992, in terms of notional principal, stood at $3.12 trillion (105,000 contracts), whereas the volume in global exchange-traded futures and options trading in 1992 totaled $140 trillion in notional value (600 million contracts).[6] Clearly, the exchange-traded futures and options are traded in more active markets in the sense

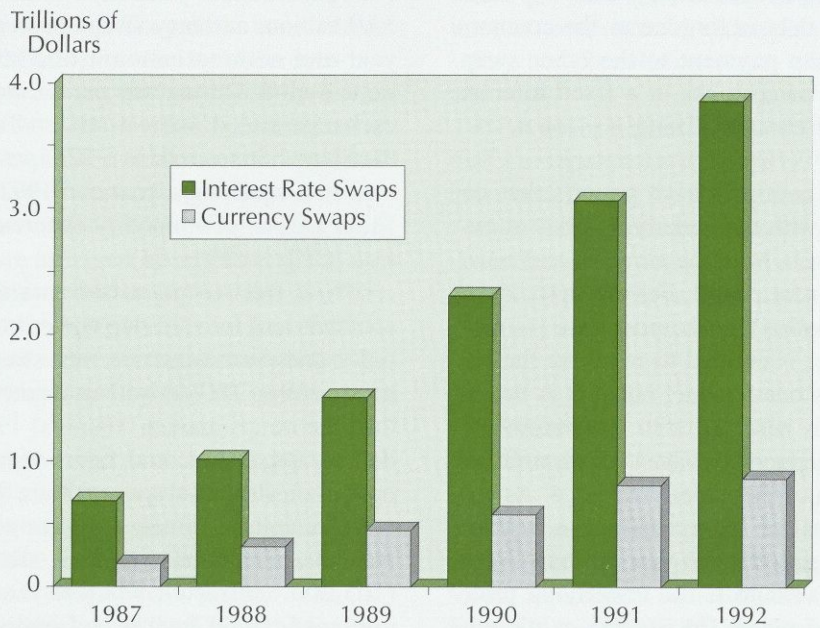
that contract turnover is much higher. One reason for this activity is that the average maturity of futures and options contracts is less than one year; in fact, most trading involves contracts with maturities of one month or less. On the other hand, roughly 60 percent of interest rate swaps fall within a one- to three-year maturity band, about 30 percent within three to seven years, and 10 percent, more than seven years. Currency swaps are skewed toward even longer maturities. The long maturities of swap contracts affect the riskiness of swap portfolios.

Dealers. Most swap and other OTC derivatives trading takes place through dealers, which are primarily the largest money-center banks, investment banks, and insurance companies.[7] Worldwide, 150 dealers are members of the International Swap Dealers Association (ISDA). They run derivatives portfolios or "books" that contain various swap and other derivatives positions they have with their customers, who may be end users or other dealers. Dealers typically seek to hedge their books against changes in interest rates (and other market factors). Matching a swap of a counterparty that exchanges fixed-for-floating interest rate payments with another counterparty that exchanges floating-for-fixed payments is a standard method of insulating a swap portfolio from interest rate movements. (This risk is discussed more fully below.) Dealers also hedge or "lay off" risk using exchange-traded futures and options contracts—for example, Eurodollar futures contracts.

In addition to a commission, compensation for dealers' intermediation takes the form of a spread between the fixed rate they receive from a counterparty to a swap (the ask or offer rate) and the fixed rate they pay to another (the bid rate). The swap ask rate is a few basis points (hundredths of a percentage point) higher than the bid rate. Dealers quote different bid-ask spreads for each instrument in which they "make markets." Less active markets—exotic options markets, for instance—command larger dealer spreads. Dealers bear more risk and greater costs in hedging these derivatives. Larger spreads may also represent economic rents for offering unique derivative instruments.

No aggregate statistics on dealer activity are available. The dominant dealers in the United States are the largest commercial banks. Federal Reserve statistics

Chart 1
Swaps Outstanding: Year-End Notional Amounts, 1987–92



Source: CFTC, using data from the Bank for International Settlements and the International Swap and Derivatives Association.

from the Consolidated Financial Statements for Bank Holding Companies (FR Y-9C) give a glimpse of the largest bank holding companies' (BHC) dealer activity. The top ten BHCs' positions as of June 30, 1993, are reported in Table 1. More than 90 percent of the dealer derivatives business is concentrated in these largest institutions; relatively little is conducted in the next 205 BHCs. The total size of derivatives positions as measured by notional principal is typically a large multiple of the total assets of each institution, but, as mentioned earlier, this figure enormously exaggerates the scale of this business and its risks. Forwards are the main areas of bank dealer activity, followed by swaps and options.

In ten years of derivatives trading, trading revenues amounted to $35.9 billion, whereas cumulative losses came to merely $19 million. Moody's and Standard and Poor's, which provide credit risk ratings for corporate bonds, have never downgraded a firm strictly on the basis of its derivatives activities. Both firms regard derivatives as sources of profit and income stability for commercial banks.[8] No commercial bank has failed because of derivatives activities.[9]

The Risks of Derivatives

Derivatives risk stems from a variety of sources. This section discusses each of the following categories of risk that arise in derivatives markets: market risk, credit risk, legal risk, settlement risk, operating risk, and systemic risk.

Market Risk. Market risk refers to any market-related factor that changes the value of a derivatives position. The relevant exposure is the unhedged portion of a derivatives portfolio. Changes in the underlying price cause a change in the current market value of a derivative. This change in value is referred to as delta risk. For example, as the level of interest rates rises, the value of a plain vanilla swap falls for a counterparty that receives a fixed rate of, say, 8 percent on a swap. If the swap rate on a newly originated floating-for-fixed swap is now 9 percent, another counterparty would be willing to take over the existing swap and receive 8 percent payments only if compensated for the lower present value of the cash flows from that swap.[10] This situation is analogous to the capital loss realized on a

Table 1
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).

fixed-rate coupon bond when interest rates rise. Conversely, a counterparty paying an 8 percent fixed rate would realize a capital gain on the swap upon closing it out before maturity. The net cash flows from a swap portfolio can be similarly analyzed.

The market risk of nonlinear payoff contracts—options and other derivatives with option features—is more difficult to assess. The entire "probability distribution" of the underlying price may be relevant to valuation. For example, as the volatility or dispersion of the price increases, option prices rise because of the greater likelihood that the contract will yield a payoff at maturity. This characteristic is known in the market jargon as volatility risk or vega risk. It is conceivable, and in fact not uncommon, for the price of the underlying contract to remain unchanged while its volatility shifts. Volatility risk is most effectively hedged using other option contracts.

A payoff's nonlinearity implies that the sensitivity of an option's price to changes in the underlying price varies with the underlying price. For example, a call option's price becomes increasingly sensitive to the underlying contract's price the farther in the money the option becomes (that is, the higher the price moves above the strike price). (In the extreme, the price of an option that has no chance of finishing out of the money moves one-for-one with the underlying price.) This risk, known as convexity or gamma risk, though predictable (unlike volatility shifts), complicates the hedging of options portfolios. Hedges need to be dynamic, meaning frequently adjusted, rather than static, as in the hedging of linear payoff contracts like swaps and forwards.[11]

Credit Risk. Because OTC derivatives are entered into bilaterally, performance on a contract depends on the financial viability of the opposite counterparty. Should the opposite counterparty become insolvent and go bankrupt, a counterparty has to attempt to recover the value of a derivative contract in bankruptcy court or, in the case of depository institutions, through the institution's conservator or receiver (the Federal Deposit Insurance Corporation for banks or the Resolution Trust Corporation for savings and loans). This position contrasts with exchange-traded derivatives that have an exchange clearinghouse as the opposite counterparty. The credit exposure is to the clearinghouse—effectively all clearing members of an exchange—rather than to an individual counterparty.

According to an ISDA survey conducted at the end of 1991, the cumulative losses on derivative contracts among participating ISDA members (representing 70 percent of the market) over a ten-year period was $358 million (Group of Thirty 1993b, 43). Somewhat more than half this amount was attributable to defaults triggered by a legal technicality, which will be discussed in the next subsection. A recent survey of fourteen major U.S. OTC derivatives dealers revealed that cumulative, combined losses from 1990 through 1992 amounted to $400 million (with $250 million occurring in 1992). This loss represents only 0.14 percent of the dealers' gross credit exposure, which is a worst-case measure of losses if all contracts defaulted (U.S. General Accounting Office [GAO] 1994, 55, and Appendix III). Although actual losses experienced have been rather small historically, derivatives dealers are clearly cognizant of the credit risks derivatives pose, and evolving market practice continually refines safeguards against credit losses.

The credit risks of linear payoff contracts are different from nonlinear payoff contracts because the former can be either an asset or a liability to a counterparty, depending on the future evolution of the underlying price. A counterparty would not default on a swap that is an asset. Unwinding that swap by marking it to market and closing it out would result in a cash payment from the opposite counterparty.[12] Default occurs when the counterparty is insolvent and the swap is a liability. In fact, conceptually the credit risk of a swap or forward contract may be viewed and analyzed in terms of options.[13]

The current exposure of a derivative is its mark-to-market value or its replacement cost. The future exposure is the potential loss on a derivative as market rates and prices change. This exposure is difficult to quantify and generally requires sophisticated simulation analyses. The future exposure of an interest rate swap traces a dome-shaped curve that rises and then falls from the time of its origination to the time of its expiration. The reason is that early on there is relatively little uncertainty about movement in market rates. The dispersion of rates or prices away from current levels increases over time, elevating future exposure. On the other hand, derivatives have fixed maturities, so the number of remaining future payments falls with the passage of time. These two effects offset each other. By the last payment date there is no uncertainty and no future exposure. In contrast, currency swaps have future exposure profiles that rise steadily because the final exchange of principal is the dominant cash flow, which swamps the amortization effect of earlier periodic cash flows.

Converting derivatives exposures into expected losses requires an assessment of the probability that a counterparty will default. Intuitively, the credit exposure to a counterparty may be large in the near term—

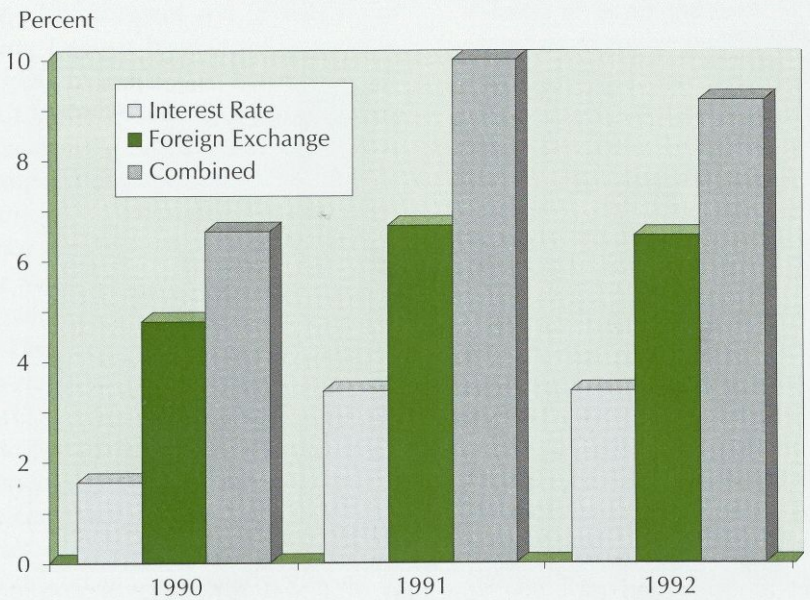
say, three months—but the expected loss during this interval could be negligible for a financially strong counterparty because insolvency is highly unlikely. The likelihood of default rises over progressively more distant time horizons as current information about a firm's financial condition has less and less predictive value and relevance. For example, currency swaps generally have larger expected credit losses compared with interest rate swaps because the greatest probability of default coincides with the greatest total credit exposures, both coming at the end of a currency swap's life.

The analysis of credit risk becomes more complex in moving from considering the credit risk of individual derivatives to portfolios of derivatives. Simulation analysis is again needed to handle the interrelationships of a portfolio's derivatives. One issue is the extent to which individual derivatives in a portfolio with the same counterparty may be netted against one another. That is, a dealer or end user may owe payments on some derivatives while simultaneously receiving payments on others, all with the same counterparty. If only the net amount is paid, then the total cash flow is generally much smaller. It is becoming increasingly common practice to bundle individual derivatives into so-called master agreements that provide for netting of payments.

A related concept is close-out netting in the event of counterparty bankruptcy. Through a master agreement, the amount a defaulting counterparty owes upon termination of its outstanding contracts with another counterparty would be limited to the net amount of the mark-to-market values. In the absence of a master agreement, the sum of the gross amounts of contracts with negative replacement value would be owed. The credit exposure is generally much larger without netting arrangements in place. The practice of bilateral netting and the use of master agreements are becoming more widespread. Legal uncertainties pose the greatest obstacles to broader application of bilateral netting.

Chart 2 shows the gross replacement costs relative to the book value of assets of commercial bank derivatives dealers from 1990 to 1992. These are disaggregated into interest rate and foreign exchange derivatives. The gross replacement costs or current exposures amount to less than 10 percent of assets. These measures exaggerate exposures because they ignore the fact that many derivatives contracts with a single counterparty are included in bilateral netting arrangements, which

Chart 2
Commercial Bank Derivatives Positions—Dealers: Replacement Costs Relative to Book Assets



Source: CFTC, using data from the Board of Governors of the Federal Reserve System FR Y-9C Reports.

