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A PRIMER ON DERIVATIVES

THEIR MECHANICS, USES, RISKS AND REGULATION

Christopher L. Culp

Senior Fellow in Financial Regulation

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PREFACE

What follows is a non-mathematical, non-technical primer on derivatives for the uninitiated. One misconception with which many readers will proceed is that derivatives are hopelessly cryptic, complex, and arcane. Though by no means exhaustive, this primer from the Competitive Enterprise Institute (CEI) is designed to dispel that myth by exploring several aspects of derivatives: what they are, how they work, and who uses them. A primary mission of CEI is to disseminate information that will allow public policy to be made on the best informed basis. It is hoped that readers of this primer will indeed be one step closer to understanding why the current political rumblings in Washington about the need to further regulate derivatives are ill-conceived and may drive an industry in which the United States has significant competitive advantages to friendlier foreign shores.

It should be noted that three broad subjects deliberately have been omitted from this primer. First, you will not see a discussion of proposed regulatory and legislative changes. The intention of the primer is to have a shelf-life beyond most of those proposals anyway. Second, you will not see a discussion of why a whole host of firms supposedly lost money on derivatives in 1993 and 1994. Except to explode the myth that these losses were caused largely by derivatives (though a few were), no useful purpose would be served in discussing them here. Finally, you will not see a guide to managing the risks of derivatives. Many people have written on these three issues elsewhere. Discussing them here is beyond the scope of this publication.

Finally, I owe a debt of gratitude to Tom Miller at CEI for his hours of patient editing and direction. I am also grateful to Greg Conko for his review of this work and to my co-authors on previous works Dean Furbush, Steve Hanke, Barb Kavanagh, Robert Mackay, and Merton Miller without whom much of my knowledge and much of this text would not exist. All these parties remain blameless for remaining errors, however, and the usual disclaimer applies.

Chicago, April 1995

EXECUTIVE SUMMARY

Although criticized often and considered unfathomably complex, "derivatives" are relatively straightforward financial contracts that are not inherently riskier than other, more traditional financial instruments. Derivatives are simply contracts created by the negotiation of two parties that derive their value from some underlying asset price, reference rate, or index level. This primer explores the mechanics, benefits, risks, and regulation of the two types of derivatives contracts: those which are traded on organized financial exchanges, and those which are privately negotiated.

Aside from explaining this innovative and growing area of financial activity, this primer also provides support for the following main conclusions:

(1) Derivatives are not hopelessly complex. The essential economics behind most common derivatives transactions can be explained with a minimum use of either terminology or mathematics. Once the basic principles are grasped for the two "building blocks" of derivatives—forwards and options—all other derivatives can be viewed simply as various combinations of these two product types. Understanding the two building blocks of derivatives also provides new insights into more traditional financial products.

(2) Derivatives can provide significant benefits to all sorts of institutions, including banks, thrifts, institutional investors, government-sponsored enterprises, and retail investors. Using derivatives can enable institutions to lower their funding costs, diversify their funding risks, manage the risks of asset and liability portfolios, change their exposure to an existing product or asset market at low cost, manage business expansions, and exploit informational advantages. Derivatives also benefit the economy and financial system by promoting sound risk management policies and procedures to derivatives participants that are applicable to their whole institutions.

(3) The risks of using derivatives are not inherently different from the risks of using more traditional financial products, such as mortgage loans. With proper risk management procedures and internal controls, there is no reason *a priori* why corporations that use derivatives should be subject to any greater financial risk than those which do not.

(4) Exchange-traded and privately negotiated derivatives are fundamentally similar products, but they also exhibit important complementarities and differences. These two types of derivatives have evolved side by side and coexist for a reason. They are both fundamentally derivatives contracts, but the risks and uses of the two products can differ dramatically. It is appropriate to differentiate between them accordingly.

(5) Contrary to claims that derivatives activity is largely unregulated, the regulation of derivatives users and derivatives contracts is, if anything, excessive. Privately negotiated derivatives have witnessed dramatic growth over the last decade in large part because banking regulators have promoted market discipline and a "flexible supervision" rather than a "strict regulation" approach in handling derivatives activities at banks. Competition among regulators,

furthermore, has mitigated the costs of regulation without jeopardizing the taxpayer-funded Bank Insurance Fund or the stability of the financial system.

At the same time, participants in U.S. exchange-traded derivatives activity, including organized commodities exchanges, have been subject to unnecessarily strict and inflexible regulation by the Commodity Futures Trading Commission, an agency with a statutory monopoly over the regulation of these exchange-traded products. Such regulation has impeded growth and inhibited organized exchanges in their quest to innovate and remain competitive. Because of the complementarities between exchange-traded and privately negotiated derivatives, all derivatives participants would benefit from a roll-back in the current regulation of exchange-traded derivatives activity.

(6) There is no "market failure" in derivatives. A market failure is thought to occur when market participants fail to take actions that ensure either an efficient allocation of resources or adequate self-policing against excessive risk-taking and abuses. This paradigm has provided the justification for most economic regulation since World War II. Some areas thought to be "market failures" in derivatives include inadequate voluntary risk disclosures, lack of management understanding of derivatives, inadequate capitalization of dealers, the absence of a clearinghouse for privately negotiated derivatives transactions, and the growth in the number of dealers that are largely unregulated. Analysis of each of these concerns reveals that *there is no market failure*. Calls for further regulation of derivatives thus are built on a house of cards and would do little more than needlessly promote the expansion of bureaucracy at the expense of the competitiveness of U.S. financial institutions.

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LIST OF FREQUENTLY USED ABBREVIATIONS

AMEX	American Stock Exchange
BIS	Bank for International Settlements
BOE	Bank of England
BOTCC	Board of Trade Clearing Corporation
CBOE	Chicago Board Options Exchange
CBOT	Chicago Board of Trade
CEA	Commodity Exchange Act of 1936
CFTC	Commodity Futures Trading Commission
CME	Chicago Mercantile Exchange
FASB	Financial Accounting Standards Board
FCM	futures commission merchant
FDIC	Federal Deposit Insurance Corporation
FDICIA	Federal Deposit Insurance Corporation Improvement Act of 1991
FRA	forward rate agreement
FTPA	Futures Trading Practices Act of 1992
GAO	General Accounting Office
ISDA	International Swaps and Derivatives Association
LIBOR	London Interbank Offered Rate
OCC	Office of the Comptroller of the Currency
PHLX	Philadelphia Stock Exchange
PND	privately negotiated derivatives
SIB	Securities and Investments Board, U.K.
SEC	Securities and Exchange Commission

I. INTRODUCTION

From the pages of the popular press to the political voices of Capitol Hill, "derivatives" have been subjected to numerous criticisms during the last two years. Any time a financial loss has been even associated with a non-standard financial instrument, "risky derivatives" have been indicted in the public view. Criticisms of derivatives have ranged from "excessive complexity" to lack of regulation to the creation of new risks that could jeopardize the very fabric of the international financial system.

As with most waves of financial innovation throughout history, however, the current vitriolic attacks on derivatives have been made with little substance behind them. Even in the widely publicized derivatives-related losses at firms such as Barings PLC, Metallgesellschaft AG, Procter & Gamble, and Gibson Greetings, derivatives were *involved* with the losses but not directly *responsible* for them. [1] As is often the historical case, the messenger is blamed rather than the message.

Derivatives typically are defined as bilateral contracts negotiated between two counterparties which derive their value from some underlying asset, index, or reference rate. [2] Although derivatives tend to be somewhat more complicated contracts than most other financial contracts, such as common stock or corporate bonds, the risks created by derivatives are no more complex than the risks inherent in a traditional mortgage loan.

Derivatives still appear to be a mystery to many outside the industry. Contrary to this perception, however, derivatives are relatively easy to understand. A cursory comparison of a typical MBA textbook on derivatives with one on stock and debt investments reveals that understanding derivatives is in many ways *simpler* than understanding stock and debt markets. Derivatives, after all, derive their value from another asset that can usually be identified quite easily. Common stock, by contrast, derives its value from the assets—tangible (e.g., plants and equipment) and intangible (e.g., patented processes and talented workers)—comprising that slipperiest of economic concepts called rather mysteriously "the firm." Determining why a corporation is valuable is often far more challenging than ascertaining the source of value of particular derivatives.

This monograph for the Financial Innovation Project of the Competitive Enterprise Institute is intended to serve as a primer on the mechanics, uses, risks, and regulation of derivatives. The discussion is by no means exhaustive, but it is intended to serve as a "first pass" over derivatives with one goal in mind. After reading this primer, we hope people will be able to intelligently question the validity of headlines about "derivatives doomsday."

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[1] *Cf.*, Stephen Figlewski, "How to Lose Money in Derivatives," *Journal of Derivatives* 2(2) (Winter 1994).

[2] Global Derivatives Study Group, *Derivatives: Practices and Principles* (Washington, D.C.: The Group of Thirty, July 1993).

Section II of this paper presents a definition of derivatives, and it then explains the mechanics of common types of derivatives contracts. Section III provides an overview of the historical development of derivatives and the distinctions between the two main varieties: exchange-traded and privately negotiated. Section IV gives an overview of the participants in, and the scope of, global derivatives activity. Section V discusses some of the benefits of derivatives and why certain institutions use them. In Section VI, the risks of derivatives to their users are enumerated, and we explain how these risks are also present in *non*-derivatives activities. Section VII offers an overview of the regulation of derivatives activity in the United States. [3] Section VIII explains why derivatives are regulated, why some political forces seek to regulate them further, and why the justifications for subsequent regulations are based on a flawed paradigm known as "market failure" rather than sound economic theory and empirical evidence. Section IX concludes with a discussion of some of the positive aspects of the regulation of privately negotiated derivatives and with a warning about future regulatory changes.

[3] In the initial sections of the paper, our discussion is entirely general, but specifics such as regulation focus mainly on the United States with apologies offered to foreign readers.

II. THE MECHANICS OF DERIVATIVES

A. What Are Derivatives?

Some have defined derivatives as "anything that lost money in 1993 or 1994." Setting that aside for a more useful construct, the standard definition of a derivatives transaction is a bilateral contract whose value is derived from the value of an underlying asset, reference rate, or index. [4] This definition, however, is generally a bit too broad to be of much practical use. A share of common stock, for example, represents for its holder a proportional claim on the assets (e.g., machines, real estate, receivables, etc.) of the issuing corporation. In a very real sense, equity shares *derive* their value from those assets underlying what is called "the firm." [5]

A derivatives contract can more usefully be defined as *a zero net supply bilateral contract deriving its value from some underlying asset, reference rate, or index.* [6] This definition contains three distinct characteristics: zero net supply, based on some "underlying," [7] and bilateral.

(1) Zero Net Supply

The first attribute of derivatives—"zero net supply"—means that for every "purchaser" of a derivatives contract, there must be a "seller." In financial parlance, for every "long" (buyer) there must be a "short" (seller). At first glance, this characteristic would seem to describe *anything* in an economic marketplace. Shoes, after all, cannot be *sold* unless someone is prepared to *buy* them. But look further. Shoes are in fact *positive* net supply assets. They are produced using capital (e.g., leather punches) and labor (e.g., cobblers). Shoes can be produced *regardless* of whether someone stands ready to purchase them. [8] In the same way, traditional equity securities are also positive net supply assets. They may be issued before buyers and sellers agree about a price for the issue. Issuing equity shares consists only of a firm's decision to finance itself in that manner. The same firm would still exist if it chose a partnership structure instead. The *assets* underlying the firm make the equity issue possible, not would-be purchasers of common stock.

Suppose, by contrast, Mr. Midway enters a bilateral contract with Ms. Woodlawn in

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[4] Global Derivatives Study Group, *op. cit.*

[5] Finance specialists will not be surprised at the notion that common equity shares can be viewed as a type of derivatives contract. A common stock share is essentially a "call option" on the value of the issuing firm, with a strike price equal to the face value of the issuer's outstanding debt. We will discuss call options later in this section.

[6] Christopher L. Culp, Dean Furbush, and Barbara T. Kavanagh, "Structured Debt and Corporate Risk Management," *Journal of Applied Corporate Finance* 7(3) (Fall 1994).

[7] The term "underlying" is often used as a noun, as in the sentence above, when referring to derivatives.

[8] That shoes *can* be produced in the absence of demand does not necessarily mean they *will be*.

which Mr. Midway pays Ms. Woodlawn $1 if the value of a single Lake Shore Drive Corp. equity share is positive, and Ms. Woodlawn pays Mr. Midway $1 if the value of Lake Shore Drive Corp.'s equity shares falls to $0 per share. Neither Mr. Midway nor Ms. Woodlawn need own any of Lake Shore Drive Corp.'s stock to enter into this contract. Indeed, the contract was *created* only by the agreement of Mr. Midway and Ms. Woodlawn to enter into it. This contract is a zero net supply asset because its very existence owes to the agreement of buyer and seller.

(2) Based on an "Underlying"

Derivatives contracts must be based on at least one "underlying." An underlying is the asset, reference rate, or index that is the *principal* source of value for a derivatives transaction. In practice, derivatives cover a diverse spectrum of underlyings, including physical assets, exchange rates, interest rates, commodity prices, equity prices, or indexes. There is practically no limit to the assets, reference rates, or indexes that can serve as the underlying of a derivatives contract. [9]

Suppose Mr. Midway contracts with Ms. Woodlawn to pay her $200 in one month in exchange for a particular pair of shoes. The principal source of value for the contract is the value of the pair of shoes when the contract matures. If Mr. Midway did not want the shoes and was unwilling to pay $200 for the pair, the contract would have no value. Given that he does want the shoes and agrees on that purchase price, the pair of shoes is the "underlying" from which the contract derives much of its value.

Other factors may also affect the value of the contract. Because Mr. Midway and Ms. Woodlawn are exchanging an asset for a cash flow in the future, the discount rate used to measure the "present value" of future cash flows will affect the value of the contract. This discount rate, however, is not the *principal* source of value to the derivatives contract, so it is not referred to as the "underlying."

Some derivatives, moreover, can cover more than one underlying. Suppose Mr. Midway agrees to pay Ms. Woodlawn $350 in one month in exchange for the above pair of shoes *and* one particular pair of socks. The pair of shoes *and* the pair of socks are the underlyings of this derivatives contract.

(3) Bilateral

Derivatives are bilateral contracts inasmuch as they represent an obligation by one party to the other party in the contract, and vice versa. All financial contracts are bilateral in the sense that one economic agent contracts to make payments or exchanges to another. But all *assets* are not necessarily *financial assets.* To return to the previous example, the pair of shoes underlying the contract between Mr. Midway and Ms. Woodlawn is not a bilateral contract. Perhaps the actual

[9] Regulation sometimes serves as such a limit. U.S. law prohibits, for example, many derivatives contracts based on individual shares of common stock, with exceptions to be discussed below.

exchange of money for the shoes is bilateral, but the shoes themselves are fashioned leather. Once they are purchased and taken home, their value *does not depend on the performance of the shoe seller*. The value of the contract between Mr. Midway and Ms. Woodlawn to exchange $200 for a pair of shoes, by contrast, does depend on Ms. Woodlawn's willingness and ability to deliver the shoes and on Mr. Midway's willingness and ability to pay $200. The value of a bilateral contract thus depends not just on the value of its underlying, but on the performance of the two parties to the contract.

(4) Problems with the Definition

Even with the more detailed definition offered above, the term "derivatives" still has some serious drawbacks. A loan, for example, is also a zero-net supply bilateral contract deriving its value from an underlying. Because a bond is just a fungible loan, debt securities also satisfy this definition of a derivatives contract. Although the definition presented here is a little better than the popularized definition of derivatives, it still includes more "traditional" types of financial contracts. This serves to illustrate a theme that will be repeated through much of this document: Derivatives are not fundamentally different from other financial instruments—hence, our inability to define derivatives without including other contracts in that definition.

B. The "Building Blocks" of Derivatives

For practicality, the term "derivatives" in this document refers to financial contracts that are either constructed with, or are one of, two simple and fundamental "financial building blocks": forwards and options. [10] A forward contract obligates one counterparty to buy and the other to sell an asset or commodity in the future for an agreed-upon price. In return for the payment of a premium, an option contract gives the buyer (or holder of the option) the right, *but not the obligation*, to buy or sell an asset in the future at an agreed-upon price.

Economist and industry practitioner Charles Smithson refers to these two building blocks as the LEGOS® with which all derivatives contracts are built. [11] This makes it crucial to understand exactly what these building blocks are before proceeding.

(1) Forward Contracts

The most basic forward contract is a forward delivery contract. As early as the 12th century, the medieval fairs of England and France provided opportunities for English, Flemish, Spanish, French, and Italian merchants to gather together and contract for the purchase or sale of

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[10] Charles W. Smithson, "A LEGO® Approach to Financial Engineering," *Midland Corporate Finance Journal* 4 (1987).

[11] *Id.*

a specified amount and quality of a commodity at a specified date in the future. [12]

A simple forward delivery contract might be a contract to purchase 100 troy ounces of gold one year in the future for a price set equal to the price of gold today (i.e., its "spot" price). If the price of gold is $400/oz. when the contract is entered and the price happens to be $450/oz. one year from now, the purchaser of this contract makes a profit equal to ($450 - $400)x100, or $5,000. (To see why, just imagine the forward purchaser buys the gold for the contracted $40,000 and immediately resells it for its market value of $45,000.) Suppose instead the price of gold in a year happened to be $350/oz. Then the purchaser of the forward contract loses $5,000, and she would prefer to have bought the gold at the lower future spot price.

The value of this forward contract at its maturity is depicted in Figure 1, where P is the price of gold and V is the value of the contract.[13] (Figures appear in Appendix I.) The value of the contract is represented by the dashed line, and notice that it is a 45° line. Every dollar increase in the price of gold above the price at which the contract is negotiated yields a $1 increase in value in the contract at maturity. Every dollar decline causes a loss on the contract. If the price of gold at maturity is exactly $400/oz., the forward purchaser is no better or worse off than if the contract had not been entered.

Forward delivery contracts can also be entered to *sell* an asset at a future date. Because derivatives are bilateral contracts, the value of a forward sale contract is the exact opposite of the contract value shown in Figure 1. Figure 2 depicts the value of this contract at maturity from the perspective of the party that has agreed to *sell* 100 troy ounces of gold in the future. As we would expect, the value of the contract to the seller *declines* as the price of gold rises and *rises* as the price of gold falls.

Forward delivery contracts are popular for numerous underlying assets, including physical commodities and financial assets such as foreign exchange. Forward contracts may also be "cash-settled." In a cash-settled derivatives transaction, a *cash flow* rather than a physical asset is bought, sold, or exchanged. Cash-settled forwards are based on such underlyings as interest rates or indexes.

A popular cash-settled forward contract known as a "forward rate agreement" (FRA) is a forward contract based on the London Interbank Offered Rate (LIBOR). In a typical FRA, Firm Wells may agree to pay one year hence to Firm La Salle the then-prevailing three-month LIBOR (i.e., the rate on interbank Eurodeposits of three months to maturity) based on an assumed principal value of $1 million, less a fixed interest rate of, say, 6 percent of the $1 million principal

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[12] Chicago Board of Trade, *Commodity Trading Manual* (Chicago: Board of Trade of the City of Chicago, 1989).

[13] Value is often a subjective concept, differing across individuals. Under a broad set of reasonable assumptions, however, the value of a financial asset is the same for everyone regardless of the purpose for which the asset is being used.

amount. If three-month LIBOR is 6 percent when the FRA is negotiated, any three-month LIBOR increase above 6 percent will create a profit on the FRA for Firm La Salle and a loss for Firm Wells, and conversely if LIBOR declines. Because the cash principal amount is not actually exchanged, it is referred to as "notional."

(2) Swaps and "Forward-Based" Derivatives

Derivatives can also be "forward-based." A forward-based derivatives contract is one that can be constructed with multiple forward contracts. Today, two of the most popular and widely used forward-based derivatives are interest rate swaps and currency swaps. An interest rate swap obligates the counterparties to exchange interest payments periodically for a specified period. In the most common form of interest rate swap, called the "plain vanilla" swap, one payment is based on a floating rate of interest that resets periodically, such as LIBOR, while the other payment is based on a rate fixed at the inception of the contract. The actual amounts exchanged are calculated based on a notional principal amount. Like FRAs, the notional principal of interest rate swaps is not exchanged.

Currency swaps are similar to interest rate swaps in that one party makes a series of fixed or floating-rate payments to its counterparty in exchange for a series of fixed or floating receipts. In a currency swap, though, the payments and receipts are in different currencies, and the principal amounts of each currency *are* exchanged at the beginning of the swap and returned at its conclusion. The principal of a currency swap is therefore *not* notional.

To illustrate how a swap can be viewed as a "portfolio" of forward contracts, consider the following example. [14] Suppose Firm La Salle enters into an interest rate swap with Firm Wells with a notional principal value of $10 million. Firm La Salle agrees to pay a fixed interest rate at periodic intervals, in exchange for which La Salle receives a floating interest rate. Suppose in this example of a fixed-for-floating rate swap, Firm La Salle agrees to pay six percent of the notional amount underlying the contract to Firm Wells semi-annually for one year, in exchange for which Firm Wells pays Firm La Salle an amount equal to the LIBOR percentage of the notional amount on the same dates. LIBOR at months six and 12 are denoted as R(6) and R(12), respectively. Firm La Salle thus has "swapped" a fixed interest payment for a floating interest receivable. Firm La Salle's inflows and outflows six months and 12 months hence are depicted in Figure 3.

Now suppose that instead of entering into the interest rate swap, Firm La Salle had entered into a six-month FRA with a notional principal of $10 million that entitled it to receive R(6) in exchange for paying six percent. If Firm La Salle entered a second FRA maturing in 12 months obligating it to exchange six percent for R(12), the *combination* of the two forward contracts would be exactly the same as the single interest rate swap. Even though swaps are negotiated and viewed as a *single* derivatives contract, they can be viewed economically as

[14] Smithson, *op. cit.*

portfolios of forward contracts.

(3) Options

Options are the other component of the derivatives LEGOS®. An option is a contract giving its holder the *right* but not the obligation to purchase or sell an asset on or before some date in the future. A *call option* gives its holder the right to buy an asset, and a *put option* gives its holder the right to sell. When a call or put option is sold, the seller/writer must honor the purchaser's right to buy or sell if the purchaser "exercises" that right. In exchange for honoring such exercises when they occur, option writers collect option "premiums" from the option purchasers. The use of the term "premium" is not accidental. Whereas forwards give their purchasers unlimited upside and unlimited liability (See Figures 1 and 2), purchased options are limited-liability assets and thus can act as a form of price insurance for their holders.

The most common types of options are either "European" or "American." A *European option* is an option that allows its holder to buy or sell only on the option's specified expiration date. An *American option*, by contrast, enables its holder to buy or sell an asset *at any time on or before the option's expiration date.*

Options have a variety of assets, reference rates, or indexes underlying them. In options parlance, we would thus say that options are "written" on a variety of underlyings. Popular option underlyings include foreign exchange, securities, interest rate indexes (e.g., LIBOR), and commodities.

The most common way of depicting the value of an option graphically as a function of the price of its underlying is to assume the option is European and look at its value *at expiration.* This graph for a purchased European call option is shown in Figure 4. As in Figure 1, P represents the price of the underlying at expiration, and V is the value of the contract at that time, indicated by the dashed line.

The point labeled "C" in Figure 4 represents the "strike price" at which the owner of the option may buy the underlying. As in our earlier example, if the option is written on gold, C represents the price per troy ounce of gold at which the option owner may exercise her right to buy gold. If the spot price of gold is above C at expiration, the option owner will exercise her right to buy at C and make a profit of P_T - C, where P_T is the price of gold at expiration date T. If, instead, the price of gold is less than C, the option will expire worthless. It would not pay for the owner of the option to exercise her right to buy gold at the strike price, because the latter is above the price at which she could buy gold in the spot market. When an option has positive exercise (called "intrinsic") value, it is said to be "in-the-money"—that is, $C<P_T$ in the example above. If the underlying price is less than the exercise price, the option is "out-of-the-money."

Notice from Figure 4 that the owner of the option has limited liability on the contract. On the option's expiration date, if the price of gold is below the strike price C, the option will be out-of-the-money and will not be exercised. The option purchaser, however, loses nothing due to the

decline in the price of gold, *unlike* the owner of the forward contract depicted in Figure 1 who loses dollar-for-dollar as the price falls. Similarly, once the price has risen above C, the option holder gains dollar-for-dollar from the price rise, as the 45° line in Figure 4 shows. [15]

Note also in Figure 4 that even though the call owner's losses do not increase with decreases in the spot price below C, the flat portion of the dashed line is *below* 0 by an amount equal to -$B. This reflects the premium the option owner must pay for the right to purchase the asset at C in the future. Even though a decline in gold prices below C at expiration imposes no additional losses on the option purchaser, the purchaser is out the purchase price of the option paid at the inception of the contract.

The counterparty to the option purchaser, the seller of the call, faces an exposure opposite to that depicted in Figure 4. Indeed, the option seller faces potentially *unlimited* liability in the event of a price increase. Figure 5 depicts the value of the call option at expiration to its writer. If the price at expiration is below C, the buyer of the option does not exercise it, and the writer happily collects $B in premium income—the same $B paid by the option purchaser and reflected in Figure 4. If the price is above C and the buyer does exercise her right to purchase at C, however, the writer must honor that commitment.

The method by which an option writer honors her commitment depends, as with forwards, on whether the option is written on a physical asset or cash-settled. If the option requires the writer to deliver one share of common stock in Lake Shore Drive Corp., for example, an exercise by the option purchaser at maturity requires the option writer to go into the market and purchase the stock at its *then-current* price to deliver to the option purchaser. Every dollar that the stock price is above C when the option matures represents an economic dollar loss for the call writer because the writer must sell at price C. If the option is cash-settled, the writer need not directly purchase the physical asset, but the economic loss still rises dollar-for-dollar for every $1 price increase above C at maturity.

The payoff diagrams in Figures 4 and 5 are similar for European put options, with the difference that the owner of a put profits when prices *fall* because the put owner has the right to *sell* the asset at a fixed price. Figure 6 depicts the payoff at expiration to the owner of a put who pays $E in premium for the right to sell the underlying at price F.