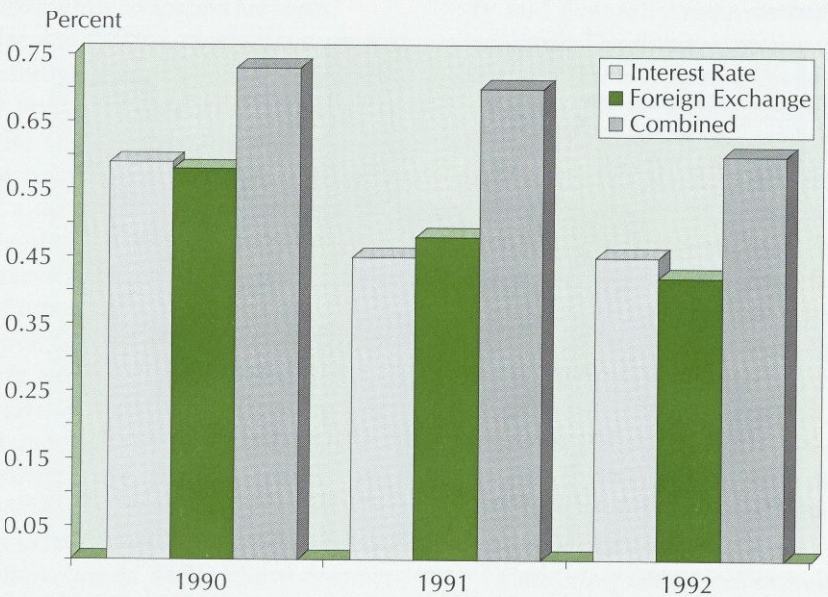
have been estimated to reduce counterparty exposures by 40 percent to 60 percent (Group of Thirty 1993b, 135). Furthermore, all derivatives counterparties are highly unlikely to default simultaneously—the expected loss is considerably smaller than the gross exposure—and recoveries in the event of default are likely to be greater than zero. Chart 3 shows the corresponding gross replacement costs for bank nondealers, who as a group have current exposures relative to assets about a tenth the size of bank dealers'.

Gross credit exposures appear larger when measured against the equity capital of an institution. In a recent survey conducted by the General Accounting Office, the derivatives gross credit exposure of thirteen major U.S. derivatives dealers in 1992 amounted to 100 percent or more of equity capital for ten of the thirteen dealers. However, another perspective emerges in considering the same exposures relative to loans for seven of the dealers that are commercial banks. Whereas the derivatives exposures ranged from 100 percent to 500 percent of equity capital, the commercial loan exposures ranged from about 350 percent to 1200 percent (GAO 1994, 53-55), with loan exposures being a multiple of the derivatives exposures at each bank, except for one.

Legal Risk. The derivatives markets span industrialized nations all over the globe. Each nation of course has different securities and bankruptcy laws, and uncertainty about how derivatives contracts are treated in different legal jurisdictions stands as one of the major challenges to the derivatives business. Another level of complexity is that many laws that affect OTC derivatives were legislated before the advent of OTC derivatives trading. Derivatives counterparties risk losses because of legal actions that render their contracts unenforceable.

The most notorious case is that of the London borough of Hammersmith and Fulham. In 1991 the U.K. House of Lords nullified swap contracts that this London municipality had established during the mid-1980s on the grounds that derivatives transactions were "beyond its capacity"—that is, the municipality did not have the legal authority to enter into the contracts. This decision was far-reaching and voided contracts between 130 government entities and 75 of the world's largest banks (Group of Thirty 1993b, 46). On the basis of consultations with regulators and lawyers, participants in these swaps had assumed prior to the ruling that the municipalities had the right to engage in swaps. Over half of the realized losses from defaults

Chart 3
Commercial Bank Derivatives Positions—Nondealers: Replacement Costs Relative to Book Assets



Source: CFTC, using data from the Board of Governors of the Federal Reserve System FR Y-9C Reports.

(as of year-end 1991) stemmed from the Hammersmith and Fulham decision.

The question of capacity is also an issue in jurisdictions outside of the United Kingdom as well as for other kinds of swap counterparties. A recent Group of Thirty survey disclosed that, besides municipalities, derivatives market participants are also concerned about entering into contracts with sovereigns (that is, national governments), pension funds, and, to a lesser degree, with unit investment trusts and insurance companies (Group of Thirty 1993b, 47).

Another major area of concern regarding legal risks is how derivatives are handled in the case of early termination as a result of the bankruptcy, insolvency, or liquidation of a counterparty. Market participants have serious doubts about how bankruptcy courts may treat master agreements with bilateral close-out netting provisions. First, there is the risk that a particular bankruptcy proceeding could result in netting provisions not being recognized, leaving a creditor counterparty with a higher exposure than anticipated. Second, even if respected, an automatic stay on terminating contracts (and transferring funds) that is typical in bankruptcy proceedings contributes to uncertainties about exposures and the eventual recovery of funds from a bankrupt counterparty.

The United States is ahead of many other jurisdictions in resolving these legal uncertainties because of the general consistency among the Bankruptcy Code (for nonfinancial entities) and the two laws governing financial institutions—the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) of 1989 and the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991.[14] Through its authority under FDICIA, the Federal Reserve Board in February 1994 expanded the definition of a financial institution to encompass all large-scale OTC derivatives dealers. In particular, certain affiliates of broker-dealers and insurance companies were not included in the definition prior to the ruling, which now accords legal certainty to netting arrangements that involve these institutions. The Federal Reserve Board advocates developing a single standard regarding the netting of obligations (U.S. Congress 1993, 353-54).

Settlement Risk. Settlement risk is the risk of default during the period, usually less than twenty-four hours, when one counterparty has fulfilled its obligation under a contract and awaits payment or delivery of securities from the other counterparty. Owing to differences in time zones and other factors, most exchanges are not made simultaneously (doing so would eliminate settlement risk).

The classic case of settlement risk is the failure of the Bank Herstatt, a German bank, on June 26, 1974. As of the close of business that day, the German banking authorities permanently closed Herstatt, after it had received marks from New York banks for its foreign exchange transactions but had not yet paid the counterparty banks in dollars (R. Alton Gilbert 1992, 10). (The dollar payments were scheduled to be made after the close of business in Germany.) Settlement risk is now sometimes called Herstatt risk.

Bilateral payments netting through master agreements is one mechanism that reduces settlement risk. The fact that many contracts, such as interest rate swaps, do not involve exchanges of principal also mitigates this risk. The greatest settlement risks lie in cross-currency derivatives, for which notional amounts are exchanged in different currencies. However, the settlement risks of derivatives, excluding forward foreign exchange contracts, are small compared with those stemming from spot and forward foreign exchange contracts. In 1992 worldwide average daily net cash flows were $0.65 billion and $1.9 billion for interest rate and currency swaps, respectively, whereas the net worldwide cash flows for spot and short-dated forward foreign exchange transactions were $400 billion and $420 billion (Group of Thirty 1993a, 50).[15]

Operating Risk. Operating risk is exposure to loss as a result of inadequate risk management and internal controls by firms using derivatives. This risk category encompasses a wide variety of nuts and bolts operations that are central to the use of derivatives, either as a dealer or as an end user. At the broadest level, lack of involvement or understanding by a firm's senior management or board of directors is an operating risk. The example cited earlier—Showa Shell, a subsidiary firm speculating on foreign currency—is an extreme case in point. There is a consensus between derivatives practitioners and regulators that an independent group within a dealing firm be responsible for overseeing risk management. For example, the oversight of a firm's derivatives positions needs to be uncolored by pressures to generate trading profits or by other conflicting objectives. End users with extensive derivatives involvement should adopt similar practices.

At a more mundane level, inadequacies in documentation, credit controls, limits on positions, and types of instruments approved for use can expose a firm to risk of loss. Related to these considerations is the functioning of the back-office operation, which handles trade confirmations, documentation, payments, and accounting. Errors anywhere along the line of processing trades or maintaining positions are potentially

sources of loss. Systems have to be in place for allowing internal audits by the risk management group to monitor derivatives activity within the firm. Computer or communications hardware breakdowns could leave an organization open to losses because of the inability to conduct business. This danger is present for any business, but particularly for derivatives, which require frequent portfolio adjustments to hedge exposures and so forth.

Backlogs in documenting transactions can be a source of legal risk. During the beginning years of the OTC derivatives markets, severe backlogs were not uncommon and oral agreements were often the only contract binding counterparties. Because of rapidly changing rates and prices, it is standard practice in financial markets to make a transaction orally, followed by a written contract. The risk is that if too much time elapses, a counterparty holding a losing position could deny the existence of an oral agreement or dispute the terms of that agreement. Though a continuing concern, derivatives documentation backlogs are reportedly much less severe today (Group of Thirty 1993b, 45).

Personnel in derivatives operations are also sources of risk. As in any business, human error can be costly if not caught in time. The same is true of outright fraud. A more subtle problem is the reliance on one or a few highly specialized individuals. The loss of an individual or group of individuals could wreak havoc on an operation if no one else knows the specialists' jobs. For example, if the manager of a derivatives portfolio were to leave the firm for a better offer elsewhere, others might be hard pressed to understand the composition and risks of that portfolio or to be able to liquidate or unwind the portfolio in the event of a crisis.[16]

Systemic Risk. The influential Promisel Report of the Group of Ten central banks defines systemic risk as "the risk that a disruption (at a firm, in a market segment, to a settlement system, etc.) causes widespread difficulties at other firms, in other market segments or in the financial system as a whole" (Group of Thirty 1993a, 61). As noted earlier, defaults have been relatively rare occurrences in derivatives markets. There has not been a systemic crisis.[17] However, the markets' global scope and interconnections as well as their relatively unregulated structure have raised concerns among regulators and legislators.

A major concern about derivatives markets is their lack of transparency. Accounting and disclosure of derivatives positions is widely regarded as inadequate. Accounting standards lag well behind financial innovation. An April 1993 survey of derivatives dealers and end users by the Group of Thirty revealed that only 60 percent of dealers and 30 percent of end users disclose their accounting policies for derivatives in their public financial statements, and 40 percent of dealers and 60 percent of end users have inconsistent accounting policies for derivatives and underlying assets. Other pertinent information about the risks and profitability, like credit exposures and unrealized gains and losses, of derivatives activities was available publicly from only a fraction of the survey respondents (Group of Thirty 1994, 80, 129). As of the survey date, 85 percent of dealers mark all derivatives positions to market for internal management purposes while only 41 percent of end users do so. These percentages are much lower for external financial statements—67 percent and 28 percent, respectively.

Even if these deficiencies in disclosure were remedied, the fast-changing nature of derivatives positions would always create uncertainties for outsiders about current positions and exposures. In times of hectic market conditions, there will be less agreement among market participants about the equilibrium value of derivatives, particularly options and contracts containing embedded options. Traders may be uncertain about the appropriate volatility to use in pricing options. Furthermore, the financial condition of counterparties may be difficult to evaluate. As a result, market liquidity may be reduced so that buying or selling derivatives causes bigger price moves than during ordinary trading, reflecting a reluctance to trade. If a major derivatives player were suspected to be in difficulty, it might have problems hedging its positions or obtaining funding to finance them, which would tend to compound its solvency problems. Under such conditions, should the institution fail, the firm or its regulators could have a hard time closing out or assigning its derivatives positions to other counterparties. In fact, as a precautionary measure, counterparties may reduce their exposure limits with other counterparties in times of market turbulence.

Despite the relatively good—albeit brief—track record of the OTC derivatives practitioners, there is simply no way to guarantee that a systemic crisis will not occur. Any of the previous sources of risk individually or in combination could precipitate a systemic crisis. Federal Reserve Bank of New York president William J. McDonough states the regulator's perspective succinctly: "It may appear that central banks are unduly preoccupied with low-probability scenarios of possible systemic disruptions. However, it is precisely because market participants may only take minimal precautions for events in the tails of probability distributions that central banks must be vigilant" (James A. Leach and others 1993, 17). Implicit in this view is that the private

sector may lack the incentive to internalize the costs of safeguarding markets against systemic risk. In other words, regulation may be necessary to compel participants to take additional measures to protect the stability of derivatives (and other) markets. Few observers of derivatives markets would deny that systemic risk is potentially a concern; the controversy is over measures to minimize that risk.

Recommendations for Safeguarding the Derivatives Markets

Derivatives markets have come under scrutiny by a number of derivatives industry groups and regulators—both in the United States and abroad. Each has made recommendations for improving industry practice to reduce the chance of firm-level losses as well as systemic risk. This section discusses the key recommendations of four of these groups whose views are particularly influential. The purpose here is to highlight the salient points and not to give a comprehensive review.

The studies and proposals to be considered are the following, in order of their publication:[18]

1. Basle Committee on Banking Supervision (April 1993):
   - "The Supervisory Recognition of Netting for Capital Adequacy Purposes"
   - "The Supervisory Treatment of Market Risks"
   - "Measurement of Banks' Exposure to Interest Rate Risk"
2. Group of Thirty (July 1993), "Derivatives: Practices and Principles"
3. House Committee on Banking, Finance, and Urban Affairs Minority Staff (November 1993), "Financial Derivatives"
4. U.S. General Accounting Office (May 1994), "Financial Derivatives: Actions Needed to Protect the Financial System"

The Basle Committee on Banking Supervision, established in 1975, consists of senior representatives of bank supervisory authorities and central banks from the Group of Ten countries.[19] The Group of Thirty comprises senior financial markets practitioners, regulators, and academics and largely corresponds to the private sector's perspective. The Minority Staff report, prepared under the direction of James Leach, the ranking minority member of the House Committee on Banking, Finance, and Urban Affairs, was submitted as part of the proceedings related to the committee's *Hearings on Safety and Soundness Issues Related to Bank Derivatives Activities* (U.S. Congress 1993). The U.S. General Accounting Office report was prepared at the request of members of several House committees that frame legislation affecting financial markets.