Figure 7 depicts the exposure of the seller of a put—that is, the counterparty to the option purchase depicted in Figure 6. As before, the option writer collects $E in premium from the

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[15] One might wonder why people ever use forwards rather than options. As further reading of the text will make clear, there are three reasons. First, because purchasing options is like buying insurance, you must pay a premium for the limited liability. Forwards, by contrast, generally involve no exchange of cash flows up front, and hence no up-front payment is required. Second, someone must be willing to take the other side of the option and bear the risk that the purchaser has paid to avoid. Everyone cannot be protected from financial risk. In forward contracts, *both* sides face unlimited profit and loss potential. Finally, some firms use derivatives to manage existing or new financial risks, and options cannot always provide the degree of protection against risk that a firm requires.

option purchaser but faces potentially unlimited liability if prices decline and the put owner exercises her right to sell the asset to the option writer at strike price F.

The value of an option over a range of prices is difficult to express graphically before expiration. The option pricing models of Black and Scholes; Cox, Ross, and Rubinstein; and others provide analytical and numerical solutions to the value of an option, and hence the sensitivity of the option to the price of the asset on which it is written. [16]

(4) "Option-Based" Derivatives

Just as forward-based derivatives are bundles of forward contracts negotiated as single financial contracts, "option-based" derivatives are portfolios of options sold as single products. Perhaps the most common types of option-like derivatives contracts are interest rate options known as caps, collars, and floors. A cap, for example, is actually a portfolio of call options in which each call option entitles the buyer to the higher of a fixed interest rate or a floating rate, such as LIBOR, multiplied by a notional principal amount. Each option in the cap is called a "caplet," but in practice the cap is virtually always considered a "single" financial instrument on which the seller makes periodic payments to the buyer when the floating rate exceeds the fixed cap rate. A floor is the opposite of a cap; it is a combination of "floorlets" marketed as a single instrument that entitles the buyer to the lower of a fixed rate or a floating rate. A collar is just a portfolio of caps and floors sold as a single product.

(5) Combinations of Forward-Based and Option-Based Derivatives

Forwards and forward-based derivatives are often bundled together with explicit or embedded options to form combination derivatives. A typical example is a "putable swap," in which either one or both counterparties to a swap contract may terminate the swap early for a specified value if prices or rates move in a particular fashion.

Forward contracts often contain embedded options, even though not obvious at first glance. Consider, for example, a forward contract requiring one party to sell 5,000 bushels of wheat to the forward purchaser in 90 days at a fixed price. But suppose the contract allowed the seller to deliver *either* No. 2 Dark Northern Spring wheat *or* No. 1 Northern Spring wheat. The forward seller would thus possess a valuable option (written implicitly by the forward purchaser) to sell the *cheapest* of the two wheat grades. We shall see in a section below that "futures contracts" are forward-based derivatives similar to forward delivery contracts but set apart from forwards largely because of their standardized delivery/settlement terms. "Cheapest to deliver"

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[16] *See* Fischer Black and Myron Scholes, "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy* 81 (May-June 1973), and John C. Cox, Stephen A. Ross, and Mark Rubinstein, "Option Pricing: A Simplified Approach," *Journal of Financial Economics* 7 (1979). A user-friendly survey of option pricing models can be found in chapter 13 of Charles W. Smithson and Clifford W. Smith, Jr., *Managing Financial Risk* (Chicago: Irwin Professional Publishing, 1994). For a slightly more technical discussion, *see* John Hull, *Options, Futures, and Other Derivative Securities*, 2d ed. (Englewood Cliffs, N.J.: Prentice Hall, 1993), and the references therein.

options are quite commonly found in futures contracts.

Other popular forward/option derivatives include the following:

- Firms Cosette and Marius might enter into a fixed-for-floating *forward-start swap* in which Firm Cosette pays Firm Marius a fixed interest rate semi-annually for five years *beginning six months hence* in return for which Firm Marius pays a floating rate at the same intervals. The contract is thus a forward contract with a maturity date six months hence, where the underlying of the forward contract is a fixed-for-floating interest rate swap.
- Firm Cosette might prefer simply to have the *option* to enter into the fixed-for-floating swap in six months. Rather than enter into a forward-start swap with Firm Marius, Firm Cosette might purchase from Firm Marius a *swaption*, or an option to enter into a swap six months hence.
- Rather than entering into a fixed-for-floating rate swap, Firm Cosette might simply prefer paying some option premium to put a ceiling on its interest costs. A cap could accomplish this today, but Firm Cosette wants the right to decide whether to cap its borrowing costs *six months hence*. Firm Cosette thus might purchase a *caption*, or an option on a cap giving it the right to purchase a cap in six months. Conversely, a *floortion* is an option to purchase an interest rate floor on some future date. A *fraption* is an option on an FRA.
- A *futures option* is an option to enter into a futures contract on some later date.
- *Index amortizing swaps*, increasingly popular in the last decade, are swaps whose notional principal value amortizes over time according to some index or reference rate, such as LIBOR. Although viewed as a single product, many index amortizing swaps simply are combinations of caps or floors with simple interest rate swaps.

The process by which financial contracts are built from the elemental forward and option building blocks is often referred to as "financial engineering." Financial engineering enables firms to create virtually any zero net supply financial contract or bundle of cash flows.

(6) "Synthetics"

Sometimes combining the elemental derivatives building blocks yields *other building blocks*. Suppose, for example, that a firm purchases a European call and sells a European put, both of which are written on a forward contract with strike price K. From Figures 4 and 7, we can easily construct Figure 8, the combination of the two positions. When the net position of the long call and short put is examined, the two positions together are equivalent to a long contract for a forward purchase at price K.

The opposite is true, as we might expect, when the same firm or individual purchases a put option with strike price K and sells a call option at strike price K. Figure 9 shows that the net value of the two options is the same as the net value of a short forward contract with a selling price of K.

When two derivatives building blocks are combined to yield the net exposure equivalent to another building block, the position is called a "synthetic." A long call and short put is thus said to be "synthetically equivalent" to a long forward contract on the same underlying, and a short call and long put is synthetically equivalent to a short forward.

Constructing synthetic financial instruments generally is not regarded as financial engineering, because synthetics are not really "new" products. In fact, the absence of arbitrage in efficient capital markets requires that the price of a synthetic differ from the price of the instrument the synthetic replicates only by transaction costs. To take a specific example, suppose two European options—a short call and a long put—are entered at the same strike price. If the asset underlying the options is physical, the following relation must hold to preclude arbitrage opportunities:

$$c - p = S - Ke^{-rT}$$

where c is the price of a European call, p is the price of a European put, S is the price of the underlying commodity (which is assumed to pay no dividends), K is the strike price of the call and put, r is the interest rate, T is the amount of time remaining to the expiration of the options, e is the exponential function, and we have assumed costless transacting for simplicity. This relation is called "put-call parity." [17] Borrowing the present value of the option strike price, purchasing a put, and selling a call are synthetically equivalent to selling the underlying asset short. Lending the present value of the option strike price, purchasing a call, and selling a put are synthetically equivalent to purchasing the underlying asset.

Borrowing is required to make the above relation hold, because the underlying asset must be purchased in the synthetic strategy. If the asset underlying the option is a derivatives contract, however, no initial cash flow generally is required. A typical forward contract, for example, has *no value* initially, because the future selling price is usually specified as the current spot price when the contract is negotiated. Until the spot price moves up or down, the contract has no value to the buyer *or* seller.

Because there is no initial investment in most forward-based derivatives, no borrowing is required to establish the contract. The corresponding put-call parity relation for options written on zero net supply assets thus is

$$c - p = e^{-rT}(F - K)$$

where F is the price in the underlying derivatives contract at which the future purchase, sale, or exchange will occur. If the options are struck "at-the-money" (i.e., F=K), we are left with the simple relation

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[17] *See* Hans R. Stoll, "The Relationship Between Put and Call Option Prices," *Journal of Finance* 24 (1969).

$$c = p$$

so that the price of an at-the-money European call and an at-the-money European put written on a zero net supply derivatives contract must be identical. A long call and short put on a forward contract, for example, is thus exactly equivalent to a synthetic long forward contract (Figure 8), and conversely for a synthetic short forward (Figure 9).

Another type of synthetic bundled as a single financial instrument is called a "structured security," usually structured debt and also called "structured notes" or "hybrid debt." Structured notes are combinations of straight debt instruments, such as coupon bonds, with a derivatives transaction. Unlike the synthetic positions replicated in put-call parity, structured notes are sold as separate financial products. They can be either forward-based or option-based. A commonly issued structured note, for example, is a "floating rate note" (FRN), which can be viewed as the combination of a fixed-rate bond with a fixed-for-floating interest rate swap. [18]

Structured notes are often called derivatives, and given the broadness of the definition of derivatives, that label is not inaccurate. An important difference distinguishes structured notes from traditional forward-based and option-based derivatives, however. A structured note can be viewed as a combination of a debt instrument and an embedded derivatives contract, with the debt serving to "collateralize" the derivatives component. A derivatives transaction, by contrast, typically involves collateral only some of the time. Structured notes involve an up-front purchase of a debt instrument by the investor, which is in effect pledged as collateral to cover losses, if any, on the embedded derivatives component of the structured note. These instruments, in other words, bundle capital raising and risk management functions into a single instrument and thus serve a fundamentally distinct purpose from pure derivatives transactions.

[18] *See* Christopher L. Culp and Robert J. Mackay, "Structured Notes: Mechanics, Benefits, and Risks," Group of Thirty Discussion Paper (July 1995).

III. THE EVOLUTION OF DERIVATIVES

A. The Process of Financial "Commodization"

Commentators often refer to derivatives "markets." This is a somewhat unfortunate characterization in that it has led many to view derivatives activity as occurring in a homogenous industry with a standard set of participants. In fact, derivatives are simply contracts and, like any other contract, can be as customized as the two parties wish.

The process by which customized financial contracts evolve into homogenous markets for financial products is sometimes referred to as "commodization." Harvard professor Robert Merton defines commodization as the process by which "financial markets replace financial intermediaries as the institutional structure for performing certain [functions of the financial system]." [19]

Yale professor Stephen Ross classifies institutions involved in financial contracting on a "scale." [20] At one extreme, the most decentralized financial contracting occurs within an *opaque* structure of financial institutions. To return to a previous example, the derivatives contract in which Mr. Midway agreed to purchase a pair of shoes from Ms. Woodlawn in the future was negotiated in an opaque setting; no one beyond the two parties need know that the contract was ever negotiated. At the other extreme, Ross refers to standardized financial contracting on organized, visible, public markets as *transparent*. Merton has generalized this spectrum and provided examples, which are reproduced in Figure 10.

The process of commodization can be viewed as the process by which financial contracts evolve away from opaque bilateral negotiation between institutions like commercial banks toward transparent markets. Securitization is a good example of commodization in traditional security markets. Securitization is the process by which the liabilities or assets of an opaque institution are "repackaged" and transformed into securities that can be traded in a "market." The principal and interest receivables on mortgage loans made by banks and thrifts, for example, are often securitized and transformed into mortgage-backed securities, now a relatively liquid and well-developed security market.

Not all customized contracts evolve into standardized, traded financial instruments through the process of commodization. No market exists for homogenous financial contracts based on shoes, for example, despite the existence of long-term contracts between retailers and wholesalers to buy and sell shoe inventories in the future. Those contracts that do evolve into "markets" through commodization, moreover, often spawn further evolutionary changes in the

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[19] Robert C. Merton, "Operation and Regulation in Financial Intermediation: a Functional Perspective," Working Paper 93-020, Harvard Business School (1993), p.18.

[20] Stephen A. Ross, "Institutional Markets, Financial Marketing, and Financial Innovation," *Journal of Finance* 44 (July 1989).

process by which the *original* contracts are negotiated. Merton refers to this as the "financial-innovation spiral," which he defines as follows:

> [A]s products such as futures, options, swaps, and securitized loans become standardized and move from intermediaries to markets, the proliferation of new trading markets in those instruments makes feasible the creation of new custom-designed financial products that improve "market completeness"; to hedge their exposures on those products, their producers, financial intermediaries, trade in these new markets and volume expands; increased volume reduces the marginal transaction costs and thereby makes possible further implementation of more new products and trading strategies by intermediaries, which in turn leads to still more volume. Success of these trading markets and custom products encourages investment in creating additional markets and products, and so on it goes, spiraling toward the theoretically limiting case of zero marginal transactions costs and dynamically-complete markets. [21]

Why does commodization and the financial-innovation spiral occur? The answers to that question are many and diverse—as much in the evolution of derivatives as other financial innovations. [22] The next section summarizes the development of derivatives in the context of this process of innovation.

B. The Financial-Innovation Spiral in Derivatives

Derivatives have probably been around for as long as people have been trading with one another. Forward contracting dates back at least to the 12th century, and may well have been around before then. Early forward contracts were economically no different from the ones used today. Merchants entered into contracts with one another for future delivery of specified amounts of commodities at specified prices.

A primary motivation for prearranging a buyer or seller for a stock of commodities in early forward contracts was to lessen the possibility that large price swings would inhibit marketing the commodity after a harvest. Then as now, forward contracts could be customized fully as to their material economic terms (e.g., delivery location, quality, price, time of delivery, etc.). Such was the state of affairs for a very long time.

(1) The Development of "Exchange-Traded" Derivatives

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[21] Merton, *op. cit.*, p.23.

[22] Merton, *op. cit.*, Merton H. Miller, "Financial Innovation: The Last Twenty Years and the Next," *Journal of Financial and Quantitative Analysis* 21 (1986), and Merton H. Miller, "Financial Innovation: Achievements and Prospects," *Journal of Applied Corporate Finance* 4(4) (Winter 1992).

The process of the commodization of forwards is evident from various historical examples around the world, but is perhaps *best* illustrated by an example close to home. The village of Chicago was incorporated as a city in 1837, and its tremendously rapid growth was due almost entirely to its location and function as a grain terminal for the United States' primary farming region. In the early 1800s, farmers, packers, and millers regularly traveled to Chicago to buy and sell grain and livestock in spot markets (i.e., with no contracting for future delivery).

Unfortunately, for merchants and producers alike, the weather in Chicago, as well as much of the Midwest, was so volatile that supply and demand conditions changed constantly. By the time a farmer brought his grain to Chicago, he often found no one there willing to buy it. After production gluts, farmers would often dump their grain on the streets of Chicago when they could not find buyers. [23] Forward contracting arose in the Midwest in the 1800s as a means of trying to ensure future purchases and sales after an uncertain harvest period by prearranging buyers and sellers.

Although early forward contracts in the U.S. addressed merchants' concerns about ensuring that there were buyers and sellers for commodities, "credit risk" remained a serious problem. Illinois folklore tells the story of a farmer who, before his harvest, sold his crop forward to a grain merchant in Chicago. The entire grain harvest was huge that year. When the time came for the farmer to sell his grain, the price had fallen well below the agreed-upon purchase price in the forward contract. The merchant who had agreed to buy the grain then saw that he could buy it more cheaply elsewhere at current prices and reneged on the forward contract. Legend has it that the farmer walked up to the merchant and said, "I have a wagon of grain and a shotgun with me. Which should I unload?" [24]

To deal with these problems, a group of 82 local businessmen formed the Chicago Board of Trade (CBOT) in 1848 for the purpose of trading commodities in a more centralized and organized arena. The primary intention of the CBOT was to provide a centralized location known in advance for buyers and sellers to negotiate forward contracts. The belief was that merchants who wanted to transact on the CBOT season after season would know the location to which all the merchants were going and would not risk their reputation among those other merchants by failing to perform on forward contracts negotiated on the CBOT.

In 1865, the CBOT went one step further and listed the first "exchange-traded" derivatives contracts in the United States. Designed to be close cousins to forward contracts, these CBOT contracts were called "futures contracts." They were still bilateral agreements, but the essential difference was that the CBOT "listed" contracts that had certain standardized elements, thus eliminating the need for buyers and sellers to negotiate *anything* in the contract except the price at which a subsequent exchange would be made.

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[23] Chicago Board of Trade, *op. cit.*

[24] Todd E. Petzel, *Financial Futures and Options* (New York: Greenwood Press, 1989), p.6.

In 1874, another group of agricultural dealers formed the Chicago Produce Exchange to trade butter, eggs, poultry, and other perishable products. In 1898, the butter and egg dealers split off to form the Chicago Butter and Egg Board, which was again reorganized to allow futures trading in 1919. When it was reorganized, its name was changed to the Chicago Mercantile Exchange (CME). The CBOT and CME remain the two largest organized futures exchanges—indeed, the two largest *financial* exchanges of any kind—in the world today by almost any measurement.

Although exchange-traded derivatives developed at about the same time throughout the world, the Chicago exchanges are regarded by almost everyone as having set the standard for the success of exchange-traded derivatives. In part, this success traces to the Chicago exchanges' recognition that if exchange-traded derivatives were to succeed, they had to be different from—and at least to some people preferable to—customized, off-exchange forward contracts.

(2) The Benefits of Standardization

The Chicago exchanges sought to offer an attractive product different from off-exchange forward contracts. One way was to exploit the benefits of standardization. The role of an organized exchange was, and still is, primarily to list a contract by predefining its elements of standardization. Those standardized components of a futures contract include the definition of an underlying asset, the amount of the asset to be bought or sold, the date on which the exchange will occur, and the method of delivery and/or payment. The CME currently lists a futures contract on frozen pork bellies, for example, that allows a buyer to purchase 40,000 pounds of cut and trimmed frozen bellies. The pork belly contracts allow buyers to purchase for delivery in February, March, May, July, and August of each calendar year. A contract thus can be entered in September for the purchase of pork bellies the following August.

Organized futures exchanges also maintain a set of rules which buyers and sellers must obey in entering into the derivatives contracts that the exchange lists. Some of these rules address the following issues: trading hours, the particular "forum" in which trading must occur, price quotation styles, "tick" sizes, limits on how high or low a price can be quoted, the quality of product that must be accepted by a purchaser and delivered by a seller, the location and time of delivery, and so on. Perhaps the most important rules are those pertaining to the "forum" of trading. The Chicago exchanges, for example, utilize an "open outcry" trading forum in which buyers and sellers gather together in a pit and literally shout prices at one another. Other exchanges use different trading forums. At the other extreme, for example, are "electronic" exchanges such as GLOBEX™ that require all trading to be done over a set of interlinked computers. Whatever the forum, because it is specified as part of the rules an exchange provides, the forum's details (including any centralized location for trading) are *known* in advance.

The *only* nonstandard component of a futures contract is its price, which is set by buyers and sellers, or "members" of the exchange. In other words, people and corporations pay an exchange for the right to trade the standardized derivatives that the exchange lists within the rules set by the exchange. This system of standardization and rule-setting is regarded by many

derivatives users as highly beneficial. It facilitates the speed with which trading occurs by eliminating the need for counterparties to negotiate anything other than price. Standardization thus also lowers transaction costs.

Today, the standardization and low transaction costs of futures markets make them natural arenas for "price discovery." As futures markets underwent the process of commodization over time, their liquidity and depth grew, thus making those markets the ones in which most information is first incorporated into observed financial asset prices.

The price discovery function of futures markets has made them an easy target for crusading politicians over the years. As recently as the 1987 stock market crash, politicians blamed stock index futures markets because they fell further and faster than the underlying equity markets. [25] This is a classic case of blaming the messenger. Because futures markets tend to react *first* to new information, they will probably continue to be the so-called smoking gun for politicians searching to place blame for major market movements on some innovative financial activity.

(3) The Benefits of Anonymity

Exchange-traded derivatives have two other features not shared with their off-exchange, customized-contract predecessors. First, "margin" is required by all derivatives exchanges today, which means that a trader must post a performance bond *before* engaging in a transaction. Second, derivatives exchanges utilize what is known as "multilateral clearing and settlement." Together, these two features help ensure that traders of exchange-traded derivatives *both can and will* honor their contractual obligations.

Wishing to mitigate the potential for farmers to show up with loaded weapons to enforce their contracts, members of the Chicago exchanges began informally collecting performance bonds from one another in the late 1800s. If one party refused to honor his contract, he forfeited his performance bond. This system of margin, as it came to be known, helped mitigate some of the credit risk concerns of buyers and sellers; the exchanges thus attracted merchants who had previously contracted only with forwards.

The farmer/merchant example illustrates what might be called "walkaway" or "don't know" risk—a credit risk relating to the *willingness* of counterparties to honor their commitments. The Chicago traders also perceived another form of credit risk, which pertains to counterparties' *ability* to make good on contracts. Margin arose in large part to manage walkaway risk, but that did not always take care of those situations in which a merchant simply did not *have* the money to pay up. Traders were quick to recognize that the risk of nonpayment on a single, small amount of money was lower than the nonpayment risk on two large sums of

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[25] *See* Christopher L. Culp, "Stock Index Futures and Financial Market Reform: Regulatory Failure or Regulatory Imperialism?" *George Mason University Law Review* 13(3) (Summer 1991).

money. The risk that one trader, for example, would fail to come up with $1,000 was lower than the risk that either of two traders would fail to come up with $50,000 and $49,000 respectively. Also, it cost less to write one check than two. Pairs of traders on the exchange floors thus began to reach informal agreements whereby *net* rather than gross cash flows were exchanged. This process of reducing the amount of cash flows at risk between individual traders is known as "bilateral netting."

In the 1860s and 1870s, netting began to occur among more than just two traders *because the contracts traded on the exchanges were standardized.* Groups of traders in the same commodities formed "rings" in which financial obligations were netted *multilaterally* among all ring members. Traders then simplified matters even further by having everyone pay some money into a common ring fund before trading started each day. At the end of the day, traders took back out the net of what was due them. [26]

By the early 1880s, the CBOT rings had grown beyond specific commodities to the whole exchange. Every exchange member paid into a common fund and received his net cash flow at the end of the day. This arrangement was formalized, and the clearinghouse of the CBOT—now called the Board of Trade Clearing Corporation (BOTCC)—was set up in 1883. [27]

When clearinghouses started to develop in the 1880s, the Chicago exchanges began to merge the settlement risk management function of the clearinghouse with the walkaway risk management function of the margin system. Specifically, clearinghouses began interjecting themselves as the counterparty to all transactions. Previously, if Ms. Woodlawn entered into a futures contract to purchase soybeans from Mr. Midway, her contract would be with Mr. Midway. With the creation of clearinghouses, exchange members recognized the benefit of having the *legal* contract be between each trader and the clearinghouse. Immediately after Ms. Woodlawn negotiates the contract with Mr. Midway and they agree on a price, a legal contract is established that commits Ms. Woodlawn to purchase soybeans *from the clearinghouse* and commits Mr. Midway to sell soybeans *to the clearinghouse*. Ms. Woodlawn and Mr. Midway still set the price in their negotiations, but *after* that their legal obligations are to the clearinghouse.

The clearinghouse system, still in existence today, provides a major attraction for some market participants when compared to off-exchange contracting: Every exchange-traded derivatives contract has the same default and settlement risks, equal to the risk the exchange clearinghouse itself defaults. Exchange-traded derivatives users thus *do not really care who their actual counterparty is*. This benefit of exchange-trading, typically referred to as "trading anonymity," reduces transaction costs by lowering the costs traders must incur to search for creditworthy counterparties. Not all market participants place a high value on lower search costs.

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[26] If the contracts being negotiated had contained customized terms of delivery, this process obviously would not have worked.

[27] Chicago Board of Trade, *op. cit.*, and Jeffrey Williams, *The Economic Function of Futures Markets* (London: Cambridge University Press, 1986).

Some firms, for example, might prefer to deal in the off-exchange market with counterparties they have known and trusted in numerous previous relationships. Other market participants, however, who are concerned about search costs and credit risk, often find exchange-traded derivatives appealing.

Standardization coupled with the clearinghouse system makes "offsetting" possible, which greatly enhances the operational efficiency and financial integrity of most futures clearinghouses. Offsetting a position simply entails reversing the purchase of a commodity in the future by selling the same contract. The prices for the purchase and sale may be different, but because the contracts are standardized, the two contracts together remove any obligation of a trader to make (take) delivery to (from) the clearinghouse. In a customized, off-exchange forward contract, by contrast, a counterparty can be released from its obligation only by negotiating an "unwind" of the contract with the *original* counterparty. Because all exchange-traded derivatives are contracts with the clearinghouse, a trader can reverse any obligation to buy by finding any other counterparty on the exchange who is willing to buy. The second transaction need not be negotiated with the same party involved in the first transaction, because both transactions are in fact legal contracts with the clearinghouse.

Offsetting not only improves liquidity on futures exchanges. It also enables an exchange clearinghouse to step in and offset a trader's positions the moment that her creditworthiness is called into question. Over time, futures exchanges have greatly refined the clearinghouse system in order to mitigate credit risk. Instead of merely *allowing* traders to post performance bonds with each other, the exchanges quickly adopted margin as a *requirement* for exchange trading. Today, *initial* or *original* margin is required of *all* traders before any trade is made. If the counterparty to the clearinghouse cannot honor a losing obligation, the posted performance bond is applied to the loss. In the rare event that a loss exceeds the initial margin, the clearinghouse members jointly bear the cost of the default. [28]

Exchanges also now engage in a practice known as "daily settling-up," or "daily marking-to-market." At the end of each day, much as they did in the 1800s, the clearinghouses tabulate the net position of all accounts and mark them to current market prices. Net winners may withdraw their profits, which come from the margin posted by the net losers of the day. If losers wish to maintain their positions in the market, the clearinghouse compares the new level in their margin account to a *maintenance* margin level. The maintenance level is often lower than the initial margin level. If a loser has lost so much that the end-of-day value of his performance bond is below that maintenance level, the clearinghouse demands the deposit of *variation* margin to bring the value of his performance bond up to the initial margin level. If the loser fails to meet this "margin call" by the next morning, his position is offset by the clearinghouse.

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[28] Exchanges also impose capital requirements on their members to ensure that, should a default occur, the collective capital of the members standing behind the clearinghouse is sufficient to cover the loss. The rules of the CME are the most conservative in this regard. Its "good to the last drop" policy requires all members of the exchange clearinghouse to agree that *all of their capital* may be applied to any clearinghouse default.

The effect of this daily settling up is the renegotiation of all futures contracts every day by adjusting margin accounts to reflect *current* prices. This ensures that at the end of every trading day, only those traders who can afford to make additional losses tomorrow are left in the market, and thus the chance of default is reduced significantly. If a default does occur, the loss is limited to a one-day price movement. Some exchanges—notably the CME and CBOT—now even mark to market more than once a day, reducing credit risk even further.

The development of futures markets was quickly followed by the development of standardized option markets, as well. Forward contracts and off-exchange options underwent a textbook case of financial commodization.

(4) "Privately Negotiated Derivatives"

As forward and off-exchange option contracts became commodized in the late 1800s and early 1900s, the demand for off-exchange contracts did not subside. Exchange-traded derivatives, after all, were not *pure* substitutes for off-exchange, privately negotiated contracts. The demand for customization persisted.

Over time, off-exchange derivatives, now called privately negotiated derivatives (PNDs), began to undergo their own process of commodization. [29] PNDs became increasingly standardized *by type*, with the material terms of each particular contract remaining customized. We explained previously, for example, that interest rate swaps can be viewed as portfolios of FRAs. Rather than being marketed and negotiated as separate forwards, these portfolios began to be bundled as a single swap contract. Many of the derivatives discussed earlier have evolved from this commodization by type of product. They include currency swaps, cross-currency swaps, commodity swaps, and collars.

One aspect of the commodization process in PNDs is the evolution of transactions from "principal-principal" to "principal-agent." In the former type of relationship, one party in a PND transaction had to find another party with a demand for the opposite side of the contract. A farmer wishing to protect herself from falling prices, for example, had to find a counterparty with a desire for a contract providing protection from *rising* prices (e.g., a miller). In the era when users of off-exchange derivatives had to find their own counterparties, both counterparties were "principals" in the transaction.

Typical PND transactions are now negotiated with one party to the contract functioning as an "agent." Called a "dealer," such a firm functions as an intermediary with the purpose of entering into virtually any transaction, generally on "either side" (buy or sell) of the contract. Dealers thus transact with principals, which are also called "end users," so that principals do not need to identify a counterparty with a demand for the opposite side of the contract to enter that

[29] PNDs are often referred to as "over-the-counter" (OTC) derivatives. We avoid this terminology here to avoid confusion with the term OTC in certain equity transactions.

contract. Dealers thus can provide customized transaction services while dramatically reducing the cost of searching for counterparties in off-exchange contracting.

Why off-exchange derivatives evolved toward "principal-agent" or "user-dealer" relationships is not clear. Part of the reason must have been just an increase in the demand for off-exchange contracting, which in turn prompted users to demand a reduction in the transaction costs of searching for appropriate counterparties. On the other side of the coin, dealers may have arisen because of their "comparative advantage" in counterparty identification. A large bank with a large client base is already in the business of gathering client information, for example. Such a bank would seem naturally better positioned than a small regional bank to find a counterparty with a desire to take an opposite position to the small bank in a PND contract.

The "forum" for negotiating privately negotiated derivatives is best characterized in this electronic age as a forum of faxes and phones. When a corporation wants to enter into a customized, bilateral derivatives contract, it generally telephones one or more dealers which offer to be the corporation's counterparty in that particular transaction. The derivatives user decides which dealer will be its counterparty in the PND transaction (usually based on the best price quote the user receives) and then relies on faxes, messengers, or other expedients of communicating information to sign the documentation governing the execution of the derivatives contract.

Several industry associations have brought some degree of operational uniformity to PND activity while preserving the benefits of ultimately customized transacting. [30] The International Swap Dealers Association (ISDA) was formed in 1984 to pursue issues of common concern to all PND participants. ISDA is neither a regulatory nor a self-regulatory body, but it does command significant influence over common practices of PND dealers and, increasingly, end users, both in the United States and abroad. In 1993, ISDA changed its name to the International Swaps and Derivatives Association, Inc., conveniently keeping its original acronym.

Of particular note among ISDA's contributions was its role in developing standardized documentation for customized PND transactions. Prior to the advent of standardized documentation, PND transactions were legally governed by disparate and sometimes unenforceable legal documents. For PNDs in which a physical asset is not exchanged (i.e., notional principal derivatives, such as interest rate swaps), bilateral netting had become a standard practice by the mid-1980s. But some users of customized PND documentation discovered that drafting errors and legal glitches could render such provisions unenforceable.

Close-out netting, for example, is a crucial component of PND documentation, because it guarantees the ability of a non-defaulting counterparty either to pay any net obligation or receive any net entitlement upon the occurrence of an event that causes its counterparty to default on the

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[30] The remainder of this section draws heavily from Christopher L. Culp and Barbara T. Kavanagh, "Methods of Resolving Over-the-counter Derivatives Contracts in Failed Depository Institutions: Federal Banking Law Restrictions on Regulators," *Futures International Law Letter* 14(3-4) (May/June 1994).

contract. Suppose, for example, Bank Mischief defaults on a swap contract with Firm Respectable. Mischief owes Respectable $1 million in floating-rate payments on the swap, and Respectable owes Mischief $990,000 in fixed-rate payments. If close-out netting is unenforceable, Respectable might be required to pay Mischief its $990,000 with no payment in return, even though Mischief owes respectable a *net* of $10,000. Were close-out netting provisions to be unenforceable in bankruptcy, the attractiveness of the PND contract might be reduced substantially. Indeed, concern about the enforceability of close-out netting provisions was one factor that accounted for the development of standardized documentation.

To moderate uncertainty surrounding enforceability, as well as to lower transaction costs for participants in derivatives activity, standardized forms of documentation for PND transactions began to evolve. Such documentation is generally offered by ISDA and other industry associations, including the British Bankers Association, the Australian Financial Markets Association, a loose confederation of German bankers, and the Association Francaise des Banques.

In 1987, ISDA formulated its first set of standardized contracts, known as the "ISDA Master Agreements," which were revised in 1992. According to a recent survey conducted by Price Waterhouse for the Group of Thirty, a Washington think tank, the ISDA Master Agreements are the standardized forms most often used by dealers. Seventy-six percent of the dealers surveyed said they most frequently use the "ISDA Master Agreement with little or no modification" when transacting with other dealers, and 81 percent planned to use it in the future for such transactions. The second most popular manner of documenting transactions between dealers, cited by 27 percent of the dealers surveyed, was the "ISDA Master Agreement with major modifications." [31] Other master agreements used by participants in global PND activity include the International Currency Options Market (ICOM) master agreement and the International Foreign Exchange Master Agreement (IFEMA).

Another development in PNDs that addresses credit risk is the use of "credit enhancements." Credit enhancements may include collateral, third-party guarantees, or periodic cash settlements of open PND contracts. [32] Credit enhancements may be used as a matter of course, or they may be demanded after a counterparty experiences an adverse credit event (e.g., exceeding an exposure limit or receiving a downgrade by a rating agency). As of December 1994,

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[31] *See* Global Derivatives Study Group, *op. cit.*, Appendix III, p. 14. In the survey, 72 end users and 80 dealers responded. When asked the same question about transacting with end users, 53 percent of the surveyed dealers use the "ISDA Master Agreement with little or no modification" and another 30 percent use the "ISDA Master Agreement with major modifications." Dealers were also asked what proportion of their derivatives transactions were documented with any type of master agreement. The responses by product type were 79 percent for interest rate contracts, 77 percent for currency derivatives (excluding forwards and options), 64 percent for equity derivatives, and 59 percent for privately negotiated commodity derivatives contracts. Notably, only 19 percent of the surveyed dealers document currency forward and option contracts with master agreements.

[32] Regulations prohibit "margin" and daily marking to market for PNDs for reasons to be explained in Section VII.B.

47 percent of a group of dealers surveyed routinely use credit enhancements on at least some of their PNDs, and another 16 percent plan to begin using credit enhancements in 1995. Of the end users surveyed, only 28 percent said they did not routinely use credit enhancements. [33]

C. Privately Negotiated vs. Exchange-Traded Derivatives

A company's choice of using privately negotiated or exchange-traded derivatives depends on a variety of factors. First, the degree of customization that a corporation may want in a derivatives contract strongly affects the choice. If customization is less important than cost, the company might prefer to use exchange-traded derivatives.

Second, firms must consider the relationships they already have with PND dealers. These dealers often are banks or investment banks, and some firms may prefer dealing with their banks when using derivatives rather than using the anonymous trading environment provided by an organized exchange. Indeed, "repeat customers" may even end up paying lower costs by taking all their business to a PND dealer rather than taking some of that business to an exchange.

Third, not all exchanges have strictly lower credit risk than all PND dealers. An exchange clearinghouse exposes traders to *identical* credit risks, but not necessarily *zero* credit risk—the clearinghouse, after all, might default. If the choice a firm faces is using a questionable futures exchange in a third-world country or a AAA-rated derivatives dealer, it may well opt for the latter when considering credit risk.

Finally, as will be explored later in the text, privately negotiated derivatives and exchange-traded derivatives are regulated quite differently, and differential regulation can affect the choice of product by a firm or institutional investor. [34]

In general, it is important to note that PNDs and exchange-traded derivatives are *neither* pure substitutes *nor* pure complements, as will become even clearer. Thus, the choice of using PNDs or exchange-traded derivatives is not always clear.

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[33] *Follow-up Surveys of Industry Practice to Derivatives: Practices and Principles*, Report by the International Swaps and Derivatives Association, Arthur Andersen & Co., and Price Waterhouse (Washington, D.C.: The Group of Thirty, 1994).

[34] *See* Christopher L. Culp, "Regulation and the Growth of Derivatives in the Global Banking System," *Derivatives Quarterly* 1(4) (Summer 1995).

IV. THE PARTICIPANTS AND SCOPE OF DERIVATIVES ACTIVITY

A. Participants in Derivatives Activity

The types of institutions that participate in derivatives activity fall into several categories. Because PNDs fall on the "opaque" end of the Merton/Ross financial intermediation spectrum (see Figure 10) and financial exchanges on the other extreme, the participants in derivatives activity do vary somewhat depending on the type of derivatives transaction.

(1) Privately Negotiated Derivatives Participants

There are two types of participants in PND activity: dealers and end users. Dealers act as agents for a variety of end user principals in PND transactions. These dealers generally run close to a "matched book" of derivatives, in which gross transactions net to a relatively small risk exposure. In other words, when dealers match one counterparty to another in exchange for earning fee income, the dealers often attempt to match the terms of their transactions when feasible. When matching is not feasible, dealers typically lay off the "residual risk" of their entire customer portfolio by using other low-cost PNDs and exchange-traded derivatives. Interest rate swap dealers, for example, rely strongly on the CME Eurodollar futures contract to manage the residual risk resulting from a portfolio of end user swap transactions whose terms are not perfectly matched. This has led some to characterize the swap market as a "retail" market for large-dollar, customized transactions. Likewise, a function of a futures market is to provide a "wholesale" market in which swap dealers can manage the risks of being retailers.

Because dealers act as financial intermediaries in PNDs, they typically must exhibit several characteristics to remain competitive as agents in negotiating PNDs. These characteristics include a relatively strong credit standing, large relative capitalization, good access to information about a variety of end users, and relatively low costs of managing the residual risks of an unmatched portfolio of customer PND transactions. Firms already active as financial intermediaries are natural candidates for dealers. Most PND dealers, in fact, are commercial banks, investment banks, and non-bank financial corporations such as trading company affiliates of insurance companies.

In the last several years, dealers have attempted to further enhance their ability to compete as agents in various PND transactions by setting up separately capitalized affiliates whose sole function is derivatives dealing. Many of these separately capitalized affiliates are affiliates of securities broker/dealers with higher credit ratings than their parent corporation. To secure such ratings, these affiliates generally have significant amounts of capital and strict policies pertaining to the use of credit enhancements in PNDs.

Dealers in PND activity are more than just brokers. They offer extended services on risk management to their clients, whereby customers can use dealers to determine how the risks of particular aspects of their primary business can be managed.

End users of derivatives are those institutions that engage in derivatives transactions as principals, or for a purpose other than generating fee income. They do not usually take "both" sides of a contract, and instead enter into derivatives to obtain or modify a particular exposure to the underlying. End users of derivatives include commercial banks, investment banks, thrifts, insurance companies, manufacturing and other non-financial corporations, institutional funds (e.g., mutual funds), and government-sponsored enterprises (e.g., Federal Home Loan Banks). Dealers, moreover, may use derivatives in an end user capacity when they have their own demand for principal derivatives exposure. Bank dealers, for example, often have a portfolio of interest rate PNDs separate from their dealing portfolio in order to manage the interest rate risk they incur in traditional banking (i.e., borrowing at short maturities and lending at longer ones).

(2) Exchange-Traded Derivatives Participants

The dealer/user paradigm for PNDs breaks down in transparent markets for exchange-traded derivatives. Perhaps the closest analogue is the relation between "organized exchanges" and "exchange participants."

(a) Organized Exchanges

There are two primary types of organized financial exchanges in the U.S.—"securities exchanges" and "commodities exchanges"—with the distinction being made entirely on how they are regulated. Options on securities and foreign exchange are legally considered *securities*, while futures and options on futures are considered commodities. Securities exchanges, such as the Chicago Board Options Exchange (CBOE), Philadelphia Stock Exchange, and American Stock Exchange thus list for trading products such as options on individual stocks, options on cash equity indexes, and options on foreign currency. Commodity exchanges, which we have called futures exchanges, allow trading in futures contracts and options on futures contracts.

Although organized financial exchanges are clearly participants in exchange-traded derivatives activity, it is incorrect to view them as analogous to PND "dealers." Exchanges do maintain the trading environment in which prices are formed, but they merely quote prices discovered by traders. The exchanges themselves do not participate directly in the process of price formation.

(b) Commodities Exchange Participants

Participation in trading and price formation on commodity/futures exchanges is limited to exchange members. To become an exchange member, a firm or individual must purchase a "seat" on an exchange, which entitles the member to perform certain trading functions. Seats are continuously available for sale, but the number of seats on an exchange rarely changes, so that if a new firm wants to acquire a seat, it must bid one away from a current seat holder. The market for exchange seats tends to be quite competitive, and many firms hold more than one membership at any time.

Most exchanges have several types of seats or memberships. Some exchanges separate membership types based on products. The CBOT, for example, has a full membership entitling its holder to trade all CBOT futures and futures options. [35] Other CBOT memberships, which include associate, GIM, IDEM, and COM memberships, allow trading by product. IDEMs may trade index, debt, and metals futures only, for example. Simple trading memberships are generally apportioned to any person or firm that can pay for the seat, pass a credit and legal check, and meet the exchange's minimum capital requirements. Benefits of an exchange membership include direct access to the trading environment (i.e., the price formation process) and reduced trading fees.

Exchanges may also delineate membership types based on the firm or individual's status in the clearinghouse of the exchange. A "clearing member" of a futures exchange provides capital to back the clearinghouse in return for reduced clearing fees. The net fees for clearing members are thus lower than for non-clearing members, but clearing members face stricter capital requirements.

Delineations of exchange memberships as clearing or non-clearing or by product are not mutually exclusive. The CME, for example, has three types of product-based memberships: full membership, to trade all products; International Monetary Market (IMM) membership, to trade financial futures and options only; and Index and Options Market (IOM) membership, to trade all index futures and futures options. The CME also has clearing and non-clearing members. Indeed, for a firm to be a clearing member of the CME, it must hold two of each type of regular membership (full CME, IMM, and IOM).

Futures exchange members and clearing members may trade for their own account, for the account of another member, or for the account of an outside customer. A single firm need not be limited to any one particular use of a futures exchange. A firm might execute one transaction for an outside customer, followed immediately by a transaction made for its own account.

In practice, participants on futures exchanges do tend to exhibit some degree of specialization. Many firms trade solely for their own account, either to facilitate their hedging activities, to speculate, or to generate fee income by acting in a pseudo-dealer capacity. "Dealers" of this variety are quite unlike PND dealers, however. Whereas a PND dealer typically runs a matched book of long-dated transactions to supply liquidity to the marketplace, an organized futures exchange "market maker" is often called a "scalper," because she essentially takes a short-term speculative position in the market in hopes of profiting from *intraday* price disparities. Scalpers rarely have open positions on their books when the market closes, but their intraday speculation does greatly enhance the liquidity of the marketplace.

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[35] The CBOT and CBOE have no formal ties today. When the CBOE was opened, however, it was started by a group of CBOT members, and the primary reason it was formed as a separate exchange was regulatory. But the early affiliation resulted in a right held by CBOT members to walk onto the floor of the CBOE and trade *without* a separate CBOE membership. CBOT full members still hold that right.

Futures exchange participants that execute transactions for non-member customers are called futures commission merchants, or "FCMs." FCMs are the futures industry's version of securities broker/dealers and may be either clearing or non-clearing members of a futures exchange. FCMs essentially act as brokers for outside customers, who are also participants in derivatives activity. Being neither clearing nor exchange members, outside customers face higher transaction costs, but they nonetheless are "end users" of exchange-traded derivatives.

(c) Securities Exchange Participants

As with commodities exchanges, direct participation in the price formation process on securities exchanges is limited to members. The primary difference in participants on commodities and securities exchanges is the role played by the "market maker." [36] As noted above, *any* member on an organized futures exchange may function as a market maker by supplying liquidity to the marketplace at any given time. But *no* trader on a futures exchange is *obligated* to supply liquidity to the trading environment, and no trader is the "designated" specialist in a futures contract.

Securities exchanges often have a classification of membership called "market maker." One or several market makers on a securities exchange are obligated by exchange rules to stand ready to buy *or* sell the listed contract at any time for a fair price, given demand for transactions by members. Market makers can benefit from this privilege by earning profits on the bid-ask spread, but they in turn are generally expected to sell into a rising market and buy in a declining one. Capital requirements on market makers thus generally are high.

All non-member customer trades on securities exchanges go through a broker/dealer member of the exchange, who in turn executes all trades through a market maker.

B. The Size and Growth of Derivatives Activity

(1) Measurement Controversies

Measuring the size and growth of derivatives activity is very difficult for several reasons. Not the least important is the basic disagreement about what to measure. For exchange-traded derivatives, most would agree that "volume" and "open interest" are the standard proxies for the size and growth of these financial contracts. Volume is a measure of contracts traded, and open interest measures the number of contracts outstanding. But measures of PND activity are problematic, largely because PNDs are negotiated at the opaque end of the Merton/Ross financial intermediation spectrum. Minimal centralized disclosure and reporting are required, and most aggregate data are based on voluntary participation in surveys. Data on prices for PND

[36] Even across securities exchanges, the concept of a "market maker" differs. We do not discuss, moreover, those securities exchanges, such as the New York Stock Exchange, that do not list actively traded derivatives.

transactions, for example, are virtually nonexistent, because by their nature PNDs are customized and bilateral. Data are reported on the more standard, plain vanilla varieties of PNDs such as LIBOR rate swaps and currency swaps, but the absence of standard conventions for products such as equity and commodity swaps makes quotation and data access nearly impossible. [37]

Data routinely are reported that provide some information on PND activity. Three popular measures are notional principal amounts, "replacement costs," and volume. Notional principal is simply the total principal amount outstanding on PNDs of a particular variety. Recall, however, that although some products such as currency swaps have principal that actually is exchanged, many products such as rate swaps do not—hence, the term notional. The notional amount underlying a swap reveals *nothing* about the capital actually at risk in that transaction. If one party to a swap agrees to pay 5 percent of a $100 million notional amount while the other party pays LIBOR as a percentage of $100 million, using $100 million as a measure of the "value" of the swap is of little practical relevance. In most cases, the cash flows actually exchanged are at least an order of magnitude smaller than the notional principal amount. And that is *before* the risk-reducing effects of bilateral netting and credit enhancements are considered.

An alternative sometimes used for reporting the extent of a firm's derivatives activity is "replacement cost," or the current mark-to-market value of its swap contracts. The replacement cost of a particular transaction is simply the discounted present value of expected future net cash flows. Replacement cost thus measures capital at risk on the same order of magnitude as netted settlement payments.

Finally, volume is a useful measure of activity in PNDs. For the same reason that price data are scant, volume data are equally difficult to aggregate for opaque, customized PND contracts. Some information is available on new swap contracts negotiated, however, which serves as the closest available analogue to the volume data reported for exchange-traded derivatives.

(2) Data Sources

Derivatives activity can be tracked on a regular or semi-regular basis through several sources. Exchange-traded derivatives data are maintained and distributed primarily by the exchanges themselves. Aggregate market data are also compiled by the Futures Industry Association, as well as price reporters such as Knight Ridder.

For PND activity, perhaps the most regular and reliable source of cross-sectional information is contained in quarterly ISDA surveys, administered and compiled by Arthur

[37] One problem resulting from the lack of centralized price data in PNDs is that dealers and users often employ different assumptions for risk management and valuation. In an effort to promote more uniformity in risk management, J.P. Morgan & Co. recently introduced the RiskMetrics™ database. Free of charge, this database is a collection of volatilities and correlations on most risk factors that commonly affect derivatives, but the prices of derivatives themselves are still hard to obtain.

Andersen & Co. As with virtually all data on PNDs relating to aggregate activity, the ISDA/Andersen surveys are entirely dependent on firms' voluntary responses to surveys. Neither full participation nor full disclosure is ensured. Surveys on commodity and equity derivatives, for example, historically have had a lower response rates than surveys on rate and currency swap activity.

In addition to the ISDA/Andersen surveys, several publications collect and report data on PNDs. *Swaps Monitor* newsletter, for example, publishes an annual report of PND activity based largely on information contained in SEC 10(k) filings and additional, voluntary disclosures. Sporadic surveys of derivatives activity are also conducted by other accounting firms (e.g., Price Waterhouse) and private organizations (e.g., The Group of Thirty).

Finally, mandatory regulatory disclosures provide some limited source of information on derivatives activity. Aggregate notional positions are required in reports, for example, filed by banking institutions to the Federal Reserve in call reports (RC-L) and bank holding company reports (Y-9).

(3) A Snapshot of Size and Growth

(a) Exchange-Traded Derivatives

For exchange-traded derivatives including futures and options on futures, Figure 11 shows annual volume on U.S. futures exchanges from 1972 to 1994. Note that options on securities are not reflected in these aggregates. Table 1 provides the breakdown of 1994 annual volume by product type. It shows that interest rate products are by far the most popular form of exchange-traded derivatives contract.

Table 1: 1994 Total Annual Volume, U.S. Futures and Futures Options

Type of Underlying	Number of Contracts Traded
Interest Rates	314,727,875
Equity Indexes	145,405,519
Agricultural Commodities	69,560,443
Energy Products	57,142,180
Foreign Exchange	49,491,268
Precious Metals	18,708,782
Non-Precious Metals	2,922,133
Other	514,067
TOTAL	658,472,267

SOURCE: Futures Industry Association

Table 2 shows that the total number of contracts traded on U.S. exchanges, which were once virtually unchallenged in the international arena, has now fallen behind foreign exchanges.

Table 2: Total Futures and Futures Options Traded by Region

	Millions of Contracts Traded		Change	
	1993	1994	Percent	Contracts (Millions)
U.S.	521.7	658.5	26.2	136.8
Abroad	538.3	776.8	44.3	238.5
TOTAL	1,060.0	1,435.3	35.4	375.3

SOURCE: Futures Industry Association

Table 3 establishes that futures remain far more actively traded on aggregate than futures options.

Table 3: Global Exchange-Traded Derivatives Volume

	Millions of Contracts Traded		Change	
	1993	1994	Percent	Contracts (Millions)
Futures	767.4	1,063.2	38.5	295.8
Futures Options	292.6	372.1	27.2	79.5
TOTAL	1,060.0	1,435.3	35.4	375.3

SOURCE: Futures Industry Association

Table 4 shows the top 10 global futures contracts in 1994 by volume, again confirming the popularity of interest rate products.

Table 4: Top Ten Global Futures Contracts (by 1994 Volume)

Rank	Product	Exchange	Contracts (Millions)
1	3-mo. Eurodollars	CME	104.8
2	U.S. Treasury Bonds	CBOT	100.0
3	French Notional Bond	MATIF (France)	50.2
4	U.S. Dollar	BM&F (Brazil)	39.2
5	3-mo. Euroyen	TIFFE (Japan)	37.4
6	German Bund	LIFFE (London)	37.3
7	3-mo. EuroDmark	LIFFE	29.3
8	"Interest Rate"	BM&F	28.5
9	IBEX 35	MEFF (Spain)	27.0
10	Light, Sweet Crude Oil	NYMEX (U.S.)	26.8

SOURCE: Futures Industry Association

Finally, Table 5 presents the 10 most active global exchanges (by 1994 volume).

Table 5: Top Ten Global Futures and Options Exchanges (by 1994 Volume)

Rank	Exchange	Contracts (Millions)
1	Chicago Board of Trade (CBOT)	219.5
2	Chicago Mercantile Exchange (CME)	205.2
3	London International Financial Futures Exchange (LIFFE)	148.7
4	Chicago Board Options Exchange (CBOE)	115.0
5	BM&F (Brazil)	103.0
6	MATIF (France)	93.4
7	New York Mercantile Exchange	78.7
8	DTB (Germany)	49.3
9	London Metals Exchange	47.7
10	TIFFE (Japan)	38.0

SOURCE: Futures Industry Association

(b) Privately Negotiated Derivatives

Table 6 shows several different estimates of PND activity by product type. Depending on the source and products included, the notional amounts reported for derivatives activity vary widely. All sources, however, agree that interest rate and currency derivatives represent the largest segment of PND activity, whereas equity and commodity derivatives have a smaller showing. (This may be due to the under-reporting of the latter groups noted earlier.)

Table 6: Notional Amounts ($ billions) of Privately Negotiated Derivatives Outstanding

Source (# reporting)	Year	Total PNDs	Interest Rate	Currency	Equity & Commodity	Other
Swaps Monitor (50 Dealers)	1992	$25,985	$10,844	$9,757	$874	$4,510
Swaps Monitor (1,139 Firms)	1992	$15,541	$5,115	$5,675	n/a	$3,661
Federal Reserve (n/a)	1991	$7,446	$3,836	$3,472	$138	$0
Federal Reserve (n/a)	1992	$8,789	$4,892	$3,783	$114	$0
GAO (875 Firms)	1991	$24,708	$10,752	$9,537	$678	$3,741

SOURCE: GAO (1994)

Table 7 shows a breakdown of total derivatives by dealer. Dealers are ranked according to the notional value of their total positions. In general, swap dealers are dominated by U.S. commercial banks and overseas banks, which is not surprising in light of our previous discussion of the expected characteristics of a competitive PND derivatives dealer.