Among the organizations that have examined derivatives activity (see note 18 for other derivatives studies), there is a general consensus that the first line of defense rests with senior management and the board of directors at individual firms involved with derivatives. They need to establish internal controls and audit procedures necessary to monitor a firm's derivatives positions and exposures. This emphasis is reflected in bank regulators' oversight of bank derivatives activity. The examination of bank holding companies and state member banks by the Federal Reserve and of national banks by the Office of the Comptroller of the Currency (OCC) has been aided by new guidelines and instructions for examiners in evaluating a banking organization's derivatives operations. The OCC issued Banking Circular 277, "Risk Management of Financial Derivatives," in October 1993, and the Federal Reserve implemented "Examining Risk Management and Internal Controls for Trading Activities of Banking Organizations" in December 1993. These guidelines are largely consistent with the Group of Thirty's recommendations. However, this kind of regulatory oversight does not extend to all participants in derivatives markets, such as unregistered securities affiliates (like Drexel's derivatives affiliate mentioned in note 17) and insurance companies. As a matter of sound business practice, derivatives practitioners must self-regulate their activities—the message that is the tenor of the Group of Thirty's recommendations.

The Group of Thirty. In July 1993, the Group of Thirty published a list of twenty recommendations for dealers and end users that are intended as a "benchmark against which participants can measure their own practices" (Group of Thirty 1993a, 7). The clear implication is that alternative practices may be equally effective or superior (and the Group of Thirty points out that some of the recommendations were not unanimously endorsed by all of its members). A fundamental criticism of the Group of Thirty report is that derivatives dealers and end users may lack the incentive to adopt the recommended practices, particularly because of the costs of implementation. Of course, a powerful incentive in favor of heeding the recommendations is concern about government regulatory efforts, which also impose

costs. An additional four recommendations are expressly for the consideration of legislators, regulators, and supervisors. Indeed, all of the recommendations have proved useful in framing many of the issues that legislators, regulators, and supervisors have been deliberating. The recommendations address each of the sources of derivatives risk sketched in the previous section.

The first recommendation stresses the integral role of senior management in understanding and controlling derivatives operations. Even among derivatives dealers, 51 percent of respondents to the April 1993 Group of Thirty survey rated the insufficient understanding of derivatives by senior management as being of serious concern (15 percent) or some concern (Group of Thirty 1994, 11). The next eight recommendations pertain to valuation and market risk management. One of these stresses the importance of having an independent group within the firm monitor market risk. Another emphasizes the need for daily marking to market of derivatives positions, which, in fact, most major dealers practice but less than half of end users do. A related recommendation advocates using a portfolio valuation approach known as value at risk. This statistical technique determines the change in the value of a derivatives portfolio resulting from adverse market movements (of any risk factor, such as price or volatility) during a fixed time period. The Group of Thirty advises using one day as the time horizon, consistent with its mark-to-market interval. The value at risk would be computed for a given confidence interval—that is, the probability of suffering a loss in excess of the value at risk would be quantified as 2.5 percent or some other small bound. (For a 2.5 percent probability, the actual daily loss would be expected to exceed the daily value at risk one trading day in every forty.) The Group of Thirty also advocates the use of portfolio stress tests, which focus on changes in portfolio value during periods of extreme volatility as well as illiquidity.

Although these last two are sound recommendations, both value-at-risk calculations and stress tests are demanding exercises. They should be conducted under conservative assumptions because there is little consensus about the best valuation models for complex interest rate derivatives. For example, there is no agreement about the best type of term structure model in the current academic literature. Such a model is one of the building blocks of simulation analyses. Current models generally fail to capture statistically the episodic bursts of volatility that occur in actual markets (see, for example, Thomas F. Cooley 1993). Also, in times of abnormal market conditions, liquidity is usually substantially reduced (see the earlier discussion of systemic risk), which would have to be recognized in stress tests as well as in value-at-risk evaluations. The challenges of simulation are compounded further when considering portfolios rather than individual instruments because of the need to estimate correlations and other interdependencies among instruments, which are also likely to be less predictable during periods of market stress.[20]

Another five recommendations address credit risk measurement and management. The Group of Thirty endorses using a probability analysis analogous to the one for measuring market risk exposure. Credit exposure, as mentioned earlier, is measured in terms of current and potential exposures. The evaluation of potential exposure (future replacement costs) requires all of the tools and sophistication that go into market risk calculations. In addition, the probability of counterparty default needs to be assessed. This is a much more challenging task because reliable statistical methods for predicting insolvency are not available and more judgmental approaches must be employed. Of course, financial institutions—especially commercial banks—are in the business of making credit evaluations and, presumably, have the expertise to monitor their counterparties. The Group of Thirty stresses the need for an independent group within the firm to evaluate credit standards and risks and to set credit limits vis-à-vis individual counterparties.

Credit enhancements of several types can reduce credit risks in derivatives transactions. The Group of Thirty recommends that dealers and end users evaluate the costs and benefits of such methods. One commonly used method is the posting of collateral, typically in the form of government securities, if the counterparty in a losing position has a mark-to-market value that exceeds a specified threshold, such as $1 million. This posting could be based on periodic marking-to-market or on a net risk limit, beyond which collateral would be transferred. Dealers generally resist being subject to collateralization provisions, but recently collateral has been requested in deals involving even triple-A banks. In transactions between dealers, it is more common for swap coupons to be reset so that credit exposures are periodically reduced to near zero (Lillian Chew 1994, 36-37). (The dealers effectively transact a new swap at current market rates.) Another method of credit enhancement is the establishing of separately capitalized derivatives subsidiaries or the use of third-party credit enhancements such as guarantees or letters of credit, which are discussed below.

The Group of Thirty strongly encourages the use of a single master agreement with each counterparty that

provides for bilateral payments and close-out netting. This position is combined with a call for continuing efforts to ensure the legal enforceability of existing and future derivative contracts. The success of netting arrangements depends on the legal certainty of derivative contracts.

The remaining four recommendations to dealers and end users pertain to the adequacy of back office systems, to the high standards of expertise of derivatives professionals, to the line of authority for committing to derivative transactions, and finally to accounting and disclosure. The Group of Thirty seeks international harmonization of accounting standards and particularly urges consistency in the way income is recognized between derivatives and the assets or liabilities being hedged. With regard to public disclosures, the "financial statements of dealers and end users should contain sufficient information about their use of derivatives to provide an understanding of the purposes for which transactions are undertaken, the extent of the transactions, the degree of risk involved, and how the transactions have been accounted for" (Group of Thirty 1993a, 21). As noted earlier, the poor quality of information in public financial disclosures is a major area for improved industry practice.

An additional four recommendations are directed toward legislators, regulators, and supervisors. Two urge the international recognition of bilateral payments and close-out netting arrangements as well as efforts to resolve other legal and regulatory uncertainties, particularly issues concerning the legal enforceability of contracts. Many tax laws need amendment so that better consistency can be achieved between the taxation of gains and losses from derivative contracts and those from the underlying instruments being hedged. Uncertainties and inconsistencies about the tax treatment of income flows impede wider use of derivatives in risk management. Finally, authorities responsible for setting accounting standards need to work to harmonize standards across jurisdictions and modernize these standards in accord with current derivative's risk management.

None of the Group of Thirty recommendations deals with capital adequacy. Capital is the cushion against losses for a financial institution. Regulators generally seek to establish minimum prudential standards, not optimal levels. Implicitly, however, the value-at-risk and credit exposure assessments discussed above are relevant to determining how much capital a firm should hold to cover market and credit risks. The provision of capital to support derivatives activities is an issue properly included in a consideration of best practices and principles. Indeed, some major derivatives dealers have their own systems, similar to value-at-risk, for allocating capital internally to different activities, such as swaps trading or government bond trading (see "International Banking Survey" 1993).

As another example, unregistered broker-dealers of U.S. securities firms fall outside the scope of capital requirements imposed on registered broker-dealers by the Securities and Exchange Commission. Most OTC derivatives transactions of these firms are conducted by unregistered broker-dealers, which deal in derivatives, especially interest rate and currency swaps, that are not classified as securities by the SEC. One of the reasons for this segregation of activities is that securities firms consider the SEC's net capital rule to be antiquated and excessive in its capital requirements.[21]

Most observers would agree that the use of derivatives carries risks, both to individual firms and to financial markets.

(The net capital rule governs capital levels at the registered broker-dealers, and, in particular, requires that 100 percent of unrealized profits on derivatives positions be deducted from net capital.) As things stand now, capital supporting unregistered securities affiliates is determined by the discretion of management, not regulators. The determination of appropriate capital levels is not just a worry of the regulators.

Some of these unregistered securities dealers have been restructured as "enhanced derivatives products companies" (DPCs) that have capital segregated in the subsidiary in order to gain the highest credit risk ratings (CFTC 1993b, Working Paper 6). The intention is that counterparties would be more willing to enter into derivatives transactions with the highly capitalized enhanced DPC than with the lower-rated parent company. (The enhanced DPC is presumed to be insulated from the bankruptcy of the parent company.) Some insurance companies have set up DPCs that are not separately capitalized but carry guarantees from the parent

that confer a triple-A credit rating. These restructurings of the derivatives dealers are market-based responses to market participants' concerns about the capital adequacy of their counterparties.

Minority Staff Report. The 900-page Minority Staff report assembles a wealth of information about derivatives markets. It reprints and summarizes much that is contained in earlier studies and gives further background information as well. In addition, the Minority Staff solicited responses from federal banking and securities regulators on a range of issues, including the Group of Thirty recommendations. (The regulators are the Federal Deposit Insurance Corporation, the Office of Thrift Supervision, the Federal Reserve, the Office of the Comptroller of the Currency, the Securities and Exchange Commission, and the Commodity Futures Trading Commission.) The Minority Staff gives thirty recommendations of its own for stronger regulatory standards. Many of these recommendations reflect the federal regulators' perspectives on the derivatives markets, and many are consistent with those of the Group of Thirty. The Minority Staff's recommendations are intended to "suggest areas where the regulators may take action to implement prudential safeguards concerning derivatives activities."[22] They are presented as points for regulators and legislators to consider rather than as detailed suggestions.

From an economic perspective, it is the proposition that derivatives markets do not internalize the social costs of their activities that supports the case for (further) regulation.

Several recommendations deal with strengthening capital requirements and protecting the deposit insurance safety net. "Bank and thrift regulators should retain a strong leverage capital standard to generally guard against risks at insured financial institutions, including risks posed by derivative instruments" (Recommendation 1). The leverage capital standard is in addition to risk-based measures for credit and market risks. The leverage standard is based on the ratio of total assets (not risk-adjusted) to capital and serves as a backup for the risk-based standard. To the extent that the latter may imperfectly measure risks, the leverage ratio would place a ceiling on overall exposures. (For example, a bank could have relatively conservative assets—like Treasury securities that currently receive no capital charge—and consequently have a very low capital cushion against interest rate shocks. In the absence of a leverage ratio, a bank with federally insured deposits could expand its balance sheet by issuing liabilities and buying Treasuries and thereby raise its exposure to interest rate risk.) Furthermore, the regulators should evaluate the need for increasing capital, particularly for potential future credit exposures, above the current standard (Recommendation 11). Then, regulators should "adopt capital, accounting and disclosure standards based on a 99 percent confidence interval (3 standard deviations)" (Recommendation 13), which is much more conservative than the 95 percent confidence interval commonly in use by derivatives dealers and end users.

There are two areas in which the Minority Staff's recommendations go beyond previous proposals for improved derivatives practice and regulation. The first is greater coordination among federal banking and securities regulators. An interagency commission would be "established by statute to consider comparable rules related to capital, accounting, disclosure and suitability for dealers and end users of OTC derivative products" (Recommendation 4). One of the purposes of this commission would be to bring uniform rules to all participants, including those outside the oversight of federal regulators, like insurance companies. The central thrust of this approach is that regulation would be applied by product type rather than by institution, as in the current system. (Recommendation 2 emphasizes this point.) Consultations among federal regulators, which are now less structured and informal, would be formalized through the mechanism of an interagency commission. (A less formal structure is the Working Group on Financial Markets, which consists of the heads of the Federal Reserve, Treasury, CFTC, and SEC. The Working Group, formed in the wake of the October 1987 stock market crash, was reconvened earlier this year to examine issues regarding derivatives. In its report, the CFTC has proposed an interagency council to improve communication among regulators and to coordinate regulation. The OCC has a similar, though narrower, proposal for an interagency task force on U.S. bank activity in derivatives.) For the federal banking agencies, this coordination extends to joint examinations of bank holding companies and

banks involved in derivatives as well as coordinated training programs for examiners.