Table 7: Top Ten Global Dealers in Privately Negotiated Derivatives, 1993

Rank	Firm	Notional Outstanding ($ Millions)
1	Chemical Bank	$2,479,271
2	Citicorp	$1,975,190
3	Bankers Trust	$1,903,784
4	Societe Generale	$1,824,483
5	J.P. Morgan	$1,651,063
6	Union Bank of Switzerland	$1,559,469
7	Mitsubishi Bank	$1,559,280
8	Swiss Bank	$1,477,400
9	Hongkong Shanghai Bank Corp. Holdings	$1,233,989
10	Paribas	$1,136,509

SOURCE: *The World's Major Derivatives Dealers*, Swaps Monitor Publications, Inc. (1994)

Table 8 gives a slightly different perspective of PND activity. In that table, the net replacement cost is given for all derivatives positions of 125 dealers surveyed as of June 30, 1994.

Table 8: 1994 Dealer Replacement Costs for PNDs

Total Replacement Cost of All Derivatives	Number of Responding Dealers
Less than $10 million	16
$10 million - $300 million	21
$300 million - $2 billion	28
Over $2 billion	28
No Response	32
Total Number of Firms Surveyed	125
Average Replacement Cost	$6 billion
Median Replacement Cost	$0.5 billion

SOURCE: The Group of Thirty (1994)

As the difference in the average and median replacement cost indicates in Table 8, the largest exposures are concentrated among a few dealers. Even then, the numbers in Table 8 give a much better perspective on capital at risk in PNDs. They are much smaller than the notional amounts shown in Tables 6 and 7.

Finally, Table 9 shows the "volume" and "open interest" of PNDs negotiated by the 125 surveyed dealers for the *first half* of 1994 (between January 1 and June 30). In comparing these figures to the corresponding aggregates in exchange-traded derivatives, it is important to keep in mind that the average *size* of transactions tends to be much larger for PNDs than for exchange-traded contracts.

Table 9: Number of New Derivatives Privately Negotiated and Outstanding at 125 Dealers

Contract Type	# New Transactions, 1/1/94 - 6/30/94	# Contracts Outstanding, 6/30/94
Interest Rate	439,250	1,036,750
Currency	1,595,125	805,250
Equity	1,069,000	259,875
Commodity	28,375	28,375
Multi-Asset	1,625	3,500
TOTAL	3,133,375	2,133,750

SOURCE: The Group of Thirty (1994)

V. THE USES AND BENEFITS OF DERIVATIVES

Thus far, we have explored only what derivatives are and how privately negotiated and exchange-traded derivatives evolved. We have yet to actually see how derivatives can benefit the institutions that use them.

Because of the functional similarities between exchange-traded and privately negotiated derivatives, most of the benefits to their participants are the same. This similarity in the beneficial uses of derivatives, however, does not imply that exchange-traded and privately negotiated derivatives are equally beneficial to all firms. The desire for customization, for example, could easily drive a firm to PNDs instead of exchange-traded derivatives. The underlying economic rationale for using derivatives, however, is generally the same for users of all derivatives. We thus do not differentiate between privately negotiated and exchange-traded derivatives in most of this section.

A. Benefits to PND Dealers

There are several obvious benefits to dealing in PNDs. First, fee income is generated whenever a dealer acts as an agent rather than a principal in a transaction. "Matching trades" allows dealers to make profits by essentially fulfilling a brokerage capacity and earning bid-offer spreads. Dealers also sometimes earn transaction fees from structuring complex products.

Second, dealers can benefit from positive clientele effects. Good reputations and competitive pricing over time will result in repeat business that benefits dealers. A related benefit is that dealers can use dealing as part of a tie-in sale. Suppose, for example, an end user brings commercial bank Dealer A its derivatives business, such that Dealer A always acts as the firm's FCM and PND derivatives counterparty (albeit still as an agent in the latter). The end user may later decide to give Dealer A its business as a commercial bank, as well. But by then, Dealer A has gathered a great deal of information about the firm. Utilizing this "economy of scope" in information acquisition, Dealer A can offer *combined* derivatives dealing and commercial banking services to the firm at a lower marginal cost than if the two services were sold separately by that or any other dealer. Although the size of the economies of scope in banking are subject to dispute, the success of existing financial intermediaries (e.g., banks and investment banks) as derivatives dealers attests to their presence.

Finally, even if economies of scope are not present, PND dealers can derive revenues from "add-on" services, such as risk management consulting services, which are provided as a related but extended dealing function.

B. Benefits to End Users [38]

End users of exchange-traded and privately negotiated derivatives include commercial and investment banks, thrifts, financial corporations (e.g., insurance and finance companies), non-financial corporations (e.g., airlines and manufacturing firms), institutional investors (e.g., pension funds), and specialized trading firms. Corporations use derivatives in a variety of ways, some of which are explained below.

First, corporations benefit from derivatives through lower funding costs. A U.S. corporation, for example, might borrow 75 million Deutsche marks in German capital markets, then use a currency swap to convert the Deutsche mark currency exposure to a U.S. dollar exposure. The final result could be a lower cost of funds in U.S. dollars than if the firm had sought direct financing in U.S. capital markets. Though an apparent "arbitrage" opportunity, international differences in taxation, regulation, and controls on capital often make these types of transactions *persistently* advantageous to some firms.

Second, derivatives allow firms to diversify their funding sources. A firm might raise capital in one market and then swap its cash flows into the currency of another market in order to diversify its creditor base. Corporations also can diversify the currency exposure of their liabilities in this manner. In today's global capital market, currency and interest rate swaps give firms the ability to borrow in the cheapest capital market, domestic or foreign, without regard either to the currency in which the debt is denominated or the nature of the interest payment. Suppose, for example, Firm Leamas is a U.S.-based firm with a large plant in Mexico. Firm Leamas might be able to reduce the costs of funding its Mexican plant by borrowing in pesos and swapping its pesos back into U.S. dollars using a peso-dollar currency swap.

Third, derivatives allow corporate institutional investors, such as pension plans, to enhance asset yields. In cases where securities trade poorly because of some undesirable feature, derivatives can be used to neutralize that feature, for example, by creating a synthetic instrument with a higher yield than a traditional instrument of the same credit quality. Asset swaps, for example, are swaps that allow firms to swap illiquid securities for similar cash flows with the same probability of default but greater liquidity.

Fourth, derivatives allow firms to expand their primary lines of business or diversify into new product and service lines. A trucking company in the primary business of supplying transportation services to a regional market might choose to expand nationally only if it can ensure that it has access to diesel fuel over time. The trucking company may choose to offset some of its price risks by using derivatives, such as entering a commodity swap to receive deliveries of diesel fuel over time at fixed prices or make (or receive) cash payments based on a floating price of diesel fuel relative to the fixed price. In this sense, the company's decision to

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[38] The next several sections draw heavily from Christopher L. Culp and Robert J. Mackay, "Regulating Derivatives: The Current System and Proposed Changes," *Regulation* 4 (1994), and Christopher L. Culp and Robert J. Mackay, "Managing Derivatives Risk: a Strategic Guide." In *Handbook of Business Strategy* (New York: Faulkner & Gray, 1995).

expand is made jointly with its decision to hedge its fuel costs using the commodity swap.

Fifth, corporations may use derivatives to manage the risks of *anticipated* expansions or business investments. A corporation that has trouble borrowing for research and development, for example, may hedge various risk exposures by using derivatives to ensure that enough cash is available to exploit future profitable investment opportunities. By reducing the variance of the firms's net cash flows, hedging can sometimes help ensure that the company has sufficient cash to make positive net present value investments.

Sixth, derivatives provide an efficient method for all types of corporations to better manage the exposures to interest rate and currency risk that result from existing primary business lines. Interest rate swaps, for example, help banks of all sizes to manage better the asset/liability mismatches inherent in funding long-term assets, such as mortgages, with short-term liabilities that reprice more frequently, such as certificates of deposit. Currency forwards, options, and swaps help importers, exporters, and multinational corporations better to manage the foreign exchange risk inherent in their ordinary business operations.

Seventh, many institutions engage in derivatives transactions not to manage risks but rather to increase their profits, thus making derivatives a part of a firm's primary line of business. Small regional banks offering equity-linked certificates of deposit, for example, generally hedge the equity price risk and thereby seek only to generate fee income. Firms may also enter into derivatives to exploit perceived profit opportunities resulting from better information. When a firm "has a view" on the direction or volatility of asset prices or interest rates, it may use derivatives to exploit that view while still reducing its overall capital at risk.

Finally, derivatives provide a low-cost and effective means for both corporations and institutional investors to efficiently manage their portfolios of assets and liabilities. A fully-invested equity fund, for example, can reduce its market exposure quickly and cheaply by using futures on stock indexes instead of selling off that part of its cash equity assets that comprises the index. Corporate borrowers can also effectively manage their liability structure—fixed/floating debt ratio and currency composition—by using interest rate and currency swaps and futures.

Not all corporations find the various potential benefits of derivatives equally appealing. A firm using derivatives to reduce the expected costs of financial distress, for example, would be unlikely also to find the inventory management use of derivatives appealing. The latter use of derivatives, although beneficial to many firms, does not necessarily reduce the volatility of a firm's value or of its cash flows, both of which may be important for a financially distressed firm. In any event, a significant number of firms and organizations find that at least one of the above benefits applies to them.

C. Benefits for the Economy

The innovation and growth in derivatives activity also has yielded substantial benefits to

the U.S. economy. By facilitating the access of U.S. corporations to international capital markets and enabling these organizations to lower their cost of funds and diversify their funding sources, derivatives have improved the competitive position of U.S. firms in an increasingly competitive, global economy. U.S. firms have also gained access to new and more effective tools to manage their exposures to interest rates, foreign exchange rates, and commodity prices. Derivatives thus have reduced the likelihood of financial distress due to volatile prices and interest rates.

By providing investors and issuers with a wider array of tools for managing risks and raising capital, moreover, derivatives improve the allocation of credit and the sharing of risk in the economy. That lowers the cost of capital formation and stimulates economic growth.

Finally, because world markets for trade and finance have become increasingly integrated and accessible, derivatives strengthen important linkages between markets, increase market liquidity, and improve market pricing efficiency.

VI. THE RISKS OF DERIVATIVES

The risks to users of derivatives are neither new nor unique. They are the same types of risks that banks, securities firms, and most non-financial corporations face in their traditional businesses.

In the 1993 report of The Group of Thirty's Global Derivatives Study Group, the risks of derivatives were identified. Richard Miller of Katten, Muchin & Zavis has catalogued these risks with the tongue-in-cheek mnemonic "IS MORC ILL?" [39] Each concept, the first letters of which form the mnemonic, are described in sections A-I below.

A. Interconnection Risk

The interconnection risk of a derivatives contract arises from its combination with other derivatives transactions, assets, or liabilities. Interconnection risk is thus a concept defined for *aggregate* risks. It arises because of the manner in which asset and liability values can move together over time.

Suppose a firm enters a forward contract to purchase Swiss francs with U.S. dollars one year hence and simultaneously enters a forward contract to sell Deutsche marks for U.S. dollars one year hence. The firm may initially estimate the correlation of the Dmark/dollar and Swiss franc/dollar exchange rates to be relatively high, thus making the relation in the values of the two forward contracts relatively stable. The firm faces an interconnection risk that the correlation between the Dmark/dollar and Swiss franc/dollar exchange rates will change dramatically, thus affecting the risk of the transaction.

In practice, interconnection risk is most pronounced at times of significant market volatility. Stated differently, historically reliable correlations between assets tend to break down when estimates of those correlations are most important.

Interconnection risk, it should be noted, can also arise in an institution that has *no* derivatives exposures at all. Take a typical thrift that funds long-dated, adjustable-rate mortgages by accepting short-dated certificates of deposit. If the term structure of interest rates rises in a "parallel" fashion, so that long rates and short rates rise by the same amount, the thrift continues to earn the same "spread" between long and short rates that it earned before the rate risk. But suppose long rates *fall* when short interest rates rise. The thrift is then paying more on its CDS and receiving less on its mortgages. This risk arose due to the "interconnection" of the firm's assets and liabilities—i.e., the imperfect correlation in interest rate changes at different maturities. And derivatives were not involved.

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[39] Richard A. Miller, "Risk in a Nutshell: 'Is Morc Ill?'" *Futures International Law Letter* 14(5-6) (July/August 1994).

B. Systemic Risk

An ill-defined source of risk associated with derivatives is "systemic risk," which is a type of interconnection risk *across institutions.* To the extent there is any definition of this slippery concept, it is well-summarized by Professor E.P. Davis as "a disturbance in financial markets which entails unanticipated changes in prices and quantities in credit or asset markets, which lead to a danger or failure of financial firms, and which in turn threatens to spread so as to disrupt the payments mechanism and capacity of the financial system to allocate capital." [40]

Derivatives are thought by some to increase potential systemic risk in several ways. [41] First, some believe that derivatives increase the likelihood that a major participant in financial and capital markets will experience a default. Second, if a default by a major participant occurs, many believe that derivatives will increase the speed and manner by which the "shock waves" of one failure spread across other institutions. Third, derivatives are sometimes believed to serve as magnifying glasses for shocks, so that small financial shocks in one market become larger shocks in other markets because of derivatives. Finally, derivatives are often thought to have increased the volatility of the asset(s) underlying derivatives contracts.

Evidence supporting these claims is lacking, and we will return to this issue later. [42]

C. Market Risk

Market risk is the risk that changes in market prices will adversely affect the value of a contract, asset, or portfolio. A common form of market risk is known as "interest rate risk," or the risk that the balance sheet assets, liabilities, and off-balance sheet items of a firm—including its derivatives—will change in value as interest rates change.

Market risk generally is classified by using a colorful argot known as "fraternity row." Trade practitioners and academics alike tend to refer to five types of market risk by using Greek or Greek-sounding letters.

"Delta" is the risk that the value of a contract or asset will deteriorate as the price or value of the underlying changes. When interest rates rise, for example, bond prices fall. A forward sale agreement for oil has the delta risk that oil prices will rise over the life of the contract.

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[40] E.P. Davis, *Debt, Financial Fragility, and Systemic Risk* (Oxford: Clarendon Press, 1992), p.117.

[41] *Cf.* Robert J. Mackay, "Derivatives and Systemic Risk: Issues, Views, and Analysis," presented before "Banking, Financial Markets and Systemic Risk," Office of the Comptroller of the Currency, Washington, D.C. (December 2, 1994).

[42] *Id. See also* Culp and Mackay (1994), *op. cit.*

"Gamma" is the risk that *delta* will change when the value of the underlying asset changes. It is sometimes referred to as "convexity risk" or "rate of change" risk. Returning to the bond example, bond prices fall as interest rates rise, but the amount of the price change depends on the *level* of interest rates. Large interest rate increases may cause larger bond-price declines than small interest rate increases.

For most forwards and for many forward-like derivatives, there is no gamma risk. Underlying price changes result in a one-for-one change in the value of the contract itself. But for virtually all options and contracts with option-like exposure (including many structured securities), gamma risk can be significant.

The risk that volatility changes in the underlying asset will cause a derivatives contract to change in value goes by many names. "Vega," "lambda," "kappa," and "tau" are among them. For purchased options, *declines* in volatility pose the risk. Less volatility means there is a smaller chance that the option held will move into the money. For options written, the opposite is true. Derivatives with embedded options are also susceptible to vega risk.

"Theta" measures the risk to an asset or contract due only to the passage of time. Because options literally represent options to buy or sell products, they are assets that "decay" or "waste" over time. For every day that passes on an unexercised option, there is one less day for the option to become valuable and be exercised. Theta generally is quite predictable and, if measured properly, does not pose a significant source of uncertainty for firms. No matter how it is measured or changes over time, however, time decay can impose real losses on users of derivatives.

Finally, "rho" is the risk that the discount rates which are used to discount future cash flows in present value calculations will change and impose unexpected losses on the firm. For many derivatives contracts, the discount rate is the borrowing or lending rate that corresponds to the maturity of the contract. For other contracts, such as swaps, a term structure of interest rates is used to discount cash flows, and hence any shifts in the level of any of several interest rates may affect cash flows. Discount rate changes are generally less important to the value of a derivatives contract than changes in other risk factors, but they are nonetheless important. [43]

Market risk also includes a type of risk The Group of Thirty calls "market liquidity" risk, or the risk that volatile markets will inhibit the liquidation of losing transactions and/or the establishment of new transactions to hedge existing market risk exposures. [44] Suppose a firm has a forward contract to purchase British pounds for Deutsche marks three months hence. If the British pound experiences a massive and rapid depreciation *vis à vis* the Dmark—as happened in September 1992 when the European Monetary System's exchange rate mechanism collapsed—the

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[43] *Cf.* Christopher L. Culp and Merton H. Miller, "Auditing the Auditors," *Risk* 8(4) (April 1995).

[44] Global Derivatives Study Group, *op. cit.*

forward contract will rapidly decline in value. If the forward contract is unhedged or the counterparty to the contract used to hedge the position defaults, volatility may be so high that a new hedge cannot be initiated, even using liquid exchange-traded futures on pounds and Dmarks. The firm's market risk is thus exacerbated by market liquidity risk.

Finally, market risk includes correlation risk, or the risk of an unexpected change in the correlation of two factors affecting the value of a derivatives contract. We must be careful here to distinguish between "basis risk," or correlation risk arising from the combination of a derivatives contract with another asset or portfolio, and correlation risk affecting a single asset held in isolation *or* in a portfolio.

The term "basis risk" comes from the term basis, which is usually defined as the difference in price between a derivatives contract and the current spot price. The oil futures basis, for example, is the difference between the current price of an oil futures contract and the current oil spot price. In equilibrium, a derivatives basis is equal to the marginal "cost of carrying" the asset underlying the derivatives contract to the maturity date of the derivatives transaction. In the oil example, the oil futures basis is thus the marginal expected cost of storing oil and the interest cost of oil storage *less* the marginal expected benefit of holding physical oil, which the holder of a futures contract foregoes. [45] To take another example, the basis of a foreign exchange futures contract is the domestic interest rate less the foreign interest rate, because the former would be earned and the latter foregone if the spot currency were "stored" over time and *then* exchanged for the foreign currency.

We treat basis risk as a form of *interconnection* risk, not market risk. [46] The risk that the value of a forward or futures contract is imperfectly correlated with the value of its underlying is a real risk to a firm only when the derivatives contract is actually used to hedge the underlying asset. Continuing with our examples, the basis risk of an oil futures contract only matters if the futures contract is used to hedge oil purchases or sales. If the oil futures contract is held in isolation, basis risk is then just one of several determinants of the market risk of the contract—then defined as the risk that the *futures price* will change unexpectedly. [47]

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[45] *Cf.* Williams, *op. cit.*, and Culp and Miller, "Metallgesellschaft and the Economics of Synthetic Storage," *op. cit.*

[46] Others quarrel with this definition and treat basis and other correlation risks as forms of market risk. (*Cf.* Global Derivatives Study Group, *op. cit.*) As long as we are clear, the distinction is totally semantic.

[47] Those familiar with finance theory will realize that all risks can be classified as either "idiosyncratic" or "systematic," where the former are risks to a specific asset and the latter are risk factors that affect *all assets*. In that sense, we could view the value of a derivatives contract, the value of its underlying, *and* the value of the basis as a combination of systematic and idiosyncratic risk factors. The Capital Asset Pricing Model, for example, supposes that the expected return on *all* assets is a linear function of the expected return on the market portfolio. *Either* the change in the value of a derivatives contract *or* the change in the value of its underlying would thus be a function of the change in the value of the market portfolio, with the idiosyncratic component of either asset being fully diversifiable. We have avoided this level of abstraction because it assumes some familiarity with the theory of capital asset valuation. *Cf.* Sudipto Bhattacharya and George M. Constantinides, eds., *Theory of Valuation* (Savage, Md.: Rowman & Littlefield

Some derivatives do exhibit correlation risks inherently. "Quanto options," for example, are options on foreign equity indexes whose value is translated from the foreign currency into the home currency at a fixed rate. Unexpected changes in the correlation between the exchange rate and equity index will thus affect the value of the option, whether the option is held in a portfolio or alone. In that sense, quanto options exhibit a correlation risk as a component of their market risk, *not* inter-connection risk.

D. Operational Risk

Operational risk is the risk that failures in computer systems, internal supervision and control, or events such as natural disasters will impose unexpected losses on a firm's derivatives positions. Consider a firm that enters into a variety of customized PNDs governed by non-standard contracts rather than master agreements. If the firm has a fire and its documentation is destroyed, its portfolio might literally become unidentifiable in a matter of minutes. As with other risks, this example of operational risk is no less true for derivatives than for a bank whose loan documentation is destroyed.

Other aspects of operational risk important for derivatives users to consider relate to personnel quality and internal controls. Firms should ensure, for example, that processes and procedures are in place to guard against fraud or irresponsible trading activities by employees. Complex valuation systems for derivatives can be manipulated if a trader changes the market inputs at which a portfolio is valued. If a trader perpetrates a fraud and covers it in this manner, a firm can lose substantial amounts of money. The greater complexity of derivatives makes auditing their use more difficult, but the actual cause of fraud is personnel, not the activities in which the firm is engaged.

Operational risk need not result only from fraud. Consider a mutual fund that wishes to protect itself against a declining value in the S&P 500 stock index. The fund might simply purchase S&P 500 put options. Or the firm might engage in "dynamic hedging," in which it adjusts the number of long futures it holds depending on current price levels. As prices rise and the futures become unnecessary, the fund would decrease its futures holdings—eventually toward zero. As prices fall and the futures become important for reducing the fund's S&P 500 exposure, long futures are added to the fund until the 100 percent hedge level finally is reached.

Dynamic strategies can give rise to operational risks that the put purchase would not have. In the former, the position must be continuously rebalanced so the fund is neither "over-" nor "under-hedged" given current prices and the specific risk management objectives of the firm. The complexity of administering this strategy makes it far more susceptible to human error. If such human error results in the fund being unhedged, it can give rise to market liquidity risk. Even with competent and honest employees, complex *strategies* (as opposed to contracts) create

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Publishers, Inc., 1989).

opportunities for more things to go wrong.

E. Regulatory Risk [48]

Regulatory risk is the risk that actions taken by regulators will impose *new* costs and risks on market participants. By their very nature, derivatives contracts are highly specific, customized products. In contrast, statutory regulations are general and inflexible. Forcing the regulation of financial innovation into an inflexible statutory and administrative law infrastructure in which regulators must operate is rather like instructing a child to insert a square peg into a round hole. Despite the futility, an obedient child will try to make the peg fit, often with disastrous consequences for the peg. [49]

Regulatory risk can take two forms. First, "procedural" regulatory risk is the risk that legal uncertainties and financial losses will result from ill-conceived and costly changes to statutory or administrative regulations. Congressional actions precipitate the first, and unilateral regulatory actions the latter.

The second type of regulatory risk is "judgmental" regulatory risk. This risk stems from inadequately informed examiners and regulatory auditors who attempt to review the derivatives activities of a firm based on incomplete information. Very complex, dynamic trading strategies can be difficult to explain to examiners in a short period of time. Examiners may be likely to draw conclusions based on conservatism, thereby resulting in actions taken to discourage the use of such complex programs. Similarly, examiners and regulatory auditors may not possess the quantitative skills necessary to evaluate the mathematical models used by firms for risk management.

People are not the real source of regulatory risk. Misplaced incentives are the problem. Unfortunately, absent corrections to those incentives in the *political* sphere, regulatory risk is a risk against which firms cannot hedge.

F. Credit Risk

One of the most important risks facing users of PNDs in particular is credit risk, or the

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[48] Richard Miller, *op. cit.*, defines the "R" as reputational risk, or, in his words, "the risk that a dealer might lose a client, or its ability to compete effectively for new clients, due to perceptions that the dealer does not deal fairly with clients or that it does not know how to properly manage derivatives." (p.3) We consider this not as a risk, but rather a disciplining mechanism of the marketplace (assuming that fraudulent misrepresentations about firms will be rectified by the legal system). Miller, *op. cit.*, subsumes regulatory risk into his definition of legal risk.

[49] This paragraph first appeared in Christopher L. Culp and Steve H. Hanke, "Pummeling Derivatives," *The International Economy: The Magazine of the G7 Council* 8(5) (September/October 1994).

risk that a loss will be incurred because a counterparty fails to make the payments or deliveries due on a derivatives contract. Credit risk in derivatives is quite different from the credit risk for positive net supply assets, *including* structured securities. Credit risk on positive net supply assets such as securities or loans is "one-sided." Although market movements may cause the amount one party owes the other to change over time, *only the creditor can default* on a positive net supply asset.

Credit risk on zero net supply derivatives, by contrast, can be either one-sided or "two-sided." The latter implies that one party may be *either* a debtor *or* a creditor at any time over the life of the transaction depending on market movements. Options are derivatives with one-sided credit risk. Once the purchaser of a call or put has paid the premium, the option *writer* stands to lose nothing if the purchaser of the option subsequently defaults, regardless of market movements. By contrast, the option purchaser faces the risk that the option writer defaults on an in-the-money option. The option purchaser thus bears all the credit risk on an option contract.

Derivatives with two-sided credit risk include all forward and forward-based derivatives, such as swaps, futures, and forwards. Consider a plain vanilla interest rate swap in which Bank Valjean agrees to pay Bank Javert a fixed percentage of notional principal semi-annually for five years, in return for which Bank Javert pays to Bank Valjean LIBOR percent of notional. Assume payments on the swap are bilaterally netted. If the fixed rate in the swap is calculated to make the initial discounted expected net present value of the swap zero, an increase in LIBOR immediately after the swap will make Bank Javert a net debtor to Bank Valjean. *Bank Valjean thus bears all the credit risk in the swap after a LIBOR increase*. If, instead, LIBOR had fallen, Bank Valjean would be a net debtor to Bank Javert, and *Bank Javert would bear the full credit risk of the swap at that time*.

Credit risk is a rather complex concept, and, to get the full picture, it helps to view its components separately and in stages. At the first stage, we can separate out two components of credit risk: probability of counterparty default, and credit "exposure." Probability of counterparty default is what it sounds like, whereas credit exposure is the financial loss a firm will experience *if* its counterparty defaults. Credit exposure can then be split into two types: pre-settlement credit exposure and settlement exposure.