The other area that gets particular attention in these recommendations is the protection of "less sophisticated" participants. Derivatives dealers would be required to judge the suitability of derivatives positions for their customers. (OCC Banking Circular 277 includes such a standard for its examiners in evaluating dealers affiliated with nationally chartered banks; the SEC requires broker-dealers to consider suitability when dealing with customers.) Counterparties, especially "less sophisticated" end users, would have to be informed about the "specific costs and risks of derivative instruments in varying interest rate or other market change scenarios" (Recommendation 23). Mutual funds that hold derivatives or securities with embedded derivatives should be subject to enhanced disclosures of risks for the benefit of their customers (Recommendation 26). Another recommendation directs regulators to set minimum prudential practices for municipalities and pension funds (Recommendation 25). The federal bank regulators would design and run programs to educate end users about the risks and benefits of derivatives (Recommendation 24).

GAO Report. The GAO report echoes the Minority Staff report's call for congressional legislative action to improve uniformity of federal regulation and, in particular, to make insurance company derivatives affiliates and unregistered broker-dealers subject to federal regulation. They go further and also recommend that Congress reconsider the entire structure of the federal financial regulatory system, with the aim of modernizing it. However, the immediate need is to broaden federal regulatory authority. The banking system currently has the most stringent federal oversight because of its access to federal deposit insurance and the Federal Reserve's discount window, but the GAO argues that the failure of a nonbank derivatives dealer could also require federal involvement to stem systemic repercussions. "Existing differences in the regulation of derivatives dealers limit the ability of the federal government to anticipate or respond to a crisis started by or involving one of these institutions [securities and insurance affiliates]" (GAO 1994, 124).

The GAO report covers much of the same ground surveyed in earlier studies. Its accent is on a stronger hand of government regulators on derivatives users. The GAO endorses the Group of Thirty recommendations but sees the need for regulations to compel compliance with best practices standards. Currently, large insured depository institutions have to follow the corporate governance provisions mandated by FDICIA.[23] The GAO would have all major derivatives dealers adopt these provisions.

Even for the banking system, where regulation is now most comprehensive, much more could be done to improve the risks of derivatives. These steps would include "(1) gathering consistent information on large counterparty credit exposures and sources and amounts of derivatives-related income, and maintaining the information in a centralized location accessible to all regulators; (2) revising capital requirements to ensure that all derivatives risks are covered and that legally enforceable netting agreements are recognized; and (3) increasing emphasis on the identification and testing of key internal controls over derivatives activities" (GAO, 124). The GAO does not believe that the April 1994 proposal by the Federal Financial Institutions Examinations Council for expanded bank reporting of derivatives activity goes far enough to be useful to regulators. The GAO wants more information on the sources of income by activity, whether from executing customer orders or from proprietary trading, and by derivative product. The proposed reporting requirements contain information that is still too aggregated to reveal potential future problems at individual banks.

Two areas that the GAO examines in some depth are accounting principals for derivatives and the state of international regulatory cooperation. As other groups have noted, accounting and disclosure practices for derivatives have many deficiencies. This shortcoming is particularly true for end users, which typically do not mark derivatives positions to market but rather account for positions at historical cost. These users can often apply so-called hedge accounting rules, which the GAO faults as being inconsistent and contradictory. Deferral hedge accounting allows the gains and losses on a derivative to be deferred and reported at the same time as the income from the instrument being hedged. A potential for manipulation of financial reports exists because hedge accounting can mask wide swings in values of derivatives that, after the fact, may prove not to have correlated well with the value of the hedged position and would not have qualified for this accounting treatment if the actual low correlation had been known (GAO, 98). Another area of concern is the use of hedge accounting in situations in which anticipated positions in an instrument are being hedged by derivatives, such as an anticipated purchase of a mortgage-backed security.

The Financial Accounting Standards Board has been improving disclosure requirements in financial statements through the adoption of several Statements of Financial Accounting Standards related to

off-balance-sheet positions, but the current standard still leaves firms with much discretion about the amount of detail to reveal regarding derivatives positions. The solution, according to the GAO, is to move to a market-value accounting standard. Derivatives dealers have to apply market-value accounting to their trading positions. If all derivatives users were subject to this standard, the transparency of derivatives activity would be substantially improved.

The GAO report gives a thorough overview of the state of international regulatory coordination. The most successful area of international cooperation is in the regulation of bank capital, which is taken up in the next section. There is less agreement on capital adequacy for international securities firms. Wide differences in accounting and disclosure standards exist internationally. As noted above, laws regarding derivatives activity, especially netting, also vary considerably from one country to another.

The GAO has identified clear weaknesses in the oversight of derivatives activities within the management of firms and within the regulatory structure. Many of these problems were also cited in the earlier Group of Thirty report. The most serious shortcoming of the GAO's assessment of the OTC derivatives markets is a failure to weigh the costs and benefits of increased regulation and disclosure requirements. The GAO's argument for further regulation rests largely on the presumed need to eliminate the risk of failure of a major derivatives dealer. The benefit of avoiding that risk evidently outweighs the explicit costs imposed by more regulation and the implicit costs of less hedging (less risk-sharing) by intermediaries and end users because of the higher costs of such transactions. This issue deserves closer and more careful examination. The vulnerability of the financial system has not been established, despite the hundreds of pages of studies that have recently been devoted to the topic.

As part of its two-year study, the GAO conducted a survey of fifteen major U.S. OTC derivatives dealers and received fourteen responses (from seven banks, five securities firms, and two insurance company affiliates). Given the concern about "global involvement, concentration, and linkages" in this report (page 7), a surprising fact is that the weighted-average net credit exposure of the derivative dealer respondents to other U.S. dealers was 11 percent at year-end 1992 (GAO, 157). This exposure is slightly lower than it had been in the 1990 and 1991 GAO surveys. The exposure to non-U.S. dealers was 27 percent. (For the responding dealers, about 75 percent of their contracts were subject to netting agreements [GAO, 58].) Furthermore, among the world's largest derivatives dealers, none had more than a 10 percent market share of any particular derivative product (GAO, 41). Eight of the dealers who responded derived an average of 15 percent of their pretax income from derivatives activity (GAO, 73). This and other information from the survey indicates that derivatives activity is not the dominant source of income; the major dealers appear to be well diversified. On balance, a convincing case has not been made that derivatives markets dangerously concentrate risks among a small number of participants.

Basle Committee Proposals. The Basle Committee proposals of April 1993 would incorporate market risks into a risk-based capital standard for banks. For banks with international dealings, the Basle Capital Accord of 1988 established minimum capital adequacy standards that were fully implemented in the G-10 countries and many other countries by year-end 1992. The basic procedure entails weighting both on- and off-balance-sheet items by credit riskiness, using weights prescribed by the capital accord, and then maintaining capital against these risk-weighted balance sheet items at or above mandated levels. The minimum core capital ratio is 4 percent of core capital to risk-weighted balance sheet items, and the total capital ratio is 8 percent of core plus supplementary capital.[24]

The proposal on netting is intended to amend the 1988 capital standard to permit bilateral netting of credit risks under well-specified conditions. The market risk proposal would assess specific capital charges on open positions (that is, unhedged positions) for debt and equity trading portfolios as well as foreign exchange positions. Derivative securities are included in the coverage of all these portfolios. The proposal focuses on trading portfolios, in which positions change rapidly, as opposed to investment portfolios, in which positions are longer-term and relatively static. The trading portfolio contains proprietary positions taken to execute trades with customers, to speculate on short-term security price movements and arbitrage security price discrepancies, and to hedge other positions in the trading account. The investment portfolios would continue to be subject to the provisions of the 1988 Capital Accord. The interest rate risk proposal would cover the entire bank, but at its current stage of development, the proposal is advancing a measurement system rather than a procedure for assessing capital charges. Derivatives, including those outside of trading accounts, figure into the measurement scheme.

The Basle Committee proposes a new class of capital to help satisfy the capital charges against market

risks in trading portfolios: "Capital requirements for market risk . . . tend to be far more volatile than those for credit risk and a more flexible source of capital may be considered appropriate" (Basle Committee 1993c, 9). (The other types of capital would also have to be allocated to back the trading portfolio activities.) Banks will be able to issue short-term subordinated debt for the sole purpose of meeting this capital requirement. Among other stipulations, the debt would have a lock-in feature that prevents the payment of principal or interest in the event a bank falls below 120 percent of the required market risk-based capital.

Under the capital accord, the only type of netting recognized is netting by novation, which is highly restrictive. Netting by novation entails combining contracts that are denominated in the same currency and have the same value dates (dates on which repricing occurs) into a new contract with a counterparty. The capital accord uses two methods to calculate credit equivalent amounts for off-balance-sheet items: current exposure and original exposure.[25] Capital requirements are based on risk weights applied to positions in on-balance-sheet items, like loans and government securities, and to credit-equivalent off-balance-sheet positions. Using the current exposure method, the total credit exposure for a derivative is its current replacement cost and a so-called add-on that represents the future exposure of the instrument, determined by a schedule of scale factors applied to the notional amount of the security. This schedule depends on the type of instrument and its time to maturity. (For example, currency swaps have higher add-ons than interest rate swaps, and longer-dated instruments have higher factors than shorter-dated ones.) The computation is performed for all contracts with positive current replacement value for which counterparty default would cause a credit loss, and then all of these credit equivalent amounts are totaled. This procedure is very conservative because any offsetting cash outflows from negative value contracts with the same counterparty reduce credit exposure but are ignored in determining the current exposure.

The netting proposal would base the current replacement cost on the net amount of the current exposure to a counterparty. The conditions under which this procedure would be permitted are restrictive. For example, the enforceability of the netting scheme must be clearly established in all relevant jurisdictions, and derivative contracts cannot contain "walkaway clauses" (discussed in note 12). The add-on amount, however, would be computed without considering netting, as it has been under the 1988 Capital Accord. The Basle Committee "has not yet identified any evidence suggesting that the need for add-ons declines appreciably in [a netting] environment" (Basle Committee 1993a, 4). They estimate that the capital charge would drop by 25 percent to 40 percent using the new procedure. However, some in the industry believe that the add-on treatment is excessive, but no satisfactory alternative method consistent with this framework has been proposed (Chew 1994, 38-39).

The proposal on market risks sets forth an elaborate system for measuring market risks of on- and off-balance-sheet items. Only interest rate derivatives positions will be considered here. For the purpose of capital determination, derivatives positions are converted into notional security positions. These positions are then grouped into thirteen maturity time bands, each of which has its own risk weight. The risk weight represents the sensitivity of that notional position at a given maturity to a given change in the interest rate risk factor. (The size of the change is a two-standard-deviation shift in interest rates. Separate factors are assigned to specific risks and general risks, for which only the latter usually apply to interest rate and foreign exchange derivatives. Specific risk reflects credit-related and liquidity risks of the underlying security.)

The central policy issue in derivatives regulation is whether further federal regulation is appropriate or whether the existing structure can oversee these markets.

The conversion of a fixed-for-floating interest rate swap is relatively straightforward. The swap is viewed as a combination of fixed- and floating-rate government securities with coupon payment dates and maturities matching the value dates and maturity of the swap. Receiving a fixed rate from a swap is equivalent to receiving a fixed coupon from a bond. The notional fixed-rate bond is slotted into the appropriate maturity time band in the capital calculation. Paying a floating rate on a swap is equivalent to having issued (or being short) a short-term bond that gets rolled over or

repriced at the next value date. This bond gets slotted as a short-term instrument, say a three-month maturity.

Interest rate options and forward contracts are more complicated. Interest rate forward contracts are treated as combined long and short notional positions in government securities.[26] Options are similar but require conversion to notional amounts using delta equivalent values. (Delta is the sensitivity of the option price to a small change in the underlying security price and is evaluated using a particular option pricing model. Options can be hedged against small changes in the underlying price by taking an opposite position in the underlying price adjusted by [multiplied by] the delta value.) The separate long and short notional securities get slotted into the time bands.

The proposal then allows for further adjustments that reflect the offsetting impacts of different types of positions. Perfectly matched positions drop out from further consideration and do not affect capital. For example, a swap in a portfolio to pay fixed and receive floating together with an identical swap with the same counterparty, swap rate, and currency to receive fixed and pay floating would be exempt from inclusion in the capital charge computation. Full offsetting is also permitted for closely matched positions that meet a number of specified conditions.

Consolidated long and short positions within each maturity band are multiplied by risk weights, and then the weighted positions are offset to give a net weighted position. Because the included securities do not actually fully offset each other—there are differences in maturity within each band as well as differences in instruments of the same maturity—a vertical disallowance factor is introduced to compensate for the so-called basis risks. The disallowance, which is added to the net weighted position, is 10 percent of the smaller of the weighted gross long or short positions. A horizontal disallowance serves a similar purpose in adjusting for offsetting positions across different time bands. This calculation adjusts for the imperfect correlation of interest rate movements across maturity time bands. (Initially offsetting long and short positions across time bands will not change in value by perfectly offsetting amounts as the term structure of interest rates shifts and twists.) The overall net weighted open position plus the vertical and horizontal disallowances would constitute the net open position against which a market risk-based capital charge would be assessed.