(1) Pre-Settlement Exposure

Pre-settlement exposure is the risk that a firm will incur a credit loss before a settlement date on its derivatives contract. Pre-settlement credit exposure is the sum of "current" and "potential" exposure, both of which depend upon movements in the market risk factors underlying the derivatives contract. If two counterparties are bilaterally netting their transactions, aggregate current and potential exposure depend on the market and interconnection risk factors affecting the *net* position.

Current exposure is a firm's credit loss if a counterparty default occurs *today*. Because this exposure is equivalent to the cost of replacing the contract today, current exposure is usually

referred to as the replacement cost of a contract, measured as today's mark-to-market value of the contract. [50] If the non-defaulting counterparty is a *net debtor* to the defaulting counterparty when the default on the contract occurs, the current exposure of the contract to the non-defaulting counterparty is zero.

The second ingredient of pre-settlement credit exposure is "potential exposure," or the exposure that could result if a counterparty defaults on a contract sometime in the future. Even if the non-defaulting counterparty owes nothing if a default occurs today, *future* asset price changes might have reversed the situation and caused the non-defaulting counterparty to become a *net creditor* later in the life of the transaction. *Future expected credit losses* can thus occur when the out-of-the-money derivatives contract defaults *today*, counter-intuitive as it may seem. Potential exposure is quite challenging to measure and generally depends on the fraternity row factors for the asset underlying the derivatives contract, even if the derivatives contract is forward-based. [51]

(2) Settlement Exposure

Some derivatives and capital market transactions exhibit a second type of credit risk known as settlement risk. Same-day settlement risk exists for transactions in which delivery of an asset or security is not synchronized with the payment for that asset or security; the security can be surrendered and payment never received for it. The same risk exists when gross payments or physical assets are exchanged, rather than having the obligation settled by a single netted payment.

(3) An Example of Credit Risk

To understand the distinction between the various concepts of credit risk and exposure, let us take a specific example. Suppose Bank Jeckyll enters into a forward contract to purchase £2 million for US$1 million from Bank Hyde in 30 days and that the spot £/$ exchange rate is 2 when the contract is entered. Suppose this is the only contract between the counterparties. Because the contract is based on foreign exchange, the underlying assets are physical, and, hence, netting does not apply.

Suppose 29 days later the £/$ rate is 1.5. If the rate remains unchanged for another day, Bank Jeckyll stands to make a tidy profit when the contract matures by paying US$1 million and

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[50] This also explains why aggregate replacement cost is a better measure of capital at risk for PNDs outstanding than aggregate notional amounts.

[51] To see why the potential pre-settlement exposure of a forward-based derivatives transaction depends on factors such as volatility, let us take a specific example. Suppose as in the text that Bank Valjean pays fixed and receives floating on a simple LIBOR swap. Its LIBOR exposure is equivalent to a long FRA, or a long exposure to LIBOR movements. But its credit exposure to Bank Javert is *zero* for all values of LIBOR below the current value—i.e., it *owes* and hence is not owed money at those levels of LIBOR. The potential pre-settlement exposure on the simple rate swap thus resembles an at-the-money call option on LIBOR, thereby making its value a function of LIBOR, LIBOR volatility, the discount rate, and time to the next settlement date.

receiving £2 million, now worth US$1.5 million on the open market.

But suppose Bank Hyde becomes insolvent and defaults on its forward sale agreement with Bank Jeckyll one day before the forward contract matures. Assuming the one-day interest rate is zero, Bank Jeckyll incurs an immediate realized credit loss of US$500,000, because that is the *current pre-settlement exposure* of its in-the-money forward contract. [52] Thought of another way, if Bank Jeckyll wanted to replace its contract to purchase U.S. dollars tomorrow, it would do so at the new rate of £1.5/$.

Now suppose instead that Bank Hyde defaults on the forward contract *on the day the contract matures* when the rate is then £1/$. If Bank Hyde defaults *before* Bank Jeckyll remits its U.S. dollar currency payment to Bank Hyde, Bank Jeckyll suffers a realized pre-settlement credit loss of US$1 million, equal to the current exposure or replacement cost of the contract when Bank Hyde defaults. If, however, Bank Jeckyll has *already sent its US$1 million to Bank Hyde* when Bank Hyde defaults, Bank Jeckyll will incur a total credit loss of US$2 million, equal to the US$1 million unrecoverable payment made to Bank Jeckyll *plus* the US$1 million sterling payment that it was owed on the forward contract. This latter case is an example of settlement risk.

Settlement risk is often referred to as Herstatt risk. On June 26, 1974, Bank I.D. Herstatt in Cologne was closed by the German Federal Authority for Credit Institutions. At the time of its failure, Bank Herstatt had engaged in numerous spot and forward foreign exchange transactions. Under foreign exchange market settlement conventions, moreover, foreign exchange transactions can be settled over the course of two business days, so many U.S. financial institutions had remitted payments to Bank Herstatt in anticipation of receiving corresponding foreign currency payments from Bank Herstatt. Exactly as in the example above, those banks lost not only the *net* economic value of their contracts with Bank Herstatt, but they also lost the *gross* value of the contracts because payments had already been remitted. Bank Herstatt, it turned out, had current losses that exceeded the bank's closing capital by more than 500 percent, so many obligors of Bank Herstatt recovered nothing. [53]

Table 10 below summarizes the *actual* credit losses Bank Jeckyll would have incurred under each Bank Hyde default scenario:

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[52] The current exposure is actually the discounted present value of US$500,000, but we ignore discount rates here and in the rest of this example for simplicity.

[53] *Cf.* Jürgen von Hagen, "Herstatt Crisis," in *The New Palgrave Dictionary of Money & Finance*, Peter Newman, Murray Milgate, and John Eatwell, eds. (London: Macmillan, 1990).

Table 10: Realized Credit Losses of Bank Jeckyll

Days to Maturity	Time of Bank Hyde Default	Current Exchange Rate	Actual Credit Loss
1	Before Bank Jeckyll pays	£1.5/$	$500,000
At Maturity	Before Bank Jeckyll pays	£1/$	$1,000,000
At Maturity	After Bank Jeckyll pays	£1/$	$2,000,000

Only one of the rows in Table 10 will constitute an *actual loss* for Bank Jeckyll. But this section is designed to explain credit *risk*, not credit loss scenarios. The challenge for firms is to *anticipate* the above three scenarios. Suppose Bank Jeckyll becomes worried about Bank Hyde on day 29 of the forward contract and wants to set aside capital reserves to cover its potential credit loss. As of day 29, Bank Jeckyll's *current* pre-settlement exposure is US$500,000. But to determine its *potential* pre-settlement exposure, Bank Jeckyll must use some method of forecasting what the exchange rate will be tomorrow. Similarly, its *settlement* exposure is the sum of its pre-settlement potential exposure tomorrow plus the gross payment it will make to Bank Hyde.

To make the example even more realistic, suppose again that Bank Jeckyll needs to assess credit reserves *as of day one* of the forward contract. Current exposure is again easy to calculate, but some method must be derived for measuring potential pre-settlement exposure and settlement exposure. As above, settlement exposure is the pre-settlement potential exposure *on the last day of the contract* plus the gross payment of US$1 million that Bank Jeckyll must make to Bank Hyde. But *pre-settlement potential* exposure must be measured across *all* dates from now through maturity. All this also must be adjusted by estimated probabilities of default, netting, and any credit enhancements in place.

It should be apparent that the credit risk of derivatives poses no small challenge to firms for risk management. [54] Even the smallest end users of derivatives face credit risk. It is understandable that many refuse to deal with all but the most highly-rated dealer counterparties or demand credit enhancements, such as collateral or third-party guarantees, for their contracts.

Exchange-traded derivatives, moreover, do not pose the risk management challenge that PNDs do for credit risk. Commodities exchanges use a clearinghouse and mark-to-market system. Provided the clearinghouse itself is creditworthy, the risk of a default may be less for an organized exchange than even some A-rated swap dealers. Regardless of the clearinghouse's credit rating, the credit exposure of exchange-traded derivatives is only as long as the period between marking to markets—usually a day or less. For PNDs, by contrast, credit exposures can continue for the life of the transaction.

Despite the daunting nature of credit risk, it should be emphasized as a practical matter

[54] *Cf.* Global Derivatives Study Group, *op. cit.*, and Culp and Mackay (1995), *op. cit.*

that actual credit losses in derivatives have been relatively inconsequential over time. In 1992, for example, 14 PND dealers surveyed by the GAO reported a *total* of only $246 million in charged-off credit losses on derivatives.[55]

G. Intellectual Risk

Intellectual risk is the risk that personnel with specialized knowledge leave a firm and make it difficult for the firm to continue managing the risks of its positions and portfolios. Suppose a firm keeps poor records of derivatives positions, payment schedules, and hedging policies. If key trading personnel leave the firm, the company could miss payments or incur losses on the portfolio as prices change due to a failure of understanding of any dynamic hedging strategies in place.

More realistic examples of intellectual risk occur in large firms with complex bureaucracies. Senior management may fail to realize how important one or two workers are for identifying records, reports, or risk exposures. If those people take ill or leave on vacation, not to mention switch jobs, losses may be incurred in a fast-moving market while important information is located and retrieved.

H. Liquidity Risk

The eighth financial risk facing users of derivatives, liquidity risk, is distinct from "market liquidity risk." Perhaps more aptly called "funding risk," liquidity risk is the risk that cash inflows are insufficient to cover cash outflows.

Most firms, both financial and non-financial, have liquidity plans designed to manage funding risks. The well-publicized bankruptcy of Drexel Burnham Lambert Group, Inc., occurred due to a failure in funding risk management and has only increased corporations' attention to this financial risk. [56] Derivatives, nonetheless, complicate funding risk management because of the rapid rate at which cash flow obligations and receivables can change with market movements.

The funding risk that a firm may experience when it uses exchange-traded derivatives to hedge PNDs has been explained elsewhere. [57] Although the latter may increase in economic value with market price movements, an immediate cash inflow may not result from the increase in

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[55]General Accounting Office, *Financial Derivatives: Actions Needed to Protect the Financial System*, Report #GGD-94-133 (May 1994) (hereinafter "GAO").

[56] Culp and Kavanagh, *op. cit.*

[57] Culp and Miller (1994), *op. cit.*, and Culp and Miller, "Metallgesellschaft and the Economics of Synthetic Storage," *op. cit.*

economic value. Exchange-traded derivatives, by contrast, are marked-to-market at least daily and require variation margin payments on losing positions. If a firm does not have prearranged firm funding sources available to cover its potential cash-flow commitments, it may be forced to liquidate one leg of a portfolio of transactions, in turn transforming accounting losses on one leg of an otherwise hedged portfolio into realized losses.

I. Legal Risk

Legal risk is the risk that a derivatives transaction is unenforceable under applicable law. Although difficult to manage, this risk is one of the most threatening to derivatives participants because of the influence of statute, case law, and administrative regulatory actions on enforceability. Because these factors are largely beyond the control of derivatives participants, legal risk is difficult for firms to manage.

The Group of Thirty identified several sources of legal risk for derivatives, including conflicts between oral contract formation and the statutes of frauds in certain countries and jurisdictions, the capacity of certain entities (e.g., municipalities) to enter into PNDs, the enforceability of close-out netting, and the legality of PNDs. [58]

(1) Capacity

Some concern remains about the legal authority or capacity of certain entities—most prominently municipalities—to enter into privately negotiated derivatives transactions. In a well-publicized 1991 case before the U.K. House of Lords, [59] it was determined that the Hammersmith borough of London did not have the statutory capacity to enter into the numerous PND transactions which it had been negotiating since 1981. The Law Lords held that "a local authority has no power to enter into a swap transaction," thereby rendering the contracts *ultra vires*. That ruling of the House of Lords invalidated swap agreements between more than 130 councils and 75 major banks, and it reportedly resulted in over $1 billion in total losses to counterparties. [60]

Concern persists in the marketplace that counterparties to PNDs may not have the legal capacity to enter certain transactions, thereby giving rise to fears that the Hammersmith experience could be repeated in the future.

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[58] Global Derivatives Study Group, *op. cit.*

[59] *Hazell v. Hammersmith & Fulham Borough Council* ((1990) 2 W.L.R. 17, (1992) Q.B. 697 (Div'l Ct. 1989), *aff'd in part and rev'd in part*, (1990) 2 W.L.R. 1039, (1992) Q.B. 697 (C.A. 1990), *reinstated*, 2 A.C. 1, (1991), All E.R. 545, (1991) 2 W.L.R. 372 (H.L. 1991)).

[60] Global Derivatives Study Group, *op. cit.*, and Anthony C. Gooch and Linda B. Klein, "A Review of International and U.S. Case Law Affecting Swaps and Related Derivative Products," in *Advanced Strategies in Financial Risk Management*, Robert J. Schwartz and Clifford W. Smith, Jr., eds. (New York: New York Institute of Finance, 1993).

(2) Close-Out Netting Enforceability

"Close-out" netting is the netting of any payments between two counterparties after an event of default by one of the counterparties triggers the early termination of the PND contracts between the two counterparties. Suppose two U.S. non-financial corporations, Company Kirk and Company Spock, enter into a simple interest rate swap contract governed by an ISDA Master Agreement. One year before the last settlement date, Company Spock owes Company Kirk $1 million, and Company Kirk owes Company Spock $1.1 million. Both counterparties stipulate close-out "full two-way payments" bilateral netting. [61] Assuming their agreement is enforceable, a default by Company Spock *or* Company Kirk means that Company Kirk pays the net $100,000 to Company Spock.

Now suppose the netting provision of the swap contract is unenforceable. If Company Kirk defaults, it may insist on collecting the *gross* $1 million from Company Spock *even though it cannot pay the $1.1 million in return.*

Close-out netting contracts can be unenforceable for various reasons, most of which relate to national insolvency laws. Until recently, for example, concern existed that close-out netting might be unenforceable in French jurisdictions. In the U.K. and U.S., similar concerns have for the most part been addressed. U.S. bankruptcy law and banking law not only allow close-out netting but legally *require* it. [62] Some concerns about the enforceability of close-out netting do persist, nonetheless. [63]

(3) Legality

The legality of PNDs occasionally is called into question because of broadly written anti-gambling laws. This is not as much of a problem in the United States as elsewhere. [64] In the United States, the primary threat to the legality of PNDs is found, ironically, in the same law that

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[61] Full two-way payments simply requires that whatever the net cash flow at the time a derivatives contract terminates early, that cash flow will be exchanged. An increasingly unpopular form of close-out netting, called "limited two-way payments," requires the defaulting firm to pay the non-defaulting firm its net obligation if that net obligation is positive, but if the non-defaulting firm owes the defaulting firm a net cash flow, no payment is required. *See* Daniel P. Cunningham and Robert Y. Casper, "Over-the-Counter Derivatives Transactions: Netting Under the U.S. Bankruptcy Code, FIRREA, and FDICIA," Memorandum (New York: Cravath, Swaine & Moore, July 9, 1993).

[62] Daniel P. Cunningham and William P. Rogers, Jr., "Netting is the Law," Memorandum (New York: Cravath, Swaine & Moore, July 1990), and Cunningham and Casper, *op. cit.*

[63] Cravath, Swaine & Moore, "Enforceability of Multibranch Close-Out Netting in ISDA Master Agreements," Memorandum of Law for the International Swaps and Derivatives Association, Inc. (November 29, 1994), Cunningham and Casper, *op. cit.*, and Culp and Kavanagh, *op. cit.*

[64] *Cf.* Global Derivatives Study Group, *op. cit.*

ensures the legality of exchange-traded derivatives—the Commodity Exchange Act. This threat is sufficiently significant to be discussed separately later.

VII. REGULATION

There are two types of derivatives regulation in the United States. "Institutional" regulation is the regulation of the institutions that participate in derivatives activity, and "functional" regulation is the regulation of general types of financial contracts, instruments, and markets based on the economic function they perform.

A. Institutional Regulation

Institutional regulation of derivatives activity supplements existing regulation of the more "traditional" activities of financial institutions. From a regulatory perspective, derivatives participants fall into five categories: banks, thrifts, affiliates of securities broker/dealers, futures commission merchants, and other firms.

Derivatives are subject to three types of institutional regulation. [65] First, financial regulators may specify "permissible" activities. This allows some firms to engage in derivatives activity while prohibiting others. Second, the derivatives activities in which regulated institutions are permitted to engage are subject to prudential supervisory oversight. Finally, regulators must determine the adequacy of derivatives participants' capital relative to the risks of their derivatives activities.

(1) Permissible Activities and Prudential Regulation

(a) Commercial Banks

Commercial bank regulation in the United States is based on the type of charter held by the bank. A commercial bank may be either nationally- or state-chartered. If the bank is state-chartered, it may apply for membership in the Federal Reserve System, hence submitting itself to the Fed as its primary federal regulator. State-chartered banks that are not members of the Federal Reserve System are regulated by the Federal Deposit Insurance Corporation (FDIC). National banks, by contrast, are all regulated by the Office of the Comptroller of the Currency (OCC). State-chartered banks are also regulated by state banking commissioners *in addition* to any FDIC or Fed regulation. All bank holding companies are regulated by the Federal Reserve.

Permissible derivatives activities for commercial banks are defined by a particular bank's regulator. To conduct derivatives activities, a bank must apply for permission to its regulator. A favorable ruling on one bank's application usually represents implicit approval for all similarly situated banks regulated by that agency to engage in the activity specified in the application.

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[65] *See* Culp and Mackay (1994), *op. cit.*, and Culp, *op. cit.*

Permissible derivatives activities for banks are surveyed elsewhere. [66]

Generally, interest rate derivatives of all types are permissible for all commercial banks. Such consistency across regulators, however, is not always the case. The OCC, for example, issued two "no objection" letters in 1987 and 1990 to the Chase Manhattan Bank, indicating that it did not oppose Chase's commodity swap activities. [67] The Federal Reserve Board, by contrast, amended Fed Regulations H and K in 1991 to require any state-member banks to obtain the explicit consent of the board before engaging in commodity swaps, even if the institutions were already engaged in commodity swap activity. [68] A commercial bank's capacity to enter into privately negotiated commodity derivatives thus depends entirely on its type of charter and its primary regulator.

Supervision of commercial banks engaged in permissible derivatives activity has three common elements across regulatory agencies. First, examinations, on- and off-site, help regulators identify the risk exposure of the banking institution from derivatives activities, and how the risks of using derivatives are managed. These examinations range in depth from full-scope examinations of the institution's consolidated activities to "target" reviews of specific activities. The OCC, for example, is currently attempting to conduct targeted derivatives reviews of the largest national banks active in derivatives.

Second, regulatory disclosure is also a common theme among banking regulators. Disclosure requirements force derivatives participants to reveal certain information, such as notional principal outstanding, about their derivatives positions on reporting forms termed "call reports," which are filed quarterly with their respective federal regulators.

Third, banking regulators rely on market surveillance to collect information about the risks to which institutions are exposed. [69] Though designed to help regulators assess the risks of specific institutions, such surveillance also is predicated on regulators' desires to remain informed about market wide developments. Market surveillance plays an especially crucial role in Federal Reserve supervision, because the Reserve System has the responsibility, beyond bank-specific regulation, of ensuring the stability of the financial and payments systems.

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[66] *See* Michael G. Capatides, *A Guide to the Capital Markets Activities of Banks and Bank Holding Companies* (New York: Mayer, Brown & Platt and Bowne Publishing, 1993).

[67] *See* OCC No Objection Letter No. 87-5 [1988-1989 Transfer Binder] *Fed. Banking L. Rep.* (CCH) ¶84,034 (July 20, 1987), and OCC No Objection Letter No. 90-1 [1989-1990 Transfer Binder] *Fed. Banking L. Rep.* (CCH) ¶83,095 (Feb. 16, 1990).

[68] 12 C.F.R. §208.128.

[69] Such surveillance methods may range from examiners familiarizing themselves with the contents of their constituent banks' portfolios to merely watching financial market movements on quotation screens.

(b) Thrifts

U.S. savings and loan associations are regulated by the Office of Thrift Supervision (OTS). The OTS quite specifically defines permissible derivatives activities for thrifts. Thrifts may only participate in derivatives activity as end users, and they may only hold derivatives as hedges to reduce their overall *interest rate* risk. All swaps are permissible, but the OTS *Regulatory Handbook* nonetheless requires the supervisory monitoring of the correlations between swaps and the assets or liabilities being hedged to ensure that swaps are held only for risk management purposes.

The supervision of permissible derivatives activities in thrifts consists of three parts. Like banking regulators, the OTS utilizes on-site examinations to evaluate the risks of derivatives and the effect of derivatives on the risk of the thrift. The OTS also relies upon off-site surveillance. Using data which thrifts must disclose quarterly about their derivatives activities, assets, and liabilities, the OTS extensively evaluates the interest rate risk of thrifts with a computer simulation model designed to target institutions that assume excessive risk relative to available capital. Finally, the OTS uses and enforces a variety of prudential regulations, such as risk-based capital requirements.

(c) Securities Broker/Dealers

Registered broker/dealers are regulated by the Securities and Exchange Commission. The SEC functions as both an institutional and a functional regulator.

In regulating institutions, the SEC discharges its responsibilities under the Securities Exchange Act of 1934. These responsibilities relate to laws prohibiting fraud and manipulation, mandating registration, and ensuring customer protection. The SEC enforces those legal requirements by closely scrutinizing the registered institutions it supervises. There are no direct prohibitions by the SEC on derivatives activities, but capital requirements for conducting derivatives activities as a broker/dealer are generally prohibitive. SEC-regulated broker/dealers, therefore, generally engage in derivatives activity in an unregistered affiliate, which allows the unregistered affiliate to avoid excessive capital requirements and the direct regulation of its derivatives activities. The passage of the Market Reform Act of 1992 gave the SEC risk assessment authority over the affiliates of broker/dealers, where such affiliates have a material level of market exposure.

(d) Futures Commission Merchants

FCMs are regulated by the Commodity Futures Trading Commission (CFTC). Like the SEC, the CFTC is both an institutional and functional regulator. Because its institutional regulations do not include specifying permissible activities, a FCM may engage in any type of derivatives transaction.

The supervision of FCMs by the CFTC is based on requirements set out in the Commodity

Exchange Act (CEA or "Act"), originally enacted in 1936. They require regulation of such areas as minimum capital, reporting and disclosure, registration, customer protection, and anti-fraud.

(e) Other Corporations

Other types of corporations engaged in derivatives activities as dealers or end users are subject to specific oversight requirements. Insurance companies, for example, are subject to regulation at the state level. The National Association of Insurance Commissioners (NAIC) has drafted a model regulation for adoption by state regulators that specifies requirements about prudential risk management, stress testing, maximum size of derivatives activities, and the like. Other diverse derivatives regulations govern institutional investors, investment companies, credit unions, and finance companies.

(2) Minimum Capital Requirements

Minimum capital requirements for U.S. institutions engaged in derivatives activities vary depending on the primary regulator of the institution. For banks, risk-based minimum capital requirements were established by the Bank for International Settlements (BIS) in the Basle Accord of 1988. Under the BIS requirements, some PNDs are assigned a value expressed as a percentage of the notional value of the contract. This value represents the minimum regulatory capital an institution must have to enter into such contracts. The BIS set the values based entirely on the perceived credit and operational risks of derivatives contracts, although the BIS is due to revise its minimum capital requirements to include market risk by 1996.

Commercial banking regulators also have adopted a separate regulation that mandates minimum capital levels for banks incurring interest rate risk. This proposal, required under Section 305 of the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA), explicitly considers the market risk of interest rates in setting minimum capital levels.

The SEC sets minimum capital requirements for broker/dealers. These requirements are based on a "Net Capital Rule," in which an institution's net capital is its net worth, less subordinated liabilities, less illiquid assets, and less unsecured receivables. A percentage of the market value of the broker/dealer's derivatives positions is then subtracted from its net capital to determine whether the broker/dealer is in compliance. These subtracted values, ostensibly based on market and credit risk, are called "haircuts."

The CFTC has yet another system for calculating minimum capital requirements. Capital requirements for FCMs are defined only for *customer* funds on deposit at the FCM for futures trading. Under CFTC regulations, an FCM must keep in "segregated accounts" all of its customer funds on deposit for futures trading. The capital requirement for the FCM is then determined as a flat percentage of the value of customer funds on deposit. This minimum level is *not* a risk-adjusted amount.

B. Functional Regulation

In addition to their role as institutional regulators, the SEC and CFTC also act as functional regulators, largely because they dedicate most of their resources to regulating *products* and *markets* (i.e., exchanges) rather than the users of those products and markets. The SEC and CFTC are presumed to regulate the functions of capital formation and hedging, respectively. [70]

At the core of the regulatory responsibilities the CFTC and SEC have over derivatives is the legal basis that defines the status of exchange-traded and PND contracts. We noted earlier that legal risk can and often does result from the statutory, case, and administrative law that defines products as part of one jurisdiction or another. These legal risks will become clearer later in this section.

(1) Pre-1992 Exclusive Derivative Product Regulation [71]

In 1921, a member of the United States Senate described the Chicago Board of Trade as so much of a "gambling hell" that "Monte Carlo or the Casino at Havana are not to be compared to it." Even though others in Congress emphasized the benefits of futures trading, it was decided that legislation was necessary to regulate trading on organized commodity exchanges. This decision resulted in the Futures Trading Act of 1921, the first significant legislative endeavor to regulate futures trading in the United States.

The following year, the United States Supreme Court ruled that a portion of the 1921 act was unconstitutional, because it represented an improper exercise of congressional taxation authority. Just two weeks after the Supreme Court decision, Congress responded with legislation which sought similar objectives, but relied on an exercise of congressional power under the Commerce Clause. This legislation was enacted as the Grain Futures Act of 1922 and, unlike its predecessor, was upheld by the court. To carry out the act, the Secretary of Agriculture established the Grain Futures Authority.

In 1936, Congress again amended the existing legislative treatment of futures trading. Still seeking to prevent abuses on organized commodity exchanges—now in the wake of the Depression—it substantially revised the Grain Futures Act and passed the CEA. To carry out the provisions of the Act, Congress created the Commodity Exchange Commission, comprised of the Secretary of Agriculture, the Secretary of Commerce, and the Attorney General. Day-to-day regulatory authority over commodity trading was delegated to the Secretary of Agriculture who,

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[70] For a discussion of the practical problems with this functional separation between the SEC and CFTC, *see* Christopher L. Culp, "The Impossibility of Functional Regulation: A Program for Reforming the Commodity Exchange Act," Working Paper, Competitive Enterprise Institute (July 1995).