Public comments on the Basle Committee proposals were extremely critical of the market risk-based capital standard. The fundamental problem is that the procedure for measuring market risks is at variance with industry practice. Derivatives dealers expressed doubts about the regulatory treatment of market risks in the April 1993 Group of Thirty survey. In response to the issue of "inappropriate treatment or proposed treatment by regulators of market risk in derivatives," 33 percent indicated serious concern and another 48 percent, some concern. This survey slightly predated the public release of the Basle proposals, but the general regulatory approach involving capital based on risk-adjusted balance sheet values is well known. Many comments on the market risk capital standard stressed that a portfolio approach is the appropriate way to measure risk. A basic deficiency in the regulators' approach is that risk is treated as though it can be evaluated separately by security type and maturity and then aggregated to give a portfolio exposure. Stephen Schaefer observes that "the connection between this and a modern portfolio theory approach is, at best, tenuous since it is well known that risk does not aggregate in the linear manner implied by [the regulators' approach]" (Schaefer 1992, 12). Hugh Cohen (1994) demonstrates that the error in measuring interest rate risk exposures using the regulators' approach, even for balance sheets consisting of nothing but easily valued government bonds, is unacceptably large.

ISDA argues that the Basle Committee market risk proposal would actually increase systemic risk because it could create perverse risk management incentives. The proposal penalizes some standard hedging methods by assessing horizontal or vertical disallowances for standard hedging methods. For example, it discourages hedging a swap with an offsetting position in a Treasury security or Treasury bond futures contract. This combination would be subject to a horizontal disallowance. The disallowance seems excessive in view of the small basis risk (that is, imperfect correlation). As another example, so-called duration-based bond hedges would be subject to a vertical disallowance.[27]

ISDA offers an alternative portfolio-based approach that recognizes the risk reduction possible through diversification of securities that have "imperfectly correlated risk factor subcategories" (Joseph Bauman 1993, 6). The subcategories they propose are parallel shift risk, term structure risk, basis risk, volatility risk, and convexity risk. The risk factors to which the subcategories apply include interest rates, foreign exchange spot rates, equity indexes, commodity prices, and others. The risk-factor sensitivity approach is akin to the value-at-risk measurement advocated by the Group of Thirty.

Needless to say, this is a demanding procedure. It is probably within the means of large derivative dealers

to perform this kind of analysis, but it is less likely to be easily implemented by smaller participants. Still more demanding—and more accurate—are simulation approaches, also endorsed by ISDA. The evaluation of the precision of such analyses would come under the purview of the independent risk management group.

For establishing capital levels, ISDA would have the regulators specify the performance guidelines for each firm's internal risk model. For example, the regulators would decide the size of the confidence interval that applies to potential trading losses. The regulators would also have the discretion to evaluate the suitability of the internal risk model.

Following the requirements of FDICIA, the Federal Reserve, the OCC, and the FDIC issued a proposal (a "Notice of Proposed Rulemaking") for public comment in September 1993 that would establish a risk-based capital standard for interest rate risk, including derivatives positions, as well as fuller disclosures of off-balance-sheet items. The proposed method for measuring is very similar to that in the earlier Basle Committee proposal and shares many of its defects.[28] However, the Fed-OCC-FDIC proposal stipulates that examiners from the U.S. banking agencies could require firms to use their own internal models rather than the supervisory model of the proposal.

Clearly, the task of measuring capital and establishing capital requirements is one of the most challenging issues facing private sector participants and government regulators. The regulators have attempted to develop procedures that will set minimum prudential standards for capital without making the costs of compliance excessive. Another challenge is inconsistency in standards from one country to another—the lack of a level playing field for similar institutions. The Basle Committee seeks to achieve "regulatory convergence" across jurisdictions and expects that supervisors of other types of financial institutions will adopt its standards. However, since the release of the Basle proposals, international regulators have been unable to agree in their consultations on prudent capital standards (U.S. Congress 1993, 457).[29]

Conclusion

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. Policymakers need to be cautious about changing regulatory structures because such alterations often bring unintended and unforeseen consequences. Indeed, one leading academic observer argues that government regulation is "the sand in the oyster" that stimulates much financial innovation (Merton H. Miller 1986, 470). It is by now a truism that financial innovation outpaces the regulatory and legislative process.

Regulations that are deemed too onerous drive business into unregulated entities or offshore. An example of the former is the SEC's net capital rule for broker-dealers, which is currently under review for amendment. As noted above, this rule, in place long before the advent of OTC derivatives, was a principal reason that securities firms set up unregistered dealers to conduct most types of OTC derivatives transactions. As another example, because of uncertainties about the legality of commodity swaps (which the CFTC almost ruled to be illegal off-exchange commodity futures contracts), much of this business was transacted in London in its early years, until the passage of the Futures Trading Practices Act of 1992. (This act exempted swaps from the provisions of the Commodity Exchange Act of 1936 and its later amendments.) There are many other examples.

The regulation of capital is a specific area where ill-designed rules can be counterproductive. Different kinds of institutions are likely to have different requirements and thus a uniform standard may be inappropriate. Different institutions, such as banks and securities firms, may pose different systemic risks and therefore ought to face different capital requirements (Schaefer 1992). As pointed out above, risk-based capital standards, though an improvement over simpler standards, may mismeasure risk exposures. Consequently, firms may manage risks in suboptimal ways if better means are rendered too costly by additional capital charges. These sorts of considerations imply that rigid standards ought to be avoided because they may actually increase systemic risk by changing behavior to circumvent regulations or even by actions that comply with regulations. The current system of on-site examination, in which a degree of examiner discretion comes into play, coupled with minimum prudential standards mitigates the problems associated with fixed rules.

Systemic risk is the largest risk posed by OTC derivatives and at the same time the most ill-defined one. Diffuse fears of derivatives market calamities are shaky grounds for broader regulation. The key intermediaries in these markets are well diversified and

highly capitalized. It is also important to note that those intermediaries not under federal regulation still face market discipline, as do other intermediaries. The recent creation of separately capitalized derivatives product companies is evidence of market pressures to limit credit risks. Collateralization and coupon resetting of swaps are other commonly used methods of reining in credit risks.

An issue to consider is that regulatory actions that might constrain derivatives activity might also exacerbate systemic problems elsewhere. Hedging should reduce the risk of failure. The breakdown in September 1992 of the European Exchange Rate Mechanism, which had narrowly aligned major European exchange rates, is a recent example of how derivatives performed under turbulent conditions. The following assessment comes from the Board of Governors of the Federal Reserve System, the FDIC, and the OCC: "The markets for some derivative instruments reportedly experienced reduced liquidity during the European currency crisis. This complicated hedging strategies and heightened market risks for some intermediaries during this period. Nevertheless, it is unlikely that the underlying markets would have performed as they did in September without the existence of related derivatives markets that enabled currency positions to be managed, albeit with some difficulty in some instruments" (1993a, 18). The colorful descriptions of derivatives activity in the popular press tend to overlook the market's stabilizing influence. There is little arguing with the contention that derivatives are risky business, but so are the underlying positions of intermediaries and end users.

Notes

1. Regulators subsequently testified that hedge fund activity was not a major cause of volatility (Harlan 1994).
2. Gramm and Gay (1994) point out that from the advent of futures trading through 1920, at least 160 bills were introduced in Congress to restrain or eliminate futures trading. Much of the impetus for such bills came from agricultural price declines attributed to futures trading. For the same reason, trading in commodity options was banned in 1934 by the Code of Fair Competition for Grain Exchanges under the National Industrial Recovery Act. Trade in onion futures was banned by Congress in 1958 (see Gray 1983). Hedge funds are now being considered for tougher regulation (Fromson 1994).
3. A broad overview of U.S. and international regulatory frameworks is given in Commodity Futures Trading Commission (1993b, Working Paper 3).
4. *Financial Derivatives: New Instruments and Their Uses* (1993) contains articles that discuss and analyze many derivatives contracts in detail. The dichotomy in terms of linear versus nonlinear payoffs is somewhat arbitrary because some linear payoff contracts, such as swaps, may contain embedded options. However, the basic distinction is useful.
5. LIBOR is the acronym for the London Interbank Offered Rate, which is the rate received by large banks for short-term time deposits in the interbank market. The fixed swap rate is determined by the term structure of LIBOR rates (and extrapolated to longer maturities using government securities).
6. These figures imply that the average swap contract size has a notional value 127 times larger than the average futures and options contract.
7. Two U.S. insurance companies act as dealers in the derivatives markets (U.S Congress 1993).
8. See U.S. Congress (1993, 670-71). The trading revenue and losses data derive from Keefe, Bruyette & Woods, Inc. No dates are indicated for the period of the survey. However, the losses figure has probably risen somewhat after the market turbulence of early 1994.
9. To put trading losses in perspective, consider that the fifty largest commercial banks incurred cumulative loan charge-offs (losses) of almost $90 billion from 1985 to 1991 (Corrigan 1992, 12).
10. More precisely, the up-front payment would be equal to the present discounted value of the difference between the stream of 9 percent payments and the 8 percent payments.
11. A comprehensive list of risks that require hedging appears in Group of Thirty (1993a), 43-45.
12. Some swap agreements contain a so-called walkaway or limited two-way payment clause that gives a counterparty who owes a payment on a swap the right to terminate the agreement in the event the opposite counterparty becomes bankrupt. This is a case in which a solvent counterparty may withhold payment on a swap that has positive value to a bankrupt counterparty. Limited two-way payments were intended to give creditors extra leverage in negotiating with failed counterparties (specifically on other contracts with the failed counterparty with positive replacement value to the creditor). The ISDA and others have been advocating swap agreements with full two-way payments in the interest of establishing smooth-functioning netting agreements.
13. Abken (1993) and Hull (1989) take this approach to modeling default-risky derivatives.
14. See U.S. Congress (1993, especially 698 and 793-96), for further detail on the legal aspects of netting arrangements. Other areas of legal concern are discussed in depth in Group of Thirty (1993b, Section 3), as well as in U.S. Congress (1993, 695-700).

15. The text does not clarify whether the swap cash flows are gross or net. Presumably they are net to be comparable with the foreign exchange cash flows.
16. See Strauss (1993) for an example of extraordinary efforts by senior management to understand the risks being taken by a derivatives subsidiary.
17. The bankruptcies of Drexel Burnham Lambert in 1990 and the Bank of New England (BNE) in 1991 both required unwinding of the derivatives books of these institutions. These failures had the potential to have systemic repercussions, but both were closely managed by regulators. Reportedly, swap and other contracts were closed out or assigned to other counterparties smoothly, without significant losses to any counterparties. The FDIC took over BNE and temporarily acted as counterparty for the bank's derivatives. Similarly, the SEC unwound Drexel's derivatives portfolios, except for its swap book, which was under control of Drexel's unregistered broker-dealer affiliate. Nonetheless, the swap book was also closed out in an orderly fashion, without market disruption. Each of these institutions had derivatives books that were large, about $30 billion in notional size, but not of the size of major derivatives dealers. See U.S. Congress (1993, 798-800).
18. Two other major studies made at the request of Congress are Board of Governors (1993a) and CFTC (1993a). Other studies and recommendations have been made by the Institute of International Finance, the Bank of England, and the International Monetary Fund. See U.S. Congress (1993, 802-9) for summaries. The U.S. securities and banking regulators also have a number of narrower proposals, which are listed in U.S. Congress (1993, 53-54).
19. The Basle Committee members come from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. The group usually meets at the Bank for International Settlements in Basle, Switzerland, to frame common prudential standards for member countries.
20. See Odier and Solnik (1993) for evidence about the instability of correlations, particularly during market downturns. Asset price movements tend to become more synchronized internationally during volatile periods, reducing the benefits of diversification.
21. The SEC has proposed modifications to the net capital rule. See U.S. Congress (1993, 771-77).
22. See James A. Leach, letter to the House Committee on Banking, Finance, and Urban Affairs, November 22, 1993, 8, of U.S. Congress (1993).
23. FDICIA was enacted to protect the deposit insurance safety net and to limit systemic risk in the banking system. It contains so-called prompt-corrective-action provisions that enable regulators to intervene in problem banks before problems threaten the Bank Insurance Fund (see Wall 1993).
24. See Wall, Pringle, and McNulty (1993) for the definitions of core and supplementary capital.
25. Wall, Pringle, and McNulty (1993) give a detailed discussion and examples of the Basle Accord and example computations.
26. A security held in a long position is one that is purchased, often in the expectation of price appreciation. One in a short position is borrowed and sold in the expectation that an identical security can be purchased at a lower price.
27. A duration-based hedge insulates a bond portfolio from changes in value from interest rate fluctuations.
28. In particular, see Cohen (1994), for a critique of the measuring scheme in the Fed-OCC-FDIC proposal.
29. The CFTC and the SEC recently concluded an agreement with their U.K. counterpart, the Securities and Investments Board (SIB), to coordinate information sharing and promote improved industry practice in many of the areas cited by the Group of Thirty and others (Reed 1994).

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FYI

Comparing Dodge's Construction Potentials Data and the Census Bureau's Building Permits Series

Cynthia Bansak and Anne Toohey

Many economists and analysts consider construction an important sector of the national economy. Total residential and nonresidential spending accounted for approximately 7 percent of overall U.S. gross domestic product (GDP) in 1993. In addition, construction has strong ripple effects on local employment and business activity, not only creating jobs in construction and building materials manufacturing but also boosting employment for furniture manufacturers, financing agencies, and building maintenance companies.

At the national level, numerous construction data series—such as permits, starts, outlays, and completions—are available for tracking U.S. economic activity. Because insufficient sample sizes prohibit estimation for starts, outlays, and completions at the local and regional level, alternative measures, such as permits, must be used to monitor building activity at the local level. The construction industry is unique in that it provides its own measure of future economic activity as a by-product of the permitting process.