[71] The remainder of this section is based on Culp, "The Impossibility of Functional Regulation...." *op. cit.* Because of the numerous legal citations, no footnotes or references are given in this section, even for quotations from court opinions and statutes. All are available by consulting *id.*

on July 31, 1936, formed the Commodity Exchange Administration—later re-named the Commodity Exchange Authority—to replace the Grain Futures Authority in executing that power.

In 1974, Congress significantly revised the Commodity Exchange Act, primarily in response to increasing public participation in commodity markets. It enacted the Commodity Futures Trading Commission Act of 1974 ("CFTC Act") and established the CFTC as the independent federal regulator of U.S. commodity exchanges. Under the CEA, as revised by the CFTC Act, any instrument legally deemed a commodity, futures contract, option on a commodity, or option on a commodity future was subject to regulation by the CFTC. This *exclusivity clause* of the CEA also required that if an instrument was legally deemed a commodity, the CFTC's jurisdiction was not shared by other regulatory agencies. Under the "exchange trading requirement" of the CEA, the instrument was required to be traded on a CFTC-designated commodity exchange. New contracts, moreover, had to be approved by the CFTC before a commodity exchange was "designated" as the contract market on which that new product could trade. (The latter is still true.)

The Act defines a commodity to include "all basic goods and articles...and all services, rights or interest in which contracts for future delivery are presently or in the future dealt with...." A futures contract, although not defined explicitly anywhere in the Act, fits broadly into the language of "a contract for the purchase or sale of a commodity for future delivery."

(2) Statutory Exclusions from the Act

There are two specific statutory exemptions from the CEA, known as the "forward exclusion rule" and the "Treasury Amendment exclusion." These exclusions from the Act are *statutory* and are explained below to avoid any confusion with the meaning of an "exemption," discussed later in the text.

(a) The Forward Contract Exclusion

Since the CEA's enactment, instruments for which the actual delivery of a commodity occurs have been excluded from the CEA and the exchange-trading requirement. Known as the "forward contract exclusion," such instruments are exempt based upon the CEA's language that "the term 'future delivery' does not include any sale of any cash commodity for deferred shipment or delivery."

The forward exclusion goes to the heart of what the *legal*, as opposed to purely economic, distinctions are between futures contracts and forward contracts. The closest the Act comes to defining a futures contract is a "contract for the purchase or sale of a commodity for future delivery...." subject to the limitation on the definition of the term future delivery noted above. With this broad statutory definition in mind, the Ninth Circuit in the case *Co. Petro Marketing v. CFTC* observed that "no bright-line definition or list of characterizing elements is determinative. The transaction must be viewed as a whole with a critical eye toward its underlying purpose."

The CFTC views such an assessment as requiring not only a review of the underlying purpose of the transaction, but also of "what the parties [in the transaction] intended."

Although a rigid legal definition of a futures contract does not exist, the case law suggests that if a contract has the following characteristics, it likely is a futures contract: standardized terms; marketing to the general public; the necessity of posting a performance bond (i.e., margin); the expectation that the contract is entered into for the primary purpose of hedging or speculation, rather than to take actual delivery of the underlying cash instrument or commodity; the ability to "offset" contracts; and the determination of a price or pricing formula at the time the contract is initiated.

There also is no rigid set of legal criteria to determine what falls under the forward contract exclusion. Three characteristics, nonetheless, generally signal that a contract is likely to fall under the forward contract exclusion. First, as the Ninth Circuit stated in *Co. Petro*, "a cash forward contract is one in which the parties contemplate physical transfer of the actual commodity." This delivery component of forward contracts has two parts: the parties to the transaction must *expect* delivery, and the parties routinely must take actual delivery. Second, forward contracts are entered for "commercial purposes" relating to the underlying line of business of the parties to the transaction. Third, the parties to the transaction must have the ability to make or take delivery.

(b) The Treasury Amendment

The second statutory exclusion from the Act applies to contracts that fall under the "Treasury Amendment" to the CEA. When Congress set up the CFTC as the independent federal agency charged with administering the CEA in the CFTC Act of 1974, it also enacted the Treasury Amendment. This law amended the CEA to read, "Nothing in this Chapter shall be deemed to govern or in any way be applicable to transactions in foreign currency,...government securities, or mortgages or mortgage purchase commitments, unless such transactions involve the sale thereof for future delivery conducted on a board of trade." The Treasury Amendment was included in part because of concern about the broadness of the definition of a "commodity" under the Act, as it was revised by the CFTC Act of 1974. Following the revision, the definition of a commodity was broadened beyond physical commodities also to include "all other services, rights, and interests in which contracts for future delivery are presently or in the future dealt with."

The U.S. Department of the Treasury proposed the Treasury Amendment to the CEA as a way of helping to ensure that, in the wake of the broadening of the definition of a "commodity," the term would not include certain types of transactions which were off-exchange. Specifically, the Treasury was concerned that currency interbank transactions remain exempt from the Act. As enacted, the Treasury Amendment exempts particular products, *regardless* of the type of participant trading them. The CFTC, however, takes the view that if a foreign exchange transaction is offered to the general public, then it is *not* covered by the Treasury Amendment and hence may be subject to the CEA.

(3) The Shad-Johnson Accord

In addition to establishing the CFTC, the CFTC Act of 1974 also extended the definition of a commodity to cover all futures contracts and many securities based on financial instruments that contain elements of "futurity." As noted, this broadening of the definition of a commodity concerned the Treasury Department enough to insist upon an amendment to the CEA. This point of definition also concerned the SEC, which demanded that Congress add an "SEC saving clause" to preserve its existing jurisdiction. The SEC saving clause ensures that CFTC jurisdiction does not "supersede or limit the jurisdiction at any time conferred on the [SEC]." So, while the CFTC retains exclusive jurisdiction over commodities and futures, the SEC saving clause provides that instruments traditionally classified as securities, like options on individual stocks, could not be called commodities and futures.

Until quite recently, the CEA did not allow the CFTC to make statements about whether or not specific instruments were commodities. Instead, regulations, policy statements, enforcement actions, and letters promising "no action" were generalizations over broad classes of instruments. When a specific product became the subject of dispute, the agencies attempted to settle their dispute among themselves. When that was not possible, the dispute went to the courts.

Only a year after the CFTC was established, conflict developed between the SEC and the CFTC. Based upon the determination that Government National Mortgage Association (GNMA) certificates were commodities under the Act, the CFTC approved the trading of futures on GNMAs at the CBOT. Soon thereafter, the CBOT and other commodity exchanges began trading futures on other types of financial instruments, including government securities. The SEC challenged the CFTC's approval of those products, arguing that "GNMA certificates and Treasury bills are securities, as that term is defined in the federal securities laws. [The SEC] also believe[s] it to be quite clear that contracts for future delivery of those securities are also 'securities'."

In 1978, the jurisdictional disagreements between the SEC and the CFTC arose in hearings regarding the Futures Trading Act of 1978. The SEC and the CBOE stressed that futures contracts and options on securities were *functionally indistinguishable*, and since the SEC had jurisdiction over the latter it should also have jurisdiction over the former. Congress left the CFTC's exclusive jurisdiction intact, nonetheless. It confined its assuagement of the SEC to a requirement that the CFTC "maintain communications" with the SEC in areas of jurisdictional overlap and that the CFTC "take into consideration" the SEC's view on the approval of futures on government securities.

The burgeoning jurisdictional dispute between the SEC and the CFTC was finally litigated in *Board of Trade of the City of Chicago v. SEC*, also known as the *GNMA Options* case. This case arose after the SEC approved, in February 1981, a proposal by the CBOE to trade options on mortgage-backed certificates guaranteed by GNMA. The SEC claimed that those options were securities under the Securities Exchange Act of 1934. The CFTC, on the other hand,

claimed that options on *financial instruments* were futures contracts, as provided by the CEA. Because of the exclusivity clause, the CFTC and the CBOT maintained that the CFTC had exclusive jurisdiction over such classes of instruments, which included options on GNMAs—hence, those instruments had to trade on a CFTC-designated exchange, which the CBOE was not.

In November 1981, the Seventh Circuit court of appeals granted the CBOT's motion for a stay pending review and blocked the CBOE from trading GNMA options. The court determined that because GNMA certificates had previously been determined to be "commodities," GNMA options were commodity options, since options on commodities fell within the definition of a commodity option. The court also explicitly noted that its line of reasoning could be applied to options on corporate and debt securities, because of the SEC saving clause. It was therefore necessary for the court to delineate more specifically the jurisdictional boundaries where options on securities were concerned.

The court defined an "analysis of scope" for the CFTC's jurisdiction over transactions "involving" futures contracts. The court stated, "Since GNMA's are not traditional stocks and GNMA options have the character of a legitimate commodity derivative, we hold that the proposed GNMA options 'involve' the pre-existing GNMA futures and therefore are within the exclusive jurisdiction of the CFTC." The court's decision was predicated largely on the notion that GNMA options "involved" GNMA futures. The court's reliance on this notion of "involvement" prompted a dissenting opinion by Judge Cudahy, who argued that "[t]he majority's almost total reliance on the word 'involving' in the exclusive jurisdiction clause to bear the crushing burden of options on actuals is to rest the Rock of Gibraltar on a toothpick."

In December 1981, the CFTC and SEC reached a mutual agreement regarding their disputes over innovative financial instruments, including options. This agreement, called the Shad-Johnson Accord after the chairmen of the two agencies, provided four basic ground rules in the interpretation of existing financial market law: (1) the CFTC would regulate futures and options on futures for government securities and broad stock indexes; (2) the SEC would regulate all options on securities (including GNMAs) and on stock indexes; (3) futures on individual securities, such as stocks, were prohibited; and (4) the SEC would play a formal role in the CFTC's approval of the then-developing stock index futures contracts.

Only a few months after the adoption of the Shad-Johnson Accord, the *GNMA Options* decision called the Accord into question. The Seventh Circuit ruled that options on GNMAs were both futures *and* securities, hence warranting exclusive CFTC jurisdiction under the CEA. Perhaps more significantly, the court stated that "the CFTC and SEC [cannot be allowed] to reapportion their jurisdiction[s] in the face of a clear, contrary statutory mandate." Only Congress can change regulatory jurisdictions.

The *GNMA Options* decision gave the SEC and the national securities exchanges cause for great alarm. Under that ruling, the CEA required that the CFTC approve *all* derivative instruments, including options on stock indexes, currencies, and government securities. Several

securities exchanges, however, had already filed applications for SEC approval of options on several of those instruments. The SEC and securities exchanges thus began lobbying Congress to enact the provisions set forth in the Shad-Johnson Accord. Congress acquiesced and enacted the Accord into law almost verbatim in the Futures Trading Act of 1982.

The result of the legal dispute in *GNMA Options* and the hasty enactment of Shad-Johnson has been a decade of uncertainty about how a new financial instrument will be classified—uncertainty that even now looms over products such as equity swaps.

(4) General Exemptive Authority

The Futures Trading Practices Act ("FTPA") of 1992 was signed into law in October 1992. That Act amended the CEA and gave the CFTC "general exemptive authority," or the legal authority to grant regulatory exemptions from virtually all of the CEA, including the exchange-trading requirement.

In granting the CFTC general exemptive authority, Congress clearly enumerated a number of qualifications that it directed the Commission to consider materially before using its new authority. The Conference Report of the FTPA explains that the exemptive authority is intended to create "flexibility for the Commission to provide legal certainty to novel instruments where the determination as to jurisdiction is not straightforward." Congress indirectly acknowledged that the Act had in large part become incapable of addressing financial innovations:

> [T]he Conferees recognize the need to create legal certainty for a number of existing categories of instruments which trade today outside of the forum of a designated contract market. These instruments may contain some features similar to those of regulated exchange-traded products but are sufficiently different in their purpose, function, design, or other characteristics that...traditional futures regulation and the limitation of trading to the floor of an exchange may be unnecessary to protect the public interest and may create an inappropriate burden on commerce.

Section 502 of the FTPA amends Section 4 of the Commodity Exchange Act by adding new sections 4(c)(1) and 4(c)(2). New section 4(c)(1) allows that

> In order to promote responsible economic or financial innovation and fair competition, the Commission...may (on its own initiative or on application of any person, including any board of trade designated as a contract market for transactions for future delivery in any commodity under section 5 of this Act) exempt any agreement, contract, or transaction (or class thereof)...either unconditionally or on stated terms or conditions or for stated periods and either retroactively or prospectively, or both, from any of the requirements of subsection (a), or from any other provision of this Act (except section 2(a)(1)(B)), if the Commission determines that the exemption would be consistent with the public

interest.

Note in particular that the Commission may *not* exempt products from section 2(a)(1)(B) of the Act, which codified the Shad-Johnson Accord. The Conference Report specifically stated that "the Conferees do not intend to call into question the legality of securities-based swap or other transactions, which occur in the private marketplace at the present time, that do not violate the Accord." The general exemptive power was thus expressly limited to apply *within the confines of the SEC-CFTC jurisdictional boundaries established by Shad-Johnson*. The FTPA did not resolve the legal uncertainties created by Shad-Johnson.

The FTPA explicitly directed the CFTC promptly to exempt certain types of swaps from the Act. In January 1993, the CFTC exercised its new exemptive authority, consistent with the specific directions of Section 502(a)(5)(A)-(B) of the FTPA, by exempting certain types of swaps, provided that the products satisfy several enumerated criteria such as the absence of margining and standardization. Exempt swaps also must clearly fall outside Shad-Johnson. Interest rate and currency swaps thus may fall under the exemption, whereas the treatment of swaps on securities (e.g., equity swaps) under the exemption is less clear.

After the CFTC used its new authority under the FTPA to exempt certain types of swaps, the legal risk that swaps would be deemed futures and hence unenforceable was mitigated for many types of swap transactions. The CFTC recently reaffirmed its commitment to the swaps exemption, but at the same time made statements that further call into question the legality of PND transactions based on securities. The CFTC recently stated that "the Congress [in the FTPA] did not require the Commission to determine whether or not swap transactions are futures and, indeed, the Commission did not make that determination in [its swaps exemption]." [72] Although this seems to reaffirm the swaps *exemption*, it provides little comfort as to the legal status of swap transactions *not covered by the swap exemption*, such as swaps based on securities.

[72] U.S. House of Representatives, *Commodity Futures Trading Commission Reauthorization Act of 1995*, Report 104-104, 104th Cong., 1st Sess. (April 6, 1995).

VIII. THE ECONOMICS OF DERIVATIVES REGULATION

A. The Supply and Demand of Regulation

Political regulation of financial intermediaries and markets can affect financial intermediation, as well as financial innovation, through two avenues. First, the government can deliberately institute and enforce regulations that directly affect financial intermediaries, suppliers of financial innovation, and issuers of financial products. Second, regulations may unwittingly precipitate changes in the rate of financial innovation. The consequences of such regulations as rules for corporate operations and changes in the tax code tend to be unintentional and often *unexpected.*

Nobelist Merton Miller argues that unanticipated changes in regulations have been responsible for many of the productive and efficient financial innovations over the last three decades. [73] Consider some examples. Fed Regulation Q, which placed a ceiling on interest rates, gave rise to the development of the Eurodollar market. The 30 percent withholding tax on interest rate payments on bonds sold in the United States to foreign investors gave rise to the Eurobond market. Financing restrictions by the British government gave rise to the explosion in the use of currency swaps. A mathematical interpretation of U.S. tax laws by the U.S. Treasury Department resulted in the growth in the early 1980s of deep-discount, zero-coupon corporate bond issues. When that mathematical interpretation was corrected, the issues of zeros by corporations halted but in turn gave rise to the advent of "stripped securities." An interest rate cartel in Hong Kong that places a ceiling on certain retail deposit rates gave rise to a huge *retail* market for swaps beginning in 1981. And the list goes on....

Professor Edward Kane emphasizes that regulatory agencies must be treated as *dynamically interactive* institutions in the financial market. In particular, Kane argues that regulation both influences *and is influenced by* financial innovation and the behavior of intermediaries. He refers to that process as the "political dialectic of controls," now called the "regulatory dialectic," whereby regulators acting and reacting to change can precipitate other changes in innovation, which precipitate additional reactions by regulators, and so on. [74]

This perspective of financial regulation is well-seated in the "theory of public choice," contributions to which won James Buchanan the 1986 Nobel Prize in Economics. Public choice theory suggests that regulatory bureaucracies are primarily interested in maximizing their regulatory domain, subject to at least three constraints: statutory limitations on authority, opportunities among those regulated for avoiding the regulation, and actions taken by competing regulators. In practice, this theory of the supply of regulation suggests several practical implications. First, financial regulators will seek to identify new problems and regulate new

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[73] Miller (1986), *op. cit.*, and Miller (1992), *op. cit.*

[74] *Cf.* Edward J. Kane, "Interaction of Financial and Regulatory Innovation," *American Economic Review* 78 (1988).

instruments as they are supplied. Second, the extent to which financial regulators will be able to accomplish this task is determined by statutory limitations on authority. Third, for innovations that lend themselves to regulatory avoidance, such avoidance will occur as long as the cost of avoidance is lower than the cost of the regulation(s) to be avoided. Fourth, in cases where regulators *cannot* mitigate avoidance at a reasonable cost or with a high probability of success, they will attempt to *push the instruments out of their jurisdiction*, so as to avoid accountability for their failure to regulate a market for which they are responsible. Finally, financial regulators will compete with one another by challenging innovative instruments that are ambiguously treated by statute. In cases where innovative instruments are difficult to regulate, those same regulatory agencies may seek to eschew regulation of the "unregulatable" products, so as to push the failure into the backyard of another regulator and make their "competitor" accountable for the regulatory failure.

But the supply of regulation is only half of the picture. The "regulatory dialectic" is also affected by changing *demands* for regulation. That demand is well-described by the "theory of economic regulation," pioneered by George Stigler of The University of Chicago and winner of the 1982 Nobel Prize in Economics. [75] As Stigler explains, "[T]he central tasks of the theory of economic regulation are to explain who will receive the benefits or burdens of regulation, what form regulation will take, and the effects of regulation upon the allocation of resources." [76] He continues, "Regulation may be actively sought by an industry, or it may be thrust upon it....[A]s a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit."[77] According to Stigler, "the problem of regulation is the problem of discovering when and why an industry (or other groups of like-minded people) is able to use the state for its purposes...." [78]

Stigler suggests that there are four means by which regulation can convey benefits on particular parties, and accordingly, four sources of demand for regulation: direct and indirect subsidies, barriers to entry against potential competitors, "taxes" or costly regulations on substitutes and "subsidies" on complements, and price controls.[79]

At any point in time, the interaction of regulatory supply (public choice) and demand (theory of economic regulation) forms an "equilibrium" level of regulation. That equilibrium changes over time with the process of financial innovation. In fact, financial innovation and the

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[75] George J. Stigler, "The Theory of Economic Regulation," *Bell Journal of Economics and Management Science* 2(1) (Spring 1971). *See also* Sam Peltzman, "Toward a More General Theory of Regulation." *Journal of Law and Economics* 19(2) (August 1976).

[76] Stigler, *op. cit.*

[77] *Id.*

[78] *Id.*

[79] *Id.*

regulatory equilibrium are *mutually interdependent*.

On the one hand, financial innovation and functional evolution may precipitate a change in the demand for or supply of regulation. New financial products, for example, may prompt agencies to change their supply of regulation to try and capture greater regulatory market share. Alternatively, suppliers of new products may demand regulations on existing, competing products. Changes in the regulatory equilibrium precipitated by the innovation, moreover, could in turn affect the institutional structure of the market in which the innovation was first supplied. It might be argued, for example, that tight regulations on exchange-traded futures in the U.S. have given rise to increased PND activity, which in turn has prompted a change in the focus of regulators on that market.

On the other hand, changes in the institutional structure can be precipitated by unilateral actions by regulators. A mathematical interpretation at the Treasury Department in the early 1980s, for example, led to massive growth in the issuance of deep-discount, zero-coupon corporate bonds. In response to that massive growth, the Treasury then amended its rules, which in turn gave rise to the development of the stripped securities market. [80]

Whether the shock comes in the form of a unilateral regulatory action on the supply or demand side, or in the form of a financial innovation *not* spurred by regulation, the existence of regulation and regulators that respond to changes in the market can have profound effects on the process of financial innovation and structural changes to financial markets.

Miller has explained thoroughly how regulatory demand and supply interact in the regulation and innovation of derivatives. We will not repeat his arguments here and instead refer readers to his excellent papers. [81] Instead, we draw attention to a more fundamental issue: The regulatory dialectic is inherently wasteful. Even if productive financial innovations emerge from this complex, dynamic process, those innovations *might have occurred anyway* in the absence of regulation—perhaps faster, and perhaps at a lower cost. [82]

The existence of political regulations creates a tremendous requirement on market participants to pull resources away from productive uses toward political uses: regulatory compliance, regulatory avoidance, or "rent-seeking" designed to establish regulations

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[80] Miller (1986), *op. cit.*

[81] Merton H. Miller, "Positive and Normative Aspects of Regulation in Financial Markets," presented before the Inauguration of the New Campus of Universidad Torcuato di Tella, Buenos Aires (August 2, 1993), Merton H. Miller, "Financial Market Regulation in Practice," presented before the National University of Singapore's Conference on Asian-Pacific Financial Markets (September 9, 1993), Merton H. Miller, "On Some Anomalies in the Theory of Regulation," presented before the Symposium on Financial Market Regulation of the Center for Economic Policy Studies at Princeton University (April 29, 1994), and Merton H. Miller, "Inside Financial Derivatives," *Taxes* (December 1994).

[82] Miller (1992), *op. cit.* argues, for example, that financial innovation is also strongly driven by economic growth.

advantageous for the demander or disadvantageous for a competitor. In any case, the market would be better off without the regulation.

B. The Market Failure Paradigm

If regulation is so wasteful, why is there so much of it? Is *all* financial regulation due to the regulatory supply/demand equilibrium? Politicians and regulators certainly would argue otherwise. [83]

Since World War II, economic policy has been motivated and justified largely by an economic paradigm called "market failure." According to this theory, markets often fail to perform their most vital functions, such as efficiently allocating resources to their most highly valued uses. When a flaw—real or perceived—in the market is found, government intervention is required to fix the market's so-called failure. [84]

The theory of economic regulation, including the work of four Nobel prize winners in economics from The University of Chicago—Gary Becker, Ronald Coase, Merton Miller, and George Stigler—calls into question the market failure paradigm. [85] The Nobelists, among others, explain that market failure theory assumes government regulation is costless and perfect. "Government failure" therefore cannot occur. Evidence says otherwise. Governments fail just as markets do. The Chicago approach demonstrates that sound economic policy must be based on a comparison of which failure is the most significant, the market's or the government's.

The regulation of derivatives, like other economic activities, thus must be evaluated based on whether there are legitimate market failures that justify regulation. Alternatively, derivatives regulation may simply be the natural implication of the forces of regulatory supply and demand emerging from the market failure paradigm.

C. Supposed Market Failures in Derivatives [86]

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[83] *Cf.* Culp (1995 forthcoming), *op. cit.*

[84] Culp and Hanke, *op. cit.*

[85] *Cf.* Gary S. Becker, "Public Policies, Pressure Groups, and Dead Weight Costs," *Journal of Public Economics* 28 (1985), Ronald H. Coase, *The Firm, the Market, and the Law* (Chicago: The University of Chicago Press, 1988), Ronald H. Coase, *Essays on Economics and Economists* (Chicago: The University of Chicago Press, 1994), George J. Stigler, *The Citizen and the State* (Chicago: The University of Chicago Press, 1975), George J. Stigler, *Chicago Studies in Political Economy* (Chicago: The University of Chicago Press, 1988), Miller (September 9, 1993), *op. cit.*, Miller (August 2, 1993), *op. cit.*, Miller (April 29, 1994), *op. cit*, and Miller (1994), *op. cit.*

[86] Portions of this section rely on Culp and Mackay (1994), *op. cit.*

(1) Accounting, Disclosure, and Reporting

It is widely recognized by both the private and public sectors that accounting standards and disclosure practices for derivatives need to be improved. There is now a concerted effort to improve accounting and disclosures for derivatives in financial reports. The Financial Accounting Standards Board (FASB) issued an Exposure Draft in 1994 that addressed issues such as disclosures of fair values of derivatives transactions, the value of derivatives over an entire reporting period, and the purpose for which derivatives transactions are entered.

Derivatives dealers long have advocated improved accounting and disclosure practices for *all* financial instruments. Beyond simply voicing concern, dealers have in fact improved the quality of their derivatives disclosures continuously over the past several years. The 1993 and 1994 annual reports of derivatives dealers, for example, were the best that investors have yet seen. Even given those improvements, the industry still continues to develop guidelines for comprehensive, voluntary disclosure standards for all risk management activities, as reflected in a 1994 Position Paper on Disclosure from ISDA. In essence, what some government policy makers want to mandate is already happening spontaneously.

Mandatory disclosure requirements, by contrast, could stifle innovation by inhibiting institutional experimentation with alternative approaches to disclosure of *all* risk exposures. Disclosure requirements that focus on derivatives alone provide an incomplete snapshot of an institution's *net* risk exposure. As a result, such disclosures are likely to be misleading because the actual effect of derivatives can only be evaluated in the context of the institution's overall balance sheet or portfolio. The cash flows on interest rate swaps, for example, can be replicated by borrowing and lending or by using repurchase agreements. Because both interest rate swaps and their non-derivatives alternatives can be used for managing risks (e.g., the risks arising from asset/liability maturity mismatches), disclosures that focus only on derivatives give a distorted view of the institution's actual risk exposure.

The lack of complete disclosure, moreover, is not itself a market failure. Although information is not always costly to *disclose*, it can be quite costly to *obtain*. If firms are required to disclose all the information that makes their derivatives business their own, they will be unable to generate the profits necessary to cover the costs of information acquisition. The information consequently will not be acquired. In this case, disclosure has made everyone *worse off*.