Two sources provide data for tracking planned construction at the state and metropolitan statistical area (MSA) levels, in addition to providing aggregates of national activity. The U.S. Census Bureau reports detailed unit and value data for residential and nonresidential building permits, and F.W. Dodge releases data on what it calls construction potentials (contracts that reflect work to begin within sixty days) at the local level. Although both

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sources report construction trends, considerable differences in data methodologies set them apart from each other. Users should evaluate these differences before deciding which measure is most suitable for a particular purpose. Whereas the Census Bureau's data are largely designed for economic analysis and policymaking, Dodge's more detailed data are better suited for use by firms in the construction industry. For example, the Census Bureau offers various residential and nonresidential data series on a monthly, year-to-date, and annual basis at relatively low cost (see Table 1); on the other hand, Dodge can tailor a report for a specific user's needs according to a variety of criteria such as location, project type, and value—but at a considerably higher price.

This article compares the collection and reporting methodologies of the Census Bureau's building permit series with F.W. Dodge's construction potentials data. In addition, selected residential and nonresidential data series are compared using annual figures to illustrate data differences. The article also examines the state and local estimates in terms of the extent to which the Census Bureau and F.W. Dodge estimates may be substituted for one another.

Census Bureau Building Permit Data

The Census Bureau collects residential and nonresidential permit data directly from local permit-issuing offices, which collect and tabulate applications for future building work in their jurisdictions. Jurisdictions are defined as municipalities, counties, townships, or unincorporated towns. The permit values are based on estimates of the costs of future construction work, not on actual costs of the completed project.

The local permit-issuing agencies provide the Census Bureau with tallies of the number of units and of their dollar value as submitted on permits issued for numerous categories of residential and nonresidential construction and several categories of additions and renovation work (see Table 1 for classifications). Permits are not counted for mobile homes, landscaping, moved or relocated buildings, maintenance and repair, installations (such as plumbing, electrical, and mechanical work), placement of manufactured items, or heavy construction (such as highways and streets and earthmoving).

Respondents from local permit-issuing offices are also asked to classify whether the permit is intended for privately owned or publicly owned construction because the Census Bureau tabulates and reports only privately owned construction. Privately owned construction is defined as buildings owned by private companies during the construction period, even if the structures ultimately will be owned by the public sector. For some categories, such as single-family residential, the difference between total permits and permits for privately owned construction is negligible.

Methodology. Building permit data are collected through a mail survey, missing data are estimated, and the aggregates are reported on a monthly, year-to-date, and annual basis for local and state areas. For the monthly series, data are collected from a sample of 8,300 permit-issuing locations out of the more than 17,000 local permit-issuing jurisdictions that account for over 95 percent of all new, private residential construction in the United States. The remaining 5 percent of private residential construction is built without formal permits and is therefore not included in Census Bureau estimates. Permit-issuing agencies are asked to complete a form reporting permit activity for both residential and nonresidential construction by category.[1] On average, the Census Bureau estimates a response rate of 75 percent to 80 percent for both the monthly survey and the annual tally.

Specific large permit-issuing locations are always included in the monthly survey, forming a constant sample. Census has selected with certainty 116 MSAs and primary metropolitan statistical areas (PMSAs) as well as other large areas identified according to a variety of criteria to make up this constant sample.[2] Permit issuers from these designated areas represent the largest portion of the total 8,300 surveyed each month. For permit offices in large areas not responding to the survey, the Census Bureau extrapolates data from what is reported. The remainder of the monthly survey—approximately 800 reporting places—is a sample of smaller jurisdictions selected at a rate of one in ten. These responses are therefore weighted by ten and are also extrapolated to cover missing survey responses. The Census Bureau then sums the data from responses collected with certainty and the weighted responses.

Each month, the Census Bureau reports monthly building permit data along with a cumulative year-to-date estimate. The cumulative year-to-date estimate includes revisions made for monthly reports submitted after the cut-off date in the monthly processing cycle and for any corrections in previously reported data. These revisions may be for the most recent month or for any of the previous months in the year-to-date total. However, state- and MSA-level revised monthly data are not released, and cumulative data do not

Table 1
Census Structure Groups

Number	Structure Group Classification and Description
101	Single-Family Houses—Includes all detached one-family houses. Also includes all attached one-family houses separated by a wall that extends from ground to roof with no common heating systems or interstructural public utilities. Includes prefabricated, sectionalized, panelized, and modular homes which are manufactured partially off-site but which are transported and assembled at the construction site. Excludes mobile homes.
103	Two-Family Buildings—Includes all buildings containing two housing units, which may be one above the other or side-by-side. If built side-by-side, they (1) do not have a wall that extends from ground to roof, or (2) share a heating system, or (3) have interstructural public utilities such as water supply/sewage disposal.
104	Three- and Four-Family Buildings—Includes all buildings containing three or four housing units. If built side-by-side, they (1) do not have a wall that extends from ground to roof, or (2) share a heating system, or (3) have interstructural public utilities such as water supply/sewage disposal.
105	Five-or-More-Family Buildings—Includes all buildings containing five or more housing units. If built side-by-side, they (1) do not have a wall that extends from ground to roof, or (2) share a heating system, or (3) have interstructural public utilities such as water supply/sewage disposal.
109	Total—A summarization of items 101 through 105.
213	Hotels, Motels, and Tourist Cabins Intended for Transient Accommodations—Includes hotels, motels, tourist cabins, and apartment hotels intended for transient accommodations.
214	Other Nonhousekeeping Shelter—Includes lodge associations or club buildings with bedrooms, rooming houses, dormitories, fraternity houses, and similar nonhousekeeping residential buildings.
318	Amusements, Social, and Recreational Buildings—Includes buildings designed to provide amusement or recreation, such as theaters, radio and TV studios, auditoriums, athletic and social clubs, YMCA buildings used primarily for recreation, arenas, bowling alleys, skating rinks, bathhouses, and gymnasiums.
319	Churches and Other Religious Buildings—Includes churches, temples, synagogues, parish halls, Sunday school rooms, monasteries, and convents.
320	Industrial Buildings—Includes plants producing, processing, or assembling goods and materials, such as factories, machine shops, paper mills, beverage plants, manufacturing plants, and printing plants.
321	Parking Garages (Buildings and Open Decks)—Includes garage buildings and open-deck parking structures to be used primarily for transient parking. Does not include storage garages, which are reported in 328.
322	Service Stations and Repair Garages—Includes service stations and repair garages.
323	Hospitals and Institutional Buildings—Includes hospitals, convalescent homes, rest homes, homes for the aged, nursing homes, orphanages, and similar establishments for prolonged institutional care. Does not include doctors' offices, which are included in item 324, or staff houses and apartments, which are included in items 101 through 105.
324	Office, Bank, and Professional Buildings—Includes offices, banks, professional buildings, financial institutions, administration buildings, and medical office buildings.
325	Public Works and Utilities Buildings—Includes buildings providing public services such as transportation, communications, power, light, heat, sewage and garbage disposal, trash incineration, and water supply.
326	Schools and Other Educational Buildings—Includes buildings such as schools, libraries, museums, observatories, universities, and academies. Does not include faculty and student apartments, which are included in items 101 through 105.
327	Stores and Customer Services—Includes buildings used in buying, selling, distributing, or storing of merchandise and materials or performing customer services such as stores, auto and other showrooms, warehouses,

Continued on page 26

Table 1 *(Continued)*

	grain elevators, restaurants, taverns, night clubs, bakery shops, laundry and dry cleaning shops, laundromats, beauty and barber shops, and kennels.
328	Other Nonresidential Buildings—Includes buildings such as sheds, boat houses, barns, silos, dog pounds, post offices, storage garages, animal hospitals, jails, and reformatories.
329	Structures Other Than Buildings—Includes nonbuilding recreational facility construction and harbor and port facility construction such as outdoor swimming pools, marinas, outdoor stadiums, parks, outdoor theaters, boardwalks, wharves, and docks.
437	Additions, Alterations, and Conversions—Nonresidential and Nonhousekeeping— Includes additions, alterations, and conversions to nonresidential and nonhousekeeping residential buildings and conversions of housekeeping buildings to nonresidential or nonhousekeeping residential buildings. Does not include special "installation" permits issued to cover electrical, plumbing, heating, air-conditioning, or similar mechanical work. Also excludes the installation of fire escapes, elevators, signs, etc., and conversions to residential housekeeping buildings.
438	Additions of Residential Garages and Carports—Includes additions of new residential garages and carports, whether attached or detached. Does not include those included in items 101 through 105. Item number 436 was used through 1985.

Source: U.S. Bureau of the Census.

match the sum of unrevised monthly data. In addition, differencing the monthly cumulative figures does not produce actual revised monthly figures. The monthly report with unrevised data and the revised cumulative year-to-date data offer different advantages, and the data user interested in current analysis must decide which series is more relevant.

Annual summary data for the previous calendar year are released in May of each year. Rather than a survey, this annual report is essentially a tally of the data submitted from the approximately 17,000 permit-issuing jurisdictions in the United States. The Census Bureau uses previously collected and revised data from the 8,300 monthly respondents and canvasses the remaining jurisdictions, asking them to report total building permits for the year. Again, the Census Bureau estimates data for nonreporting places using a complex model based on the previous year's permit level.

Reporting. The Census Bureau's residential permit data are widely reported through the media and newswire services at the census regional and national levels. For state, MSA, and local levels, residential permit data are published in the *Current Construction Report Series C-40*, produced by the Construction Statistics Division of the Census Bureau.

Nonresidential data do not typically receive much media attention and are not published in the C-40 report. Only the International Trade Administration of the Commerce Department publishes the nonresidential data in their bimonthly periodical, *Construction Review*, reporting major building category detail (categories 318 through 325 in Table 1) at the large MSA, regional, and national levels. However, for states this publication reports only total private nonresidential construction, including renovations and alterations.

In addition to the C-40 report, the Construction Statistics Division of the Census Bureau releases both residential and nonresidential building permit data details on diskette or as printouts, typically with a four-week lag time. These reports provide monthly and cumulative year-to-date data. A national total is not provided on the state data diskette but can be obtained by summing the fifty states plus the District of Columbia. Each May, the annual summary data are released. Annual diskettes and printouts are similar to monthly diskettes but include only annual summaries for activity in the various classifications.

The Commerce Department Bulletin Board also provides select series on a monthly basis. Residential detailed permit data, such as whether permits are for one-unit or five-unit construction, are available at only

the state and national levels, not the MSA level. Nonresidential detailed permit data—distinguishing between industrial, office, or retail permits—are provided at only the MSA level. However, total nonresidential permits are released at the state and national levels.

Caveats. As an indicator of future construction activity, the Census Bureau's building permits series has several limitations. First, data collection is imperfect. The value of permits is based on estimates of future construction work, not on actual building costs. Value estimation criteria differ somewhat among local building permit offices so that data are not completely consistent when different geographic areas are compared on a month-to-month basis. In addition, not all work granted a permit is built, not all construction is permitted, and not all areas, particularly rural regions, require permits for construction work. No adjustments are made to account for any of these limitations.

Furthermore, the data include only privately owned construction. Therefore, all categories exclude public expenditures, which for such categories as schools, hospitals, and infrastructure may be sizable. In addition, the series do not provide land costs or estimates of planned square footage.

Finally, the Census Bureau's monthly revision procedures create discontinuities between monthly and year-to-date statistics. Monthly revisions are not provided separately but are first included in the year-to-date figures, with further revisions made after publication of the December year-to-date totals included in the annual figures. The data user must decide how to reconcile the fact that the annual total will equal neither the twelve-month summation of initial monthly data nor the December cumulative year-to-date figure.

F.W. Dodge Construction Potentials Data

F.W. Dodge collects data on planned activity at the local level. Dodge's construction potentials (contracts) data are conceptually similar to permit data. Dodge defines a contract award as a project that is within sixty days of groundbreaking, the traditional beginning of the physical construction process. When an individual project reaches the awards stage, it is entered into the Dodge construction potentials (DCP) statistical data base. Potentials data are compiled by individual project and are aggregated to the county, MSA, state, regional, and national levels.

Dodge tracks all public and private construction projects costing more than $50,000. Dodge construction potentials data cover not only construction work that is competitively bid but also negotiated contracts and design/build arrangements, in which a project is planned and constructed by a single firm.

There are some building costs and construction projects that Dodge does not include. Like Census data, Dodge estimates reflect only "hard" construction costs and do not include development costs, land, or "soft" costs such as fee profits and interest or architectural and engineering services. Contracts exclude minor additions and alterations. In addition, like the Census Bureau's series, Dodge construction potentials do not cover farm construction, some small projects, or most "force account" work, a type of work done by full-time workers of industrial firms, utilities, and local governments for their employers. Again like the Census series, Dodge's single-family potentials do not include mobile homes. See Table 2 for a list of the major Dodge structure groups.

Methodology. Dodge's data collection method is based on a system of construction news reporters and correspondents. Dodge attempts to conduct a virtual census of all ongoing building activity throughout the United States. However, Dodge samples single- and two-family housing by conducting a survey of about 5,000 permit-issuing jurisdictions. For nonrespondents and permit areas outside the sample, Dodge estimates the level of activity on the basis of a variety of available measures, such as reports from architectural firms, engineering firms, and other sources in the planning and construction process. Single- and two-family residential data are the only data Dodge develops from survey-based estimates. This residential survey is similar to the Census survey, but the Census Bureau uses a larger sample size. All other Dodge data, including multifamily housing, are based on individual project reports.