In fact, all market failures can be traced to the *absence* of well-specified property rights. [87] As long as firms have an enforceable right to keep their own proprietary information *their own*, others will be willing to pay for the right to obtain that valuable information. Too little information will not be produced. Mandated information disclosures, by contrast, have the effect of transforming information into an unpriced public good. Firms will then lose their right to profit from the sale of their property (i.e., information). *Government failure* will result. Too little

[87] *Cf.* Ronald H. Coase, "The Problem of Social Cost," *Journal of Law and Economics* 3 (October 1960).

information will be produced only when political mandates rob market participants of the chance to reap economic gains from information production. [88]

(2) Suitability Requirements

The rapid overall growth of PND activities has raised concerns about suitability issues. Suitability relates to a dealer's responsibility for ascertaining the extent to which its counterparty understands the transactions into which it enters—i.e., is the counterparty suitable? These concerns have been reinforced by press reports of a recent string of losses suffered by corporate end users on some derivatives transactions.

Both domestic and international regulators have been addressing the issue of suitability of derivatives transactions for particular end users. In a Supervision & Regulation advisory letter sent to banks in 1993, the Federal Reserve Board required that derivatives dealers assess the sophistication of their customers and obtain sufficient information to justify transacting with any institutions deemed unsophisticated. This guidance is similar to the OCC recommendation in *Banking Circular No. 277* that banks entering transactions with unsophisticated end users document the information they supply their customers. [89] The FDIC goes further, suggesting that banks be required to disclose the risks and costs of derivatives when dealing with non-registered broker-dealers. A joint statement by the CFTC and the SEC in the United States and the Securities and Investments Board (SIB) in the United Kingdom also suggests that dealers transacting with non-dealers should be required to obtain information about customers to help ensure suitability.

An overwhelming majority of PNDs are negotiated between sophisticated institutional counterparties capable of determining for themselves appropriate contracts and counterparties. Because these transactions create continuing credit exposures that last the duration of the contracts, participants have a strong incentive to ensure counterparty suitability, even in the absence of regulations and mandates. Improved accounting and disclosure standards in the industry, moreover, will make it easier for institutions to evaluate suitability without the burden of costly regulations. Industry educational efforts are also targeted on increasing the level of understanding of derivatives by end users, especially municipalities and institutional investors.

In all likelihood, legislation imposing a suitability standard for *dealers* would unnecessarily restrict derivatives *users*. Smaller and less sophisticated end users would find it more difficult to use derivatives to hedge their risk exposures. The OCC, for example, requires full documentation of all information supplied by banks concerning the risks of derivatives transactions negotiated

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[88] For an interesting application of this argument to commodities exchanges, *see* J. Harold Mulherin, Jeffry M. Netter, and James A. Overdahl, "Prices are Property: The Organization of Financial Exchanges from a Transaction Cost Perspective," *Journal of Law and Economics* 34 (October 1991).

[89] The OCC maintains that its requirement is not a suitability requirement *per se*, because it pertains only to credit risk management and is dubbed an "appropriateness" requirement.

with "questionable" counterparties, despite the absence of such requirements for non-derivatives transactions. Increased compliance costs will prompt some dealers simply to avoid users whose sophistication would be costly to document. Less sophisticated institutions will be forced, as a result, to use more expensive risk management methods or, in the extreme, to leave their risks unmanaged. Either choice will create a cost to be borne by the shareholders and creditors of the institution.

(3) Capital Requirements

Adequate capitalization is viewed by most regulators and legislators as a necessary condition for participation in derivatives activities. International efforts to harmonize minimum capital requirements have been made by the BIS, which in 1993 proposed separate capital requirements for market and credit risk arising from derivatives. These proposed requirements were based on simplified risk models that all institutions, large and small, would have been required to use to calculate minimum capital requirements. In 1995, the BIS revised its proposal to allow sophisticated institutions the flexibility to use their own internal models for measuring capital adequacy. The BIS also proposed recognizing some types of bilateral netting in determining capital adequacy.

Given the credit-intensive nature of PNDs, adequate capitalization is an essential precondition for active participation. Poorly capitalized institutions that represent significant credit risks will find that it is impossible to be competitive in derivatives activity. In fact, existing derivatives dealers, including the derivatives affiliates of securities firms and insurance companies, are already well-capitalized.

Active derivatives dealers, moreover, have developed sophisticated internal models for measuring and allocating risk capital in order to ensure adequate capitalization. Regulatory requirements for capital have been oversimplified historically and have tended to penalize those institutions which invest considerable resources in sophisticated internal risk management systems. Regulatory concerns about capital adequacy can best be addressed by allowing institutions to use their own risk management models for determining capital adequacy for credit and market risks, subject to oversight by supervisors. This policy will promote innovation, safer and sounder financial institutions, and more efficient allocation of capital.

To reduce credit risk further and conserve scarce capital, close-out netting should be fully recognized in determining capital adequacy for both current and potential future exposure to the extent it is legally enforceable. The impact of the recognition of netting on capital availability will be substantial. A GAO survey, for example, finds that netting arrangements reduced credit exposure by roughly 36 percent at year-end 1992. [90]

[90] GAO, *op. cit.*

(4) Management Oversight

Both the private and public sectors view informed oversight by senior management and directors as an integral part of sound risk management practice, not only for derivatives activities, but for *all* risk-taking activities. In 1993, The Group of Thirty recommended to industry that senior management should try to ensure that derivatives are used in a manner consistent with the overall risk management policies adopted by their boards of directors. [91]

Shareholders, creditors, directors, senior management, and outside auditors have strong incentives to ensure adequate managerial oversight of *all* risk-taking activities, including derivatives, in order to protect and enhance the profitability and soundness of the institutions. These incentives include the existing fiduciary duties and associated legal liabilities of boards, senior management, and auditors. Other market mechanisms, including reviews of risk management procedures by credit rating agencies and by insurance companies that provide insurance for directors and officers, reinforce these incentives.

In response to The Group of Thirty's 1993 recommendations, senior managers at major U.S. dealers have conducted internal reviews of risk management procedures and practices, including procedures for oversight by senior management and directors. In many cases, these internal reviews have been supplemented by external risk management audits. [92]

Federal regulations requiring a particular level of involvement by management in the oversight process will be virtually impossible to implement and enforce at a reasonable cost. Each institution faces a unique combination of risk exposures and has its own methods for managing and controlling those exposures. As even the banking regulators have acknowledged, regulation cannot substitute for effective management oversight.

(5) Unregulated Entities

The GAO and several members of Congress have expressed concern about the largely unregulated activities of U.S. derivatives dealers that are affiliates of broker/dealers and insurance companies. The GAO is especially concerned that the derivatives activities of these affiliates are not subject to safeguards such as capital standards or regulatory examinations. The GAO is also concerned that FDICIA-type mandates (e.g., independent audit committees, public reporting on assessments of internal control systems, and an annual external audit of risk management systems) did not apply to these derivatives affiliates or to active end users of complex derivatives. The fear is that a failure of one of these firms could pose risks to other, more regulated firms, including federally insured banking institutions.

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[91] Global Derivatives Study Group, *op. cit.*

[92] *See* Group of Thirty (1994), *op. cit.*

The GAO argues that federal regulators have a direct obligation to ensure the safety and soundness of major bank derivatives dealers because of payment system concerns and the federal deposit insurance guarantee. The agency also asserts, however, that derivatives have the same implications for the financial system whether the major dealer is a bank, securities firm, or insurance company. The apparent logic is that the concentration of credit exposure among the major dealers and the linkages created by derivatives between those institutions means that a failure of *any* dealer threatens the banking system and the deposit insurance fund. The GAO, however, does not provide evidence to support this conclusion. In fact, the evidence presented in the report runs counter to this underlying hypothesis and undermines the GAO recommendation.[93]

The GAO presents no evidence, for example, that unregulated derivatives dealers are "undercapitalized." On the contrary, the market demand for a high credit rating has driven some securities firms to set up separately-capitalized, credit-enhanced affiliates with AAA credit ratings. Nor is evidence presented by critics of unregulated dealers that these affiliates are poorly managed relative to major bank dealers. In fact, the credit ratings of these unregulated dealers, most of which are AAA, come only after rigorous examinations of their risks and internal controls by rating agencies such as Standard & Poor's or Moody's.

(6) Proprietary Trading

Several recent, widely publicized financial losses have fueled concerns that derivatives are simply instruments for speculation, and that such speculation creates a danger to the health of the U.S. financial system. Most suggestions for "curbing" such speculative excesses, however, give exceptions to financial institutions engaged in "legitimate" hedging transactions.

Federal financial regulators, however, are left with the daunting task of defining which transactions are legitimate. Some transactions are obvious hedges, as they can be linked directly to the reduction of risks arising from specific balance sheet assets or liabilities. Other transactions, which may nonetheless be legitimate economic hedges, are harder to define as such. Banking institutions managing their interest rate risk, for example, frequently hedge *anticipated* net interest income. If the bank expects future cash flows with a reasonable degree of certainty, derivatives such as interest rate swaps, FRAs, index amortizing swaps, and interest rate futures can indeed reduce the potential risk of the firm. But since such transactions cannot be associated with specific balance sheet items, would-be regulatory prohibitions on proprietary trading could require regulators to prohibit these types of transactions.

The problems are many at both the economic and practical levels.[94] As an example of the latter, the Financial Accounting Standards Board (FASB) has struggled for years with defining

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[93] GAO, *op. cit.*

[94] Some of the economic issues involved in defining a "hedge" are explored in Culp and Miller (1995 forthcoming), *op. cit.*

"hedge transactions" for accounting purposes. Generally, FASB defines a "micro" hedge as a transaction designed to manage the risk of specific balance sheet items. A "macro" hedge, by contrast, is a transaction that is designed to reduce the overall risk of the firm but which cannot be linked to a specific balance sheet entry. To date, FASB has been unable to define a set of criteria to determine when a macro hedge should be accounted for as a legitimate hedge. Regulators, undoubtedly, will encounter similar problems.

Even if hedging could be defined in a simple and unambiguous fashion, enactment of proposals to restrict proprietary trading on house accounts would have other deleterious consequences. Such prohibitions would discourage dealing activities, for example, by all but the most well-capitalized banking institutions. This would harm end users by limiting their access to dealers. The proposal also would place U.S.-insured depository institutions that were dealers at a competitive disadvantage relative to their foreign counterparts and relative to U.S. dealers that were not federally insured, such as investment banks and insurance companies.

(7) Multilateral Clearing and Netting

Some have argued that the absence of "clearinghouses" and multilateral netting arrangements represents a market failure in privately negotiated derivatives. [95] In the commodization of derivatives, clearinghouses for exchange-traded derivatives evolved *alongside* bilaterally-netted PNDs, not *instead* of them. There clearly is a willingness in the marketplace to manage credit risk through other mechanisms, such as bilateral netting and credit enhancements. Capital itself, moreover, is a means of managing credit risk, and swap dealers tend to be quite well-capitalized. [96]

The Chicago Mercantile Exchange also recently advanced a proposal for establishing a collateral management facility. The CME Depository Trust Co., although *not* a multilateral netting and clearinghouse association, would represent another move toward off-exchange credit risk management while allowing PNDs to remain inherently customized.

(8) Systemic Risk

Perhaps the most oft-cited source of market failure in derivatives is the "externality" believed to exist when the failure of one large institution precipitates a system wide series of failures. Concentrations of credit risk, for example, could lead to the failure of one institution (e.g., a dealer or futures clearinghouse) causing the failure of its counterparties.

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[95] *Cf.* Commodity Futures Trading Commission, *OTC Derivative Markets and Their Regulation* (October 1993).

[96] *See* Mark C. Brickell, "Clearinghouse Arrangements for Privately-Negotiated Derivatives," in *Symposium Proceedings: International Symposium on Banking and Payment Services* (Washington, D.C.: Board of Governors of the Federal Reserve System, December 1994).

Systemic risk is an easy concept to use for justifying regulation because it is impossible to define. Basic logic suggests that it is impossible to argue against that which cannot be defined. Perhaps the best argument against this market failure concern, then, is the absence of empirical evidence.

The 1993-95 period has seen several major derivatives-related losses, and at least one major failure. Barings PLC failed on February 27, 1995, after a trader purportedly ran up a $1 billion speculative loss against a firm wide capitalization of only about $500 million. Notably, no system wide disruption occurred. Nor did such disruptions occur when Drexel Burnham Lambert Group, the Development Finance Corp. (New Zealand), the Bank of New England, British & Commonwealth Merchant Bank, Olympia & York, and Lee B. Stern & Co. failed, despite the presence of derivatives in each case. [97] Nor did systemic disruptions follow the derivatives-related losses incurred by Procter & Gamble, Gibson Greetings, Piper Jaffray, Orange County (California), or Metallgesellschaft AG.

Miller argues that, far from *causing* systemic risk, derivatives help mitigate it by providing means by which people can better manage risks. True, markets may be more "interconnected" because of derivatives, but were that not so there would be no point to derivatives anyway. The interconnections between derivatives and other markets, including the underlying cash markets, are what ensures that the valuation of the derivatives contracts will be rational. [98] Miller argues that most genuine historical examples of systemic risk, such as the post-crash bank failures of the Depression Era, can be traced to *government actions*, not market forces. [99]

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[97] *Cf.* Commodity Futures Trading Commission, *op. cit.*

[98] Many financial derivatives, for example, are priced according to the "principal of no arbitrage." Because derivatives can be combined into synthetics, arbitrage opportunities will exist if the price of the synthetic differs from the price of the contract the synthetic replicates by more than transaction costs. Because such arbitrage opportunities are exploited, pricing is efficient.

[99] Merton H. Miller, "Systemic Risk," presented before the Ninth Annual General Meeting of the International Swaps and Derivatives Association, Chicago (March 17, 1994).

IX. LESSONS FROM U.S. DERIVATIVES REGULATION [100]

The current system of regulating PNDs does provide some useful insights into what comprises "better regulation." *Any* regulation based on a flawed market failure premise, of course, is undesirable, costly, and unjustified. The current system of PND regulation, however, provides three concrete examples of "second-best" regulation, especially compared to the regulation of exchange-traded derivatives.

A. Regulatory Competition

As regulators try to mitigate perceived problems, they may opt for caution and be too zealous, too conservative, and too rigid. This sort of over-regulation not only imposes high costs on regulated institutions and their clients, it can also result in actions that create instability in the banking system by forcing capital to be deployed in unnecessary regulatory compliance rather than in productive activities like risk management.

Firms dealing in or using privately negotiated derivatives can diversify their "regulatory risks" in three ways. First, a firm can diversify *geographically* by moving its operations offshore. If regulation in one country imposes costs on firms that exceed relocation costs, the firms relocate. Second, firms can sometimes diversify within national boundaries by *switching to another regulator*. In the United States, for example, a nationally chartered bank regulated by the OCC can become a state-chartered Fed-regulated bank, and vice versa. Finally, firms can diversify across "financial functions." If the institutional regulator of a bank using PNDs imposes excessively costly regulations on the bank, it may substitute toward similar products like exchange-traded derivatives.

Regulatory competition is the best possible means of ensuring that regulators consider the *costs* of regulation before acting. A "market" in derivatives regulation fosters competition among regulators that tends to force regulation down to its minimum total cost. Surprising as it may sound, regulatory competition may also benefit regulators. Some critics of regulatory diversification argue that a "race to the bottom" results, in which regulators are driven to under-regulate as they try to steal market share from other agencies, hence justifying bigger budgets for themselves. Far from it, regulatory diversification helps ensure that each regulator can develop specialized expertise about the institutions and functions it regulates, in turn allowing the regulator to focus on only the legitimate potential problems.

An important benefit of regulatory competition is that *not every privately negotiated derivatives participant is regulated.* Consider the AAA-rated separately capitalized affiliates of securities firms which have no principal regulator of their PND activities. Because these affiliates deal mostly with other swap dealers and highly-rated end users, they operate only in *wholesale*

[100] Portions of this section are drawn from Culp (1995), *op. cit.*

markets. The absence of "widows and orphans" means that regulation premised on the need to protect "retail" investors plays no role with these dealers. Because their insolvencies would neither tap deposit insurance funds nor probably ever result in a systemic crisis, regulation along those lines is also unwarranted. Competition between regulators has been a primary reason why unnecessary regulations have not been developed in this area.

End users of PNDs are also largely unregulated. This, too, is reasonable. Corporations using PNDs, such as McDonald's, are neither retail investors nor "systemically important." Regulating their use of PNDs would accomplish little except raising their costs of acquiring capital and managing risks.

B. Market Discipline

The second principle on which regulation of most PND activities is based is "market discipline." Banking regulators, for example, have tended over the last decade to promote *market discipline* as the primary mechanism for enforcing safe, sound, and equitable trade practices. [101] Consider some examples:

First, the credit-sensitive nature of privately negotiated derivatives has led firms to develop their own systems for ascertaining counterparty creditworthiness. Much like the credit assessments undertaken by firms in extending trade credit, the process of evaluating and selecting those counterparties most capable of being dealers receives continuous and close attention from swap end users. Dealers, in turn, must regularly demonstrate their integrity, reputations, and ability to honor long-term commitments. The result is a set of very well-capitalized swap dealers with financial integrity and reputations that keep customers coming back for more. The current list of swap dealers has been determined *completely* by "natural selection" in the marketplace, not political regulation.

Second, many bank regulators have deliberately avoided micro managing emerging issues such as the disclosure of derivatives risks and positions. On more than one occasion, bank regulators have accurately observed that to micro manage disclosure rules now would be to presume that regulators know better than market participants what *needs* to be disclosed. Their willingness to shun micro management to date suggests they have wisely not made that presumption.

Third, institutional and functional regulators alike acknowledge that the best form of market discipline is the risk of bankruptcy. Perhaps the best example of regulators' tendency to promote market discipline in derivatives is the recent failure of Barings PLC. Regardless of who knew what and when, the Bank of England (BOE) decision to let Barings fail goes a long way

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[101] *Cf.* David G. Oedel, "Private Interbank Discipline," *Harvard Journal of Law and Public Policy* 16 (Spring 1993).

toward promoting increased attention by market participants to risk management and internal controls.

Some have argued, however, that the BOE was only able to let Barings fail because its relatively small size meant that its failure posed no systemic risks. The reluctance of regulators to let large institutions fail is called the "Too Big to Fail" doctrine, and it has led many to conjecture that market discipline is not forceful enough among the largest commercial banks to provide an adequate market regulation mechanism. There is some merit to this conjecture, but things are changing.

The U.S. Congress, for example, enacted the Federal Deposit Insurance Corporation Improvement Act, or FDICIA. That 1991 law sets up a high set of hurdles that regulators must cross before they "bail out" a failing bank of any size, including strict limits on discount window loans to undercapitalized institutions. Even if the Federal Reserve Board and FDIC deem intervention necessary to avert a "systemic crisis," a bailout is still subject to approval by the Secretary of the Treasury, after consultation with the President of the United States.

That a statutory reform like FDICIA could completely eliminate the "Too Big to Fail" doctrine is unlikely. But FDICIA does ensure that future bailouts in the United States will result in *ex post* accountability of the regulators in full public view. [102] If central banks insist on perpetuating Too Big to Fail, at least mechanisms can be put in place to ensure that, after the bailout, regulators will be held accountable for their decisions.

C. Flexible Supervision, Not Rigid Regulation

Regulations pertaining to PNDs issued by commercial bank regulators have been more oriented toward "examiner guidance" and suggestions of "sound practices" than rigidly enforced, outright regulations. The supervisory initiatives taken around the world in derivatives have also focused mainly on those institutions with the greatest potential risks. The supervision of commercial bank derivatives activities is far stricter for large institutions with potential systemic risk than for small ones. The greater focus on larger institutions dealing in many financial products has fostered a better understanding by regulators of what specific dealers are doing. This enables regulators to assess specific risk management systems, hedging policies, and internal controls on a case-by-case basis better than if a rigid "rule book" subjected an incredibly disparate set of derivatives users to some uniform set of standards.

Supervisory flexibility is perhaps nowhere more important than to dealers with expensive, complex, internally developed models and algorithms for measuring value at risk, credit risk, and capital adequacy. Although several central banks, including the Fed and BOE, have suggested

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[102] For a broader discussion of FDICIA, *see* Tom Miller, *A Citizen's Guide to Banking Reform* (Washington, D.C.: Citizens Against Government Waste, 1992).

that these models should be reviewed for their integrity, the central banks have continued to support an approach that favors determining capital requirements based on the internal models banks already have in place.

Allowing banking institutions to rely on their own internal models for capital allocation also promotes the external benefit of increased stability in the banking system. The development of new and better risk management models, principally for use with derivatives, is already spilling over rapidly into better risk management for more traditional banking activities. The value at risk concept, for example, is being increasingly used for *comprehensive* risk management by banks not just for derivatives, but also for asset/liability management and funding risk management.

D. Current Problems and Cautions for the Future

Even though the threat of losing a regulatory constituency has forced PND regulators to consider the costs of their actions, the pressure on regulators to prevent perceived systemic disasters and functional regulators to protect "widows and orphans" prompts regulators virtually everywhere occasionally to ruminate about the need for "better" regulation. But better often means "worse" in the context of the principles of regulatory diversification, market discipline, and flexible supervision.

Centralized *national* regulatory agencies also threaten the benefits of regulatory diversification. When institutional and functional regulation is separated only across divisions in a single agency, the benefits of regulatory diversification vanish. Banks cannot diversify regulatory risk by changing the *department* to which they are accountable. Departments do not compete with each other nearly as fiercely as agencies do. In the former case, after all, departments only compete for the attention and resources of their *common* supervisor.

Proposals to merge regulatory agencies often are justified on grounds that at first glance sound almost appealing. Proponents of such proposals argue, for example, that single regulators have minimal regulatory overlap, whereas multiple agencies overlap significantly. Although the latter is sometimes true in practice, it need not always be the case. Regulatory overlap can be eliminated while allowing agencies to remain independent of one another. Indeed, that would *increase* regulatory diversification.

Finally, perhaps the biggest danger to the combined institutional/functional regulatory paradigm comes from statutory monopolies that some regulators possess. The benefits of regulatory diversification obviously cannot be realized if regulatory monopolies prohibit switching regulators. And perhaps worse, regulatory monopolies tend to foster adversarial relations between a regulator and its constituent regulatees.

There is perhaps no better example of this threat to the paradigm than the current regulation of exchange-traded derivatives by the CFTC under the Commodity Exchange Act, as discussed earlier. Because the CFTC possesses a statutory monopoly on U.S. futures exchanges

and futures contracts, regulatory competition is nonexistent. This, in turn, has given the CFTC minimal incentive to consider the costs of its regulations, with dire consequences for the futures industry. New futures contracts, for example, must be *preapproved* by the CFTC, and that process sometimes takes more than a year—plenty of time to place U.S. commodities exchanges at a severe competitive disadvantage relative to PND dealers and foreign exchanges.

The threat posed to the paradigm by the CFTC, moreover, is growing rather than diminishing in size. Not only have the CFTC's recent statements created additional cause for concern about the legality of instruments such as equity swaps, the CFTC also recently proposed a separate anti-fraud rule which it would administer over exempt privately negotiated derivatives. The Commodity Exchange Act already contains an anti-fraud rule for exchange-traded derivatives, and even that rule is becoming quickly antiquated. Originally intended to protect the retail investors using futures, the increased participation in futures by non-retail, sophisticated firms like swap dealers forces futures participants to adhere to a costly and cumbersome set of regulations that are hardly relevant to what has become more of a wholesale than retail market. Extending that authority of the CFTC to deter fraud in swaps activity, which is comprised virtually entirely of large, sophisticated participants, would be an unwarranted expansion of regulation.

Regulations that rely on regulatory competition, market discipline, and supervisory flexibility are closer to "*laissez-faire*" regulation than no regulation at all. To date, PNDs have been regulated in this manner, although exchange-traded derivatives have not. In addition to shunning calls from some agencies and legislators to step up the regulation of PNDs to a more interventionist level, Congress also should consider backing away from the statutory monopoly that the CFTC has over exchange-traded derivatives.

GLOSSARY

American Option: an option contract entitling the purchaser to exercise at or before the contract matures.

Bilateral Contract: a contract whose value depends on the performance of the two counterparties to the transaction. One party is generally considered "long" the underlying, while the other party is "short."

Bilateral Netting: the exchange of a single net cash flow between two counterparties rather than two gross cash flows. Rather than A paying $1 to B and B paying $2 to A, bilateral netting involves the payment only of the net $1 from B to A.

Call Option: a derivatives contract giving the purchaser the right but not the obligation to buy a specified amount of the underlying asset on or before the maturity date of the contract at a price fixed at the contract's inception.

Cap: a privately negotiated, option-based derivatives contract that entitles the long to receive periodic interest payments based on fixed reference rate and notional principal amount.

Caplet: a single call option written on some reference interest rate, such as LIBOR, with a notional principal amount.

Caption: a contract giving the purchaser the right but not the obligation to enter into a cap at a fixed reference rate at or before some date in the future.

Cash-Settled Contract: a contract in which the cash-equivalent value of some asset, index, or reference rate is exchanged rather than the underlying.

Cheapest to Deliver Option: an option embedded in a futures contract that allows the short (seller) to deliver any of several underlyings. Because the seller can choose the cheapest of the available alternatives, the option is valuable.

Close-Out Netting: the method by which net cash flows are calculated and exchanged following the close-out of a privately negotiated derivatives contract before the contract matures.

Collar: a privately negotiated, option-based derivatives contract consisting of a cap and a floor, thereby allowing its purchaser to specify minimum and maximum borrowing rates. The principal is notional.

Commodity Exchange Act (CEA): First enacted in 1936 and amended numerous times since, this act gives the CFTC exclusive jurisdiction over "futures" and commodities.

Commodization: the process by which illiquid financial contracts negotiated between opaque institutions gravitate toward more liquid and transparent "markets."

Credit Enhancements: supplements to privately negotiated derivatives contracts designed to mitigate the loss associated with a potential adverse credit event or counterparty default. The most popular types include third-party guarantees of performance and collateral.

Credit Risk: the risk that a counterparty default imposes unexpected losses on the non-defaulting party to a financial transaction.

Currency Swap: a privately negotiated, forward-based derivatives contract in which one party borrows foreign currency from the counterparty and repays the loan at a future date at a pre-agreed exchange rate. The principal is not notional and is actually exchanged, and interest payment are typically made on a regular basis.

Current Presettlement Exposure: credit exposure resulting from the potential for a counterparty default on the date the exposure is measured. Equal to the replacement cost of the contract.