Individual project reports are compiled by approximately 450 full-time reporters, and another 850 people conduct various newsgathering activities. In a typical year, these reporters and correspondents make about two million calls to obtain information on construction at various stages of development. The reporters also review newspapers and check with permit offices to obtain data for estimating construction contract values. Each of the more than 3,200 counties in the United States is the explicit responsibility of at least one of the full-time reporters.

Through the Dodge reporters' network, long-term relationships are developed with architects, engineers,

Table 2
Dodge Structure Group Mapping

Number	Structure Group Classification
1	Stores and Food Service
2	Warehouses (ex. Manufacturer Own)
3	Office and Bank Buildings
4	Garages/Service Stations
5	Manufacturing Plants
6	Warehouses (Manufacturer Own)
7	Laboratories (Manufacturer Own)
8	Schools and Colleges
9	Laboratories (ex. Manufacturer Own)
10	Libraries, Museums, etc.
11	Hospitals/Health Treatment
12	Government Administration
13	Other Government Service
14	Places of Worship
15	Religious
16	Amusement
17	Miscellaneous Nonresidential
18	One-Family Houses
19	Two-Family Houses
20	Apartment Buildings
21	Hotels and Motels
22	Dormitories
24	Streets and Highways
25	Bridges
26	Dams and Reservoirs
27	River/Harbor Development
28	Sewerage/Waste Disposal
29	Water Supply Systems
30	Electric Power/Heating Systems
31	Gas Systems
32	Communications Systems
34	Airport/Space Facilities
35	Miscellaneous Non-Building

Source: F.W. Dodge.

contractors, and others in the construction process. A key reason for the cooperation among these sources is that these firms are generally the agents of building owners, who encourage competitive bidding in the interest of minimizing development costs.

Reporters collect data on project value, total square footage, the project's designation as new building or additions or alterations, public or private ownership, and information on individuals and firms related to the project. Reporters follow construction from the earliest planning phases through the bidding and negotiation stage to the contract award, or the construction starts, stage. In addition, for some projects, Dodge reports after the award into the construction bidding phase for some subcontractor specialties. Dodge publishes this information in individual project summaries, titled *Dodge Reports*, which provide detailed information about construction projects, including names, phone numbers, and addresses for owners, architects, engineers, bidders, and contractors. The sale of these reports and related project news is Dodge's primary business. Building products manufacturers, suppliers, contractors, and subcontractors purchase these reports to develop sales leads.

Revisions. Dodge revises its monthly construction potentials reports as much as three years back each month. The large majority of revisions are made to the most recent months, but the window of revision is a rolling thirty-six months. After three years, the data become final. In addition, if a project is abandoned or deferred, even in the start stage, Dodge removes it from the Dodge construction potentials data base. The revised year-to-date totals include monthly revisions. To expedite the revision process, Dodge systematically audits all projects exceeding $3 million in value through an independent statistical validation and auditing function.

Reporting. Dodge releases numerous construction reports in addition to preparing individual requests for customers. For example, Dodge publishes a monthly *Construction and Housing Review*, maintains a market area construction forecast data base, and offers an online service called Dodge Dataline. Dodge's most popular releases are the *Dodge Reports*, described earlier. This study, however, considers only the Dodge construction potentials because they are most comparable to the Census Bureau's building permit series.

Dodge construction potentials are published monthly in hard copy form in the *Dodge Construction Potentials Bulletin*, which is produced in nine regional editions. Dodge's regions, which correspond closely to Census regions, include New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Pacific Northwest, and Pacific Southwest.[3] Each *Bulletin* contains building contracts data for the current month and cumulative year-to-date figures for nonresidential, residential, and nonbuilding categories, and, unlike the Census Bureau, Dodge also provides public construction data for some series. For each classification, Dodge reports the number of projects, square footage, and the total valuation. Within a *Bulletin*, data are provided by county, MSA, and state and are totaled by region.

However, the level of detail of data published at the regional, state, MSA, and county level varies. The most highly detailed data (such as that for categories of nonresidential building) are published only at the regional level in the *Bulletin*. For states, data are reported for total nonresidential, residential, and nonbuilding categories, but detail within these categories is not provided. For the MSAs and counties within the states, only total nonresidential and residential categories are reported; neither the nonbuilding category nor nonresidential and residential subcategories are reported for MSAs and counties.

In addition, because the *Bulletin* publishes only one month of data and the data are revised each month for three years back, the monthly reports, like the Census reports, do not contain sufficient information to construct a continuous time series of revised data. However, Dodge can provide monthly and annual revised series and additional categories of construction work from their Dodge construction potentials data base. By special request, Dodge offers 209 categories and subcategories of construction and any combination of county, MSA, state, or regional data that a data user might require. Table 3 provides a brief comparison of some of the major similarities and differences between Dodge and Census Bureau methodology and reporting.

Caveats. Unlike the Census Bureau, which reports all private renovations, Dodge reports only additions and alterations defined as major. A major renovation consists of three or more alterations on one structure. Although nonresidential renovations generally meet these criteria, a large portion of residential improvement may not be included under the Dodge additions and alterations classifications.

Additionally, public construction is defined as buildings that will eventually be occupied by government workers, a definition differing from that of the Census Bureau's more limited one of public construction as structures that are owned by public agencies. Finally, like the Census Bureau's, Dodge's data collection is imperfect.

Research Methodology and General Results

To assist analysts in choosing between Dodge and Census Bureau data, this study attempted to determine

Table 3
Dodge and Census Comparison

	Dodge	Census
Permits not counted for mobile homes	X	X
Reports private construction	X	X
Reports public construction	X	
Releases revised monthly data	X	
Estimates for unpermitted work	X	
Annual data compiled from 17,000 reporting places		X
Cumulative year-to-date equals sum of released revised monthly data	X	
Residential building data collected primarily from permit issuing offices	X	X
Nonresidential building data collected primarily from permit issuing offices		X
Nonresidential data collected primarily from building contractors and architects	X	
Data provide estimates of value of future construction work	X	X
Data available at national, state, and local level	X	X
Both major and minor addition and alterations included within category		X
Does not cover farm construction	X	X
Removes from estimates work that is intended but not built	X	
Residential monthly data published in bulletins	X	X
Nonresidential monthly data published in bulletins	X	
Provides customized series and hundreds of levels of detail	X	
Low cost		X

if the series were fairly close substitutes. Similar movement between the two series over time would indicate that they could be fairly interchangeable for tracking trends in construction spending. For determining the actual level of construction spending, however, a consistent ratio between comparable series of the two data sources would be a better measure for determining substitutability.

For this project, annual totals of construction contracts and permits from 1980 to 1991 were used for the six states that in whole or part make up the Federal Reserve's Sixth District (Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee) and for six MSAs in the district (Atlanta, Birmingham, Jacksonville, Miami, Nashville, and New Orleans). To compare how well F.W. Dodge and Census Bureau construction data track together, this study matched comparable categories of construction activity from the two sources (see Table 4). Although some classifications such as single-family and total nonresidential building were relatively comparable, specific building structure categories were more difficult to match. In addition, some categories were more detailed for one source than for the other. As a result, some series were aggregated to provide a more accurate mapping between the two sources. For example, Dodge maintains two categories of multifamily residential construction while the Census Bureau maintains three. In this case, the Dodge and Census categories were aggregated to provide a total multifamily category for each source. However, certain types of building activity were defined differently by the two sources and were not altogether comparable.

Table 4
Dodge and Census Structure Group Matchings

	Dodge Group Number(s) (From Table 2)	Census Group Number(s) (From Table 1)
Residential:		
Single-family	18	101
Multifamily	(19+20)	(103+104+105)
Nonresidential:		
Total Nonresidential	(1 through 17)	(318 through 328)
Stores and Customer Service	(1+2)	327
Office, Bank, and Professional	3	324
Industrial	(5+6+7)	320

After matching the building classifications, the various comparable building structure categories were compared. To better reveal the movement across building structure categories, the data for the six states and six MSAs were pooled into two panels, Dodge and Census, for each building category. Each panel contained seventy-two data points, resulting from twelve annual observations for each of the six states or MSAs. Correlation coefficients were calculated on first differences for these panels of data. Correlations were also run for each category in each state and MSA. All of these used data based on first differences (the current period less previous period values). Essentially, year-over-year changes in dollar levels were compared. The first differences represented the cyclical annual changes in the variables, but using first differences eliminated most of the trend caused by inflation and long-term real growth from the correlation coefficients. The correlation coefficients measured how well the data moved together.

Correlation coefficients were generally positive and rather high for most structure categories in the combined panels as well as the state and MSA correlations (see Tables 5, 6, and 7). However, in a few state and MSA categories correlation coefficients were negative, indicating an inverse relationship in the movement between the two series. This outcome is probably the result of timing differences in reporting contracts and permits, though. It is likely that in some cases Dodge may have reported a new contract near the end of one year that the Census Bureau did not report until early in the next year when the permit was issued. As a result, Dodge's total would be larger one year, and the Census Bureau's, the next, with such a timing discrepancy resulting in a negative correlation coefficient.

To provide a relative measure of conformity of levels of permit values over time, annual ratios of the elements of the two series were also formulated and averaged for the states and MSAs in each building structure category (Dodge/Census). An annual ratio near one indicated very similar values for a particular category of the two sources. An average ratio greater than one demonstrated higher estimates for the Dodge series than for the Census Bureau series; conversely, a ratio less than one indicated higher Census Bureau estimates. It was expected that similar methodologies and definitions would yield ratios generally close to one. However, in some instances, such as single-family building, for which Dodge includes estimates for nonpermitted work and the Census Bureau does not, a ratio consistently above one was expected, an expectation borne out by the ratio of single-family contracts to permits.

Table 5
Correlation Coefficients by Structure Category for Panels of State and MSA Data

	States	MSAs
Single-family	.960	.942
Multifamily	.919	.794
Total Nonresidential	.647	.563
Retail Building	.695	.580
Office Building	.718	.610
Industrial Building	.505	.174

Table 6
Correlation Coefficients by Structure Category for Individual States

	Alabama	Florida	Georgia	Louisiana	Mississippi	Tennessee
Single-family	.767	.975	.953	.885	.684	.818
Multifamily	.857	.921	.892	.938	.718	.878
Total Nonresidential	.606	.728	.691	.650	–.399	.360
Retail Building	.788	.708	.738	.736	–.387	.513
Office Building	–.009	.934	.610	.646	.306	.505
Industrial Building	.790	.452	.681	.796	–.408	.115

Table 7
Correlation Coefficients by Structure Category for Individual MSAs

	Atlanta	Birmingham	Jacksonville	Miami	Nashville	New Orleans
Single-family	.958	.859	.944	.845	.972	.776
Multifamily	.813	.796	.893	.651	.851	.827
Total Nonresidential	.714	.471	.302	–.039	.531	.584
Retail Building	.800	.304	.687	–.108	.760	.635
Office Building	.692	.098	.474	.306	.787	.727
Industrial Building	.527	.384	.119	.753	–.316	–.612

Standard deviations were calculated to measure the variation of these ratios. Although an average ratio near one indicated that over time the two sources had very similar dollar value estimates on average, this technique did not measure the similarity of movements over time. A low standard deviation for each ratio indicated that there was little annual variation for these ratios; that is, the relationship between Dodge and Census data was relatively constant over time. For example, in Atlanta the average ratio for single-family contracts to permits was just slightly over one, and the standard deviation was less than 0.05, indicating that the Dodge and Census estimates were quite similar, with little variation over the sample period. However, the industrial building category in Nashville had an average ratio near one (1.125) but a standard deviation

greater than 1.5. Although in this case Dodge and Census data averaged out to be similar estimates, the annual ratios demonstrated a great deal of variability.

The annual ratios and standard deviations did not demonstrate consistent patterns (see Table 8). With the exception of some residential series and the total nonresidential series, the annual average ratios and standard deviations for most structure categories varied widely. Unlike the other measures of comparison used in this study, the annual ratios did not confirm that the residential series were significantly more comparable than the nonresidential series.

An additional step involved running regressions using the panels of seventy-two observations and dummy variables for each state to see if there were any geographic effects on the relationship between Dodge and Census data (see Tables 9 and 10). For each building structure group, the Dodge data panel was used as the dependent variable and the Census panel data as the independent variable. Because the two variables were relatively interchangeable, specifying the Census data as the independent variable produced adjusted $\bar{R}^2$s fairly similar to the correlation coefficients. Once again, first differences were used to focus on cyclical movement.

None of the dummy variables for states was significant in explaining external influences; however, other regression results were consistent with the other statistical analyses. The coefficients for the Census variables were generally statistically significant at high levels of confidence for the residential series. (It is important to note that for this study the *t*-statistics tested whether the coefficients were statistically different from one rather than the usual null hypothesis of a mean equal to zero.) However, all nonresidential series, except state level industrial building, were rejected as being statistically different from one. Like the means of the ratios created, the coefficients for the regressions on the Census data were expected to be near one. The expected result was confirmed for the residential series, but the nonresidential results were much less conclusive. The adjusted $\bar{R}^2$s for each building structure group indicated that variation within the Census data was associated with most of the variation within the Dodge data for the residential series but was associated with considerably less variation of the nonresidential series.

The various summary statistics for first differences and levels indicated that the two residential series tracked each other better than did the nonresidential series. This result was not surprising because the methodologies for the residential data are quite similar for the two data sources. The results for nonresidential construction were not as clear. In some cases, series

Table 8
Average Annual Dodge to Census Ratios and Standard Deviations

	Single-family	Multifamily	Total Nonresidential	Retail Building	Office Building	Industrial Building
Alabama	2.501/.853	1.358/.336	1.038/.247	1.063/.225	1.240/.908	1.212/.672
Florida	1.094/.031	1.225/.109	.962/.123	1.272/.125	1.036/.116	.422/.097
Georgia	1.288/.105	1.172/.170	.892/.116	1.147/.302	.906/.213	.579/.131
Louisiana	1.832/.234	1.441/.572	1.191/.347	1.097/.195	.633/.357	3.364/3.359
Mississippi	2.356/.697	1.207/.548	1.196/.696	.986/.474	.817/.385	3.679/5.958
Tennessee	1.735/.478	1.214/.138	1.095/.214	1.207/.254	1.081/.355	.898/.668
Atlanta	1.097/.049	1.228/.212	.930/.135	1.310/.489	.984/.260	.397/.159
Birmingham	1.391/.335	1.957/1.787	1.054/.375	1.365/.422	1.723/2.262	.809/.480
Jacksonville	1.142/.033	1.104/.178	1.038/.292	1.386/.471	1.149/.978	.487/.308
Miami	1.030/.074	1.239/.241	1.339/.453	2.014/.715	1.477/.841	.267/.387
Nashville	1.190/.196	1.203/.269	1.255/.313	1.424/.398	1.206/.344	1.125/1.555
New Orleans	1.395/.343	1.976/2.355	1.010/.241	1.275/.326	.707/.670	2.255/3.764

Table 9
State Regression Coefficients/*t*-Statistics
(Panels of Dodge and Census Data with State Dummy Variables)

	Constant	Census	Alabama	Florida	Georgia	Louisiana	Mississippi	$\bar{R}^2$
Single-family	17652/.433	1.053/1.307	–11931/–.207	–16028/–.277	17496/.304	–35703/–.620	–26778/–.465	.915
Multifamily	–599/–.018	.901/–1.905	3493/.075	–17623/.372	–1732/–.037	4120/.089	5379/.116	.829
Nonresidential	–3593/–.052	.647/–3.606	2984/.031	67655/.691	–99/–.001	14861/.152	32416/.332	.367
Retail Building	–2991/–.127	.724/–2.826	3020/.091	8901/.268	–1185/–.036	1093/.033	2709/.082	.432
Office Building	–4613/–.158	.767/–2.405	2444/.059	–12420/–.301	–2341/–.057	2156/.052	8182/.199	.469
Industrial Building	–5839/–.162	.771/–1.341	7188/.141	19017/.371	1935/.038	17682/.346	33228/.650	.188

Table 10
MSA Regression Coefficients/*t*–Statistics
(Panels of Dodge and Census Data with MSA Dummy Variables)

	Constant	Census	Atlanta	Birmingham	Jacksonville	Miami	Nashville	$\bar{R}^2$
Single-family	–8347/–.513	1.035/.707	19772/.839	7326/.318	12543/.544	4478/.194	10372/.450	.878
Multi-family	968/.055	.896/–1.148	–2382/–.096	–1066/–.043	669/.027	4916/.196	–2373/–.096	.594
Nonresidential	–541/–.015	.615/–3.275	5620/.110	–2826/–.055	311/.006	–4650/–.091	7272/.142	.249
Retail Building	–2018/–.164	.643/–3.018	2685/.154	1630/.094	2543/.146	–6167/–.354	3089/.177	.274
Office Building	–5451/–.220	.654/–3.121	–29/–.001	4877/.139	2341/.067	–1411/–.040	5944/.170	.309
Industrial Building	1699/.237	.133/–8.900	–1841/–.182	–1567/–.155	–1474/–.145	–1219/–.120	–2838/–.280	–.067

did not have high correlation coefficients although the average of the annual ratios was near one. This result indicates a possible discrepancy in the timing of the reporting of the construction activity. In other cases, such as industrial building, both the correlation coefficients and the ratios are low. This outcome could well result from different classification criteria and mismatched series or from differences in sampling and coverage of actual activity.

When state and MSA data were compared, data aggregated to the state level were found generally to perform better than at the MSA level: that is, the state data tended to have higher correlation coefficients than the MSA data, but the two were similar for the ratios and their standard deviations. This result may be attributed largely to the effects of aggregation rather than to similarities in methodologies.

*D*ata Comparisons

The following section compares the Dodge and Census data using the outlined comparison methodology. The discussion focuses on the following structure categories: single and multifamily residential, total nonresidential, retail, office, and industrial building.

Residential Construction. Dodge and Census data for single-family and multifamily construction tended to move together much more than the total nonresidential construction data and specific nonresidential series. Tables 5, 6, and 7 show the correlation coefficients for panels of state and MSA data and for the individual states and MSAs, respectively. Relative to nonresidential categories, correlation coefficients for single-family construction and multifamily construction for the southeastern states and MSAs were quite high.

However, analysis of the ratio of the total dollar value of single-family contracts for Dodge to the total dollar value of permits for Census reveals a different picture. The mean values for these ratios varied widely, as seen in Table 8. For example, in Florida for every dollar of single-family construction activity reported by Census, Dodge reported $1.09; but in Alabama for every dollar estimated by Census, Dodge estimated $2.50. Such differences are consistent with a ratio greater than one for more rural states because Dodge estimates residential building in areas where permits are not required, and rural states generally have more nonpermitted construction. Therefore, it is not surprising that more rural states such as Alabama, Louisiana, Mississippi, and Tennessee have average ratios well above one, and, in the case of Alabama and Mississippi, above two. Consistent with this conclusion, in the MSAs—where most construction is permitted—the Dodge and Census estimates for single-family construction were similar and the means of the ratios were near one.

With the exception of Alabama and Mississippi, the standard deviations for single-family building intentions were quite small, indicating that regardless of whether Dodge had higher value estimates than Census for single-family permits, the relationship between the annual estimates did not vary greatly from year to year.

For multifamily construction, the means for the ratios were higher than one for all states and MSAs (see Table 8). For states, the mean ratios varied modestly, with Louisiana and Alabama the highest. These upper-end ratios were probably pulled up by the ratios for New Orleans and Birmingham, which had means near two. For the MSAs, there seemed to be no consistent relationship between the Dodge and Census estimates. In addition, standard deviations for both states and MSAs showed much more volatility for multifamily permits than for single-family permits.

In order to eliminate value estimation discrepancies, residential ratios were also calculated using unit data (see Table 11). The ratio of single-family units as reported by Dodge to the number reported by Census was greater than one for all states except Florida. In the more populated states, such as Georgia and Florida, the ratios were very close to one. As was the case with the ratios of the value estimates, the more rural states had ratios much greater than one. Again, this result was expected since Dodge makes estimates for unpermitted work. For MSAs, where almost all the work is permitted, the means of the ratios were consistently near one. In state and MSA comparisons based on value per unit, the Dodge estimates for single-family permits were consistently larger than the Census estimates, but the ratios were still relatively near one (see Table 11).

For multifamily contracts, the ratios for unit data were consistently closer to one than they were for the value of multifamily construction ratios. It is reasonable to expect these categories to be relatively similar because most multifamily building takes place in urban areas and is permitted, so both sources would be likely to have similar methods for estimation. However, Dodge potential estimates for multifamily construction include not only actual permits but also construction contract awards that may not yet be per-

Table 11
Average Annual Dodge to Census Ratios and Standard Deviations
(Units and Per Unit $ Values)

	Single-family (Units)	Multifamily (Units)	Single-family (Per Unit $ Value)	Multifamily (Per Unit $ Value)
Alabama	1.923/.562	1.087/.222	1.287/.067	1.254/.212
Florida	.951/.027	1.092/.068	1.151/.038	1.121/.057
Georgia	1.079/.080	1.025/.181	1.194/.056	1.157/.160
Louisiana	1.470/.181	1.207/.470	1.248/.085	1.207/.171
Mississippi	2.070/.468	1.010/.349	1.124/.082	1.174/.156
Tennessee	1.459/.328	.982/.164	1.178/.062	1.256/.170
Atlanta	.938/.070	1.085/.173	1.173/.063	1.134/.119
Birmingham	1.265/.246	1.715/1.550	1.095/.070	1.126/.324
Jacksonville	.981/.030	.912/.180	1.165/.023	1.267/.417
Miami	1.017/.089	1.073/.151	1.016/.058	1.153/.164
Nashville	1.053/.100	1.050/.260	1.124/.081	1.167/.172
New Orleans	1.042/.193	1.343/.902	1.327/.150	1.358/.518

mitted. Like the single-family category, on a value per unit basis Dodge valued multifamily construction work consistently higher than Census.

Nonresidential Construction Comparisons. When all categories of nonresidential construction were aggregated into one total series, values for the Dodge construction potentials and Census construction permits did not track as well as the residential series. Correlation coefficients for panels of aggregate state and MSA data were considerably lower than for the residential series (see Table 5). In addition, correlation coefficients for individual states and MSAs indicated even greater variation between the series (see Tables 6 and 7). In a few cases, such as that of Mississippi, some correlation coefficients were actually negative. As explained earlier, this negative correlation probably resulted from timing differences in Dodge and Census reporting. These differences are more apparent in the smaller states, with less nonresidential building, than in the larger states, for which the volume of building tends to mute the effects of timing differences.

Interestingly, the means of the ratios for the aggregated values were near one for both states and MSAs (see Table 8). Despite not moving together particularly well on an annual basis, the average values for the estimates of nonresidential construction are fairly similar over time. Once again, differences in the timing of reported data may be responsible for this outcome.

Retail. When data for nonresidential construction were separated into the specific categories, the results varied greatly among building categories. For retail buildings, the correlation between the panels of data was still fairly strong for both states and MSAs. However, the results for the individual states and MSAs varied widely and in some cases were even negative (see Tables 6 and 7).

When the means of the ratios for retail building were analyzed, the results for states and MSAs varied. At the state level, the ratios performed particularly well. Even states with low correlation coefficients had means near one. However, at the MSA level, for which all the ratios were above one, the results were not as strong. This finding supports the previous conclusion that data at the MSA level do not track as well as the state data because MSA data have less aggregation.

Office. The correlation coefficients for office construction were strong for the panels of state and MSA data (see Table 5). As before, when the data were disaggregated into series for each state and MSA, correlation coefficients generally fell. For the states, results varied widely, but MSA correlation coefficients were somewhat higher than those of the states. This result contrasts with previous results, in which data aggregated to the state level showed less variation between the series. One contributor to this contrasting result may be the fact that, because almost all office building

is done within MSAs, aggregating to the state level provides relatively little additional information.

Industrial. For industrial building, the sources did not correspond well. The correlation coefficients for the panels of state and MSA data were the lowest of all the building group categories (see Table 5). The results further deteriorated when tests were run on the individual states and MSAs. Except for a few states and one MSA, the series demonstrated almost no correlation.

The means of the ratios of Dodge data to Census data for industrial buildings for states and MSAs varied widely, demonstrating the greatest range of mean values of any of the series (see Table 8). Means for states and MSAs were not consistently greater or less than one. Although definitional differences would seem to affect states in a similar manner, it is possible that differences in categorization of buildings affect states with varying industrial compositions differently. For example, differences in warehouse classifications should have a greater effect on a state with a relatively large proportion of distributional facilities, such as Georgia, than on a state like Mississippi, which is not a major distribution center. Consistent with this assumption, Alabama and Tennessee—which have diversified industrial facilities—had means fairly close to one.

Conclusion

When F.W. Dodge and the Census Bureau used similar methodologies and reporting sources, their data series were quite comparable over time. However, when the methodologies differed, the data series were dissimilar.

The methodologies used in calculating residential contracts and permits created very similar series for Dodge and the Census Bureau. Statistical results indicated that in many cases the residential series were almost interchangeable. These series had generally high correlation coefficients and average annual ratios near one. Single-family contracts and permits demonstrated the greatest similarities, but the multifamily results were also strong.

The classifications and methodologies used by Dodge and the Census Bureau for nonresidential series were not as similar as for the residential series, and the nonresidential series showed less correspondence in statistical tests. Correlation coefficients were much lower, and the annual ratios differed to a much greater extent. Within the nonresidential category, the office building series were the most comparable, and the industrial building series demonstrated the fewest similarities. Unlike the residential series, the various nonresidential series from each data source were generally not close substitutes. Individual researchers should question which set is most useful for a particular purpose.

In addition, potential users should note that regional data are generally more highly variable than are national data, and, as the data are disaggregated, findings become more subject to error. Consequently, researchers should explore the developments that cause variation in the local economy when analyzing the data, rather than placing emphasis on the actual changes in permit levels.

Although this study is a preliminary examination of the data sources, it provides a basis for comparison of Dodge and Census data on construction permits. The specific needs of individual researchers will determine which is the most relevant data source; it is not the intention of the authors to recommend one or the other. Finally, the findings of this study suggest that a valuable next step would be a more thorough examination of monthly Dodge and Census estimates and revisions.

Notes

1. A copy and description of form C-404, "Report of Building or Zoning Permits Issued and Local Public Construction," can be found in the back of the annual *Current Construction Report Series C-40*.
2. In addition to the selected MSAs and PMSAs, large areas are defined as "all places that authorized housing units during the period greater than or equal to a predetermined number of units" (*Current Construction Report Series C-40* Appendix).
3. The latter two correspond to the Census Bureau's Mountain and Pacific regions, respectively.

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