Daily Settling Up: the daily marking to market of exchange-traded derivatives positions, followed by disbursements to the accounts of those exchange members with a positive net cash flow for the day and collections from the accounts of members with a net obligation to the clearinghouse. Some of the Chicago exchanges settle up more than once per day.

Delta: the market risk that small changes in the underlying will cause a financial asset to decline in value.

Derivatives Contract: a zero net supply contract between two parties deriving its principal value from some underlying asset, reference rate, index, or combination thereof. Derivatives contracts may be exchange-traded or privately negotiated.

Derivatives Securities: See *Structured Securities.*

European Option: an option contract that may only be exercised by the purchaser on a specified date.

Exchange-Traded Derivatives: derivatives contracts in which one party to the contract is an organized financial exchange or the clearinghouse of an organized exchange. Exchange-traded derivatives are "listed" for trading by an organized securities or commodities exchange.

Exchange Trading Requirement: This requirement of the Commodity Exchange Act holds that all non-excluded and non-exempt products deemed futures and commodities must be traded on a CFTC-regulated commodities exchange.

Exercise: the decision by a call (put) option purchaser at or before maturity to purchase (sell) the underlying at the strike price.

Financial Engineering: the construction of new financial instruments from the forward and option building blocks.

Financial-Innovation Spiral: the process by which regulation prompts financial innovation, which in turn prompts further regulations and additional innovation.

Fixed-for-Floating Rate Swap: an interest rate swap in which the periodic cash flows made by one counterparty are a fixed percentage of the notional amount of the contract, and the cash flows of the other party are based on some underlying, floating reference interest rate (e.g., LIBOR). The principal amount is notional and used only to calculate the amount of the cash flows on each settlement date.

Floor: a privately negotiated, option-based derivatives contract that entitles its purchaser to make periodic interest payments at a fixed rate based on a notional principal amount.

Floorlet: a single put option contract written on some reference interest rate with a notional principal.

Floortion: a contract giving the purchaser the right, but not the obligation, to enter into a floor at a fixed reference rate at or before some date in the future.

Forward-Based Derivatives Contract: a derivatives contract marketed as a single financial product that can be viewed as primarily a portfolio of forward contracts.

Forward Contract: a privately negotiated derivatives contract that obligates the long (short) to purchase (sell) a specified amount of a particular asset on a specified date in the future for a price agreed upon when the contract is negotiated. Forward delivery contracts involve the purchase or sale of a physical asset, whereas cash-settled forward contracts involve the future exchange of some cash flow.

Forward Contract Exclusion: exclusion of certain forward contracts from the exchange trading requirement of the Commodity Exchange Act.

Forward Rate Agreement (FRA): a forward contract obligating the long at a specified future date to borrow funds from the short at some interest rate fixed at the contract's inception. The total amount borrowed is determined by a notional principal amount. FRAs are usually based on LIBOR.

Forward-Start Swap: a swap in which the periodic settlements commence on a date after the contract is negotiated.

Fraption: a contract entitling its purchaser to enter into a FRA at or before some future date at a specified interest rate.

Functional Regulation: the regulation of products and markets and those who use them based on the perceived economic functions they supply.

Futures Commission Merchant (FCM): a regulated firm authorized to engage in futures transactions on behalf of customers.

Futures Contract: a standardized, exchange-traded, forward-based derivatives contract that obligates the long to purchase a specified amount of the underlying or make a specified cash payment when the contract matures.

Futures Option: a call (put) option that entitles its purchaser to go long (short) a futures contract on some future date at a prearranged price.

Gamma: the risk that large changes in the underlying will result in declines in the value of a derivatives contract proportionately larger than the change in the underlying. Also called "convexity."

Herstatt Risk: settlement risk associated with the two-day period in which foreign currency settlements may occur. See *Settlement Exposure.*

In-the-Money: an option contract that has a positive intrinsic value. The current price of the underlying must be above (below) the strike price of the call (put) option.

Index Amortizing Swap: an interest rate swap in which the notional principal amount amortizes over time at a rate determined either by a negotiated amortization schedule or movements in some reference rate such as LIBOR.

Institutional Regulation: the regulation of particular institutions, such as banks.

Intellectual Risk: the risk that employees with specialized knowledge about derivatives contracts and risk management leave a firm unexpectedly.

Interconnection Risk: the risk that a portfolio of assets or liabilities will incur losses resulting from unexpected changes in correlations between the products in the portfolio.

Interest Rate Risk: the risk that a portfolio of assets or liabilities declines in value as interest rates of various maturities change in absolute and relative terms.

Interest Rate Swap: a privately negotiated, forward-based derivatives contract in which two counterparties agree to exchange cash flows on periodic settlement dates for a specified length of time, where the cash flows are determined by one or more underlying reference rates and a notional principal amount.

Intrinsic Value: the current or present value of an option contract if exercised.

Legal Risk: the risk that a derivatives contract is unenforceable.

Liquidity Risk: the risk that cash flow shortfalls inhibit the servicing of current obligations and precipitate a settlement default or the termination of a contract before its maturity. Also called "funding risk."

London Interbank Offered Rate (LIBOR): the rate at which banks offer to lend to other banks in the large-dollar Euro-deposit market.

Long: a term used to describe a position in the market that increases in value as the underlying asset price, reference rate, or index increases. A long position is equivalent to the current or future purchase of the underlying.

Margin: the performance bond an investor must post with an organized commodities exchange prior to and during the life of an exchange-traded derivatives contract.

Market Failure Paradigm: the theory that government regulation is required to address failures of the market in policing itself and performing certain functions perceived as necessary.

Market Risk: the risk that an asset declines in value due to adverse movements in market-determined prices, interest rates, or index values.

Market Liquidity Risk: the risk that a losing transaction cannot be liquidated or hedged, allowing losses on the transaction to accumulate.

Mark-to-Market Value: the value of a derivatives contract evaluated at current market prices. Current mark-to-market value is generally the discounted present value of expected future net cash flows on the contract.

Master Agreements: standardized documentation for privately negotiated derivatives in which all the economic and legal terms of the contract are specified.

Mortgage-Backed Security: a debt security whose interest and/or principal repayments are based on the receivables from the interest and/or principal of an underlying pool of mortgage loans.

Multilateral Clearing and Settlement: the calculation and disbursement/collection of net cash flows between a clearinghouse or clearing association and each of its members across all transactions and products.

Notional Principal: a principal amount underlying some derivatives contracts that is never actually exchanged. The notional amount is used exclusively for calculating settlement payments. A FRA with a $1 million notional amount and fixed interest rate of 5 percent, for example, would obligate the long to borrow from the short $50,000 at the contract's maturity date.

Offsetting: the process in which an open position in a standardized, exchange-traded derivatives contract can be neutralized by taking an opposite position. Because the terms of exchange-traded derivatives are standardized, a long position can be offset with a short position in the same contract, and vice versa.

Operational Risk: the risk that inadequate systems, internal controls, disaster planning, or personnel will result in financial losses.

Option-Based Derivatives: a derivatives contract marketed as a single product that can be viewed as a portfolio of option contracts.

Option Contract: a contract that gives its purchaser the right but not the obligation to buy or sell a specified amount of a particular asset on or before some future date.

Option Premium: the amount an option writer collects from the option purchaser at the inception of the contract.

Option Pricing Models: a family of models used to approximate the value of options before maturity. These models may rely on analytical or numerical methods, or both.

Option Writer: the counterparty in an option contract that agrees to sell (buy) the underlying at the strike price in the contract to (from) the option purchaser.

Out-of-the-Money: an option contract that has no intrinsic value. The price of the underlying must be below (above) the call (put) strike price. Out-of-the-money options do still have "time value," however, reflecting the possibility that the option may later be in-the-money.

"Plain Vanilla" Interest Rate Swap: an interest rate swap in which one party pays a fixed rate and the other party pays a floating rate indexed to prevailing interbank Eurodeposit rates for the currency in which the swap is negotiated (e.g., LIBOR for U.S. dollar swaps). The principal amount is notional, and cash flows are bilaterally netted.

Potential Presettlement Exposure: credit exposures resulting from possible market movements before the maturity date of a derivatives contract.

Present Value: the current value of an asset or cash flow to be paid or received on some future date, discounted using an appropriate interest or risk-adjusted discount rate.

Privately Negotiated Derivatives (PNDs): customized, bilateral derivatives contracts (forward-based or option-based) negotiated in a decentralized, opaque environment.

Putable Swap: a swap contract in which one or both counterparties may terminate the swap early for a specified amount in the event of a particular market move. A putable fixed-for-floating rate swap, for example, might allow the counterparty that pays a fixed rate on each settlement date to terminate the contract if interest rates fall substantially.

Put-Call Parity: the relation between call and put prices that must hold to preclude arbitrage in an efficient capital market. Arbitrage opportunities are exploited if the synthetic resulting from combining calls, puts, and borrowing has a price outside transaction costs bounds of the instrument being synthetically replicated.

Put Option: a derivatives contract giving the purchaser the right, but not the obligation, to sell a specified amount of the underlying asset on or before the maturity date of the contract at a price fixed at the contract's inception.

Regulatory Risk: the risk that regulations and statutes or the judgment of regulators will adversely affect the value of a legitimate derivatives transaction.

Replacement Cost: the cost of replacing a privately negotiated derivatives contract at current market prices. Replacement cost is equal to the current mark-to-market value of the contract.

Rho: the risk that changes in the rate used to discount expected future cash flows will cause the present value of an asset to decline unexpectedly.

Securitization: the process by which debt securities are issued on which interest and/or principal payments are based on a pool of underlying assets or receivables. Securitization typically converts a pool of illiquid underlying assets into liquid, tradeable securities.

Settlement Exposure: credit exposure resulting from the possibility that a solvent counterparty will remit a payment but never receive payment from the counterparty due to a default. Both the payment and receivable represent potential credit losses. Settlement exposure is negligible on notional contracts.

Shad-Johnson Accord: accord between the SEC and the CFTC, subsequently enacted into law, that establishes the jurisdictional boundaries of the agencies in regulating derivatives based on securities and derivatives based on commodities.

Short: a term used to describe a position in the market that increases in value as the underlying asset price, reference rate, or index decreases. A short position is equivalent to the current or future sale of the underlying.

Strike Price: the price underlying an option contract that is set at the contract's inception at which the underlying asset is bought or sold.

Structured Securities: traditional debt or equity securities whose payments are combined with a derivatives transaction.

Swaption: a contract giving the purchaser the right but not the obligation to enter into a fixed-for-floating rate swap as either the fixed or floating rate payer at or before some date in the future.

Synthetic: a combination of forward and option building blocks with borrowing or lending to replicate the exposure that could be obtained by holding another building block.

Theory of Economic Regulation: the theory that regulation will be demanded by certain market participants.

Theory of Public Choice: the theory of how political agencies and bureaucracies behave in discharging regulatory responsibilities.

Theta: the risk that the value of an asset will decay as time passes.

Treasury Amendment: excludes certain securities and products based on foreign exchange from the exchange trading requirement of the Commodity Exchange Act.

Underlying: the asset price, reference rate, index level, or combination thereof which is the primary source of value for a derivatives contract.

Vega: the risk that changes in the volatility of the underlying will cause the value of a derivatives contract to decline unexpectedly. Also called lambda, kappa, and tau.

Zero Net Supply Asset: an asset for which the number of buyers and sellers must be equal. The asset is created only by agreement between buyer and seller. Examples of zero net supply assets include swap contracts and loans.

APPENDIX I: FIGURES

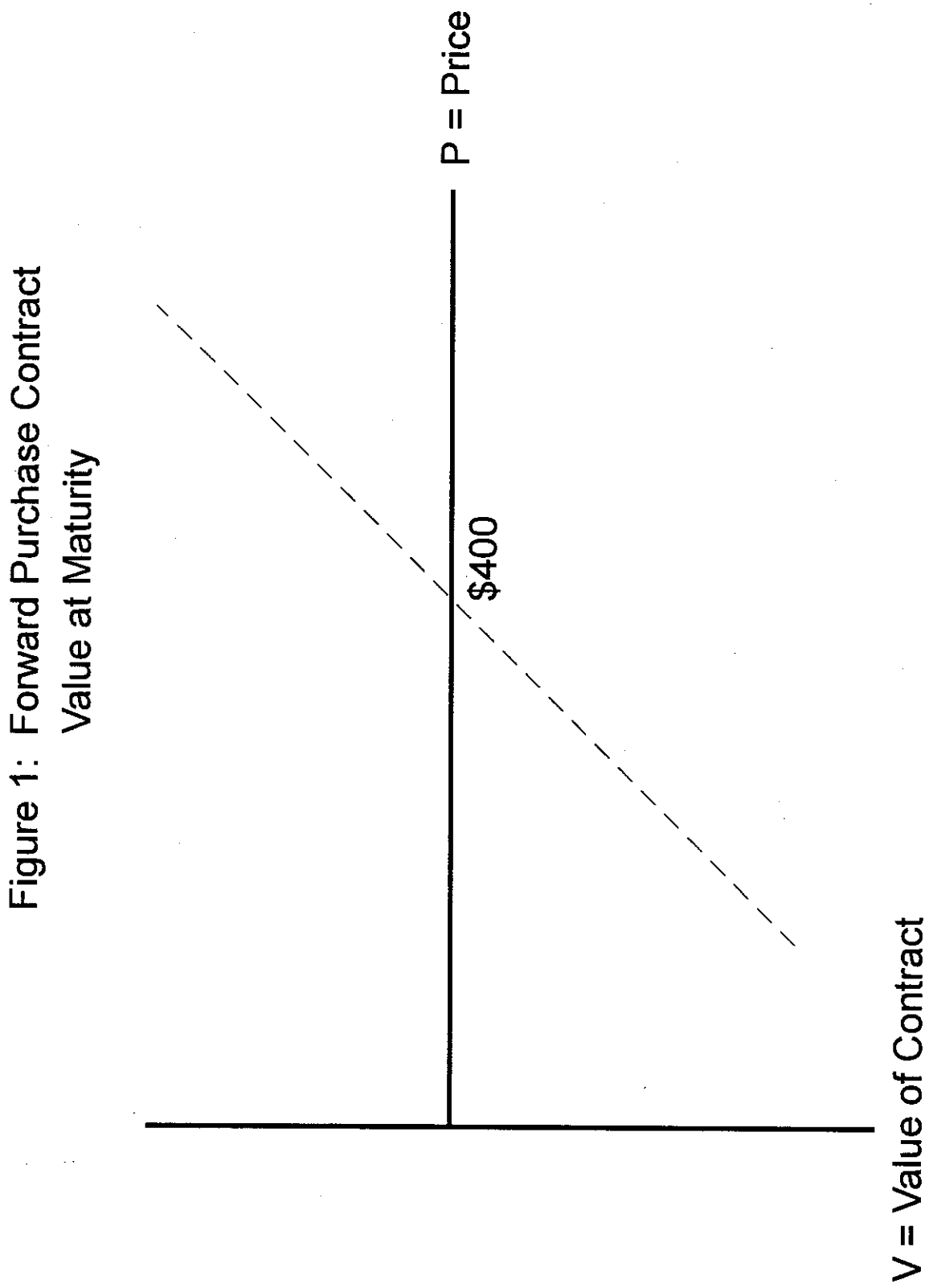


Figure 1: Forward Purchase Contract
Value at Maturity

Figure 2: Forward Sale Contract
Value at Maturity

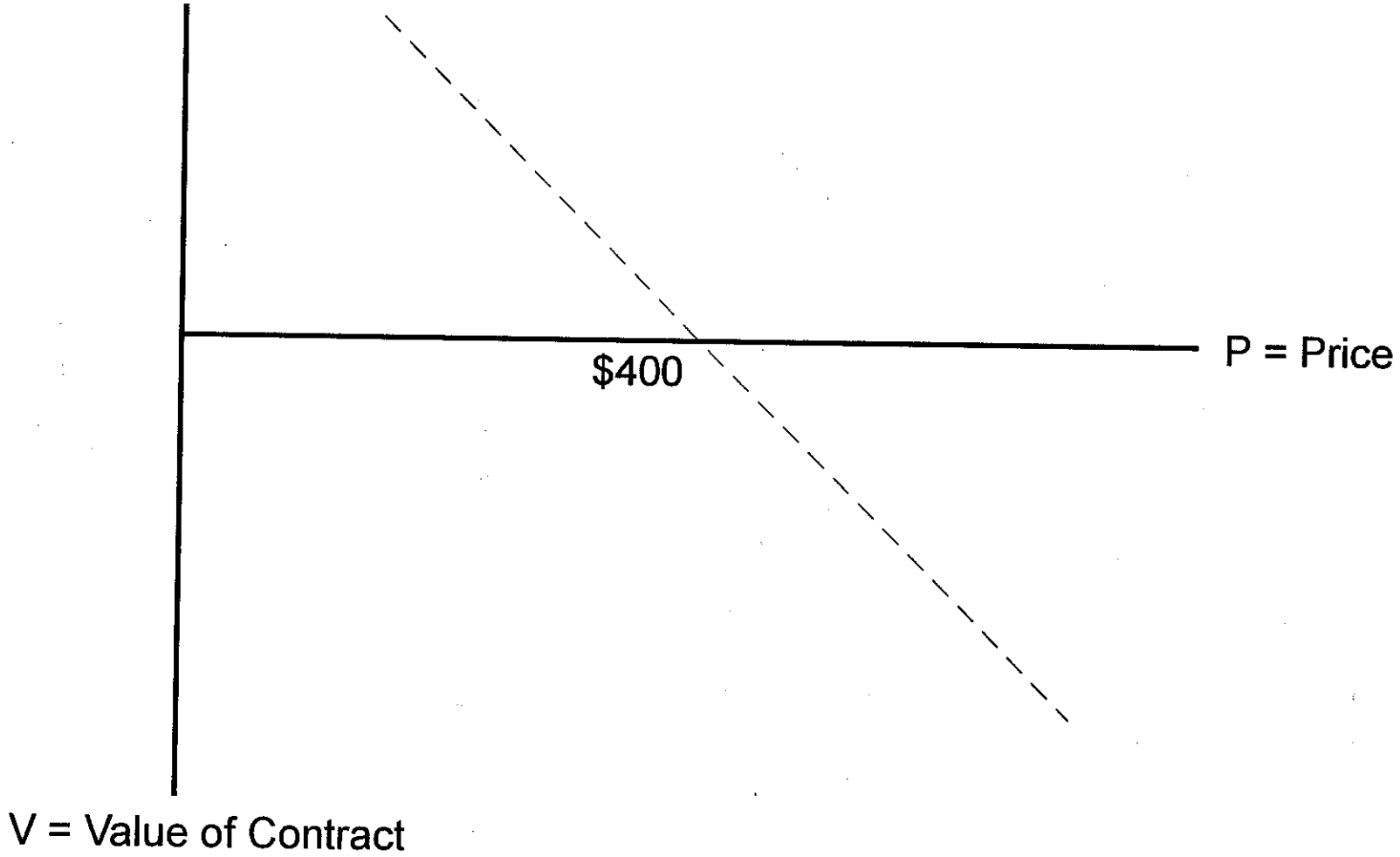
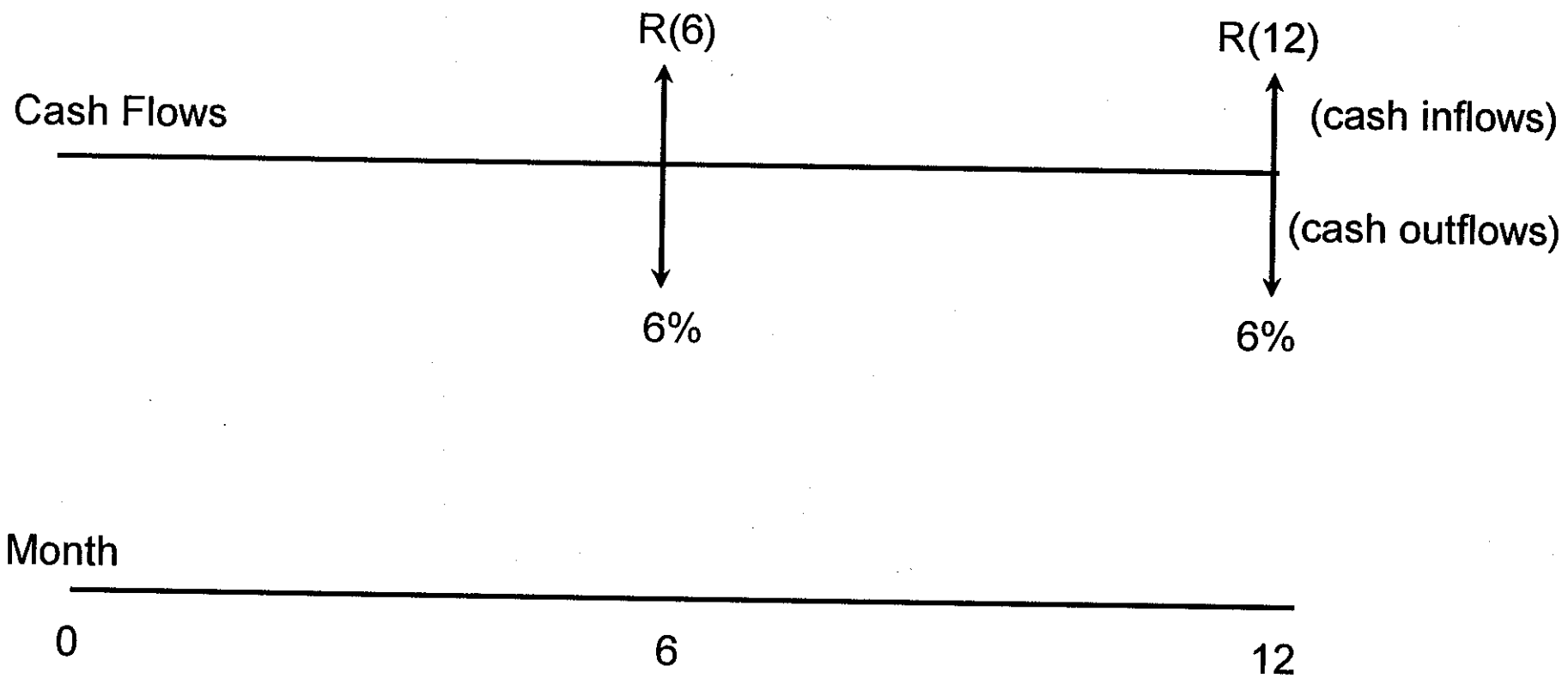
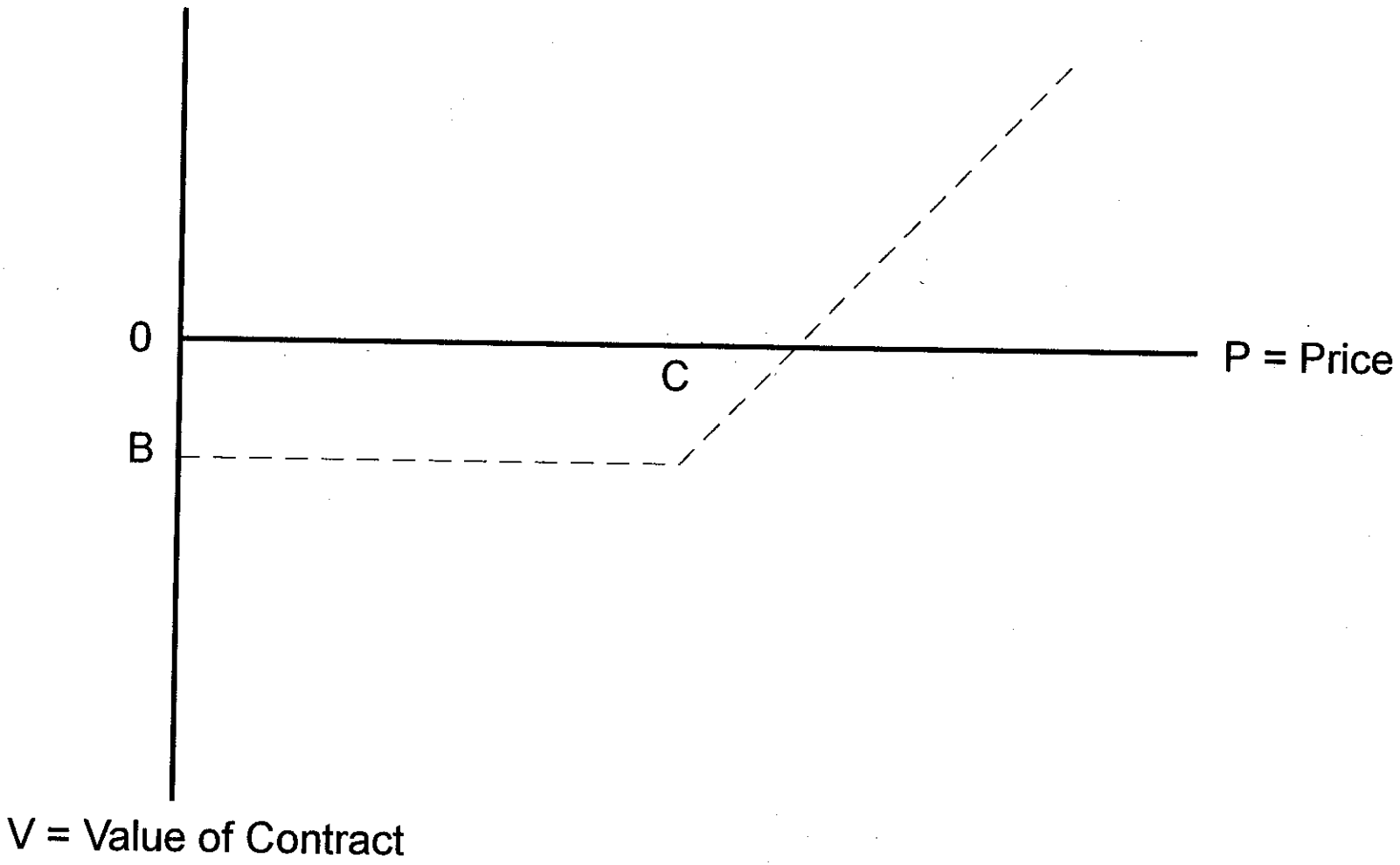


Figure 3: Cash Flows on an Interest Rate Swap for Firm Wells
Firm Wells Pays 6% Fixed and Receives LIBOR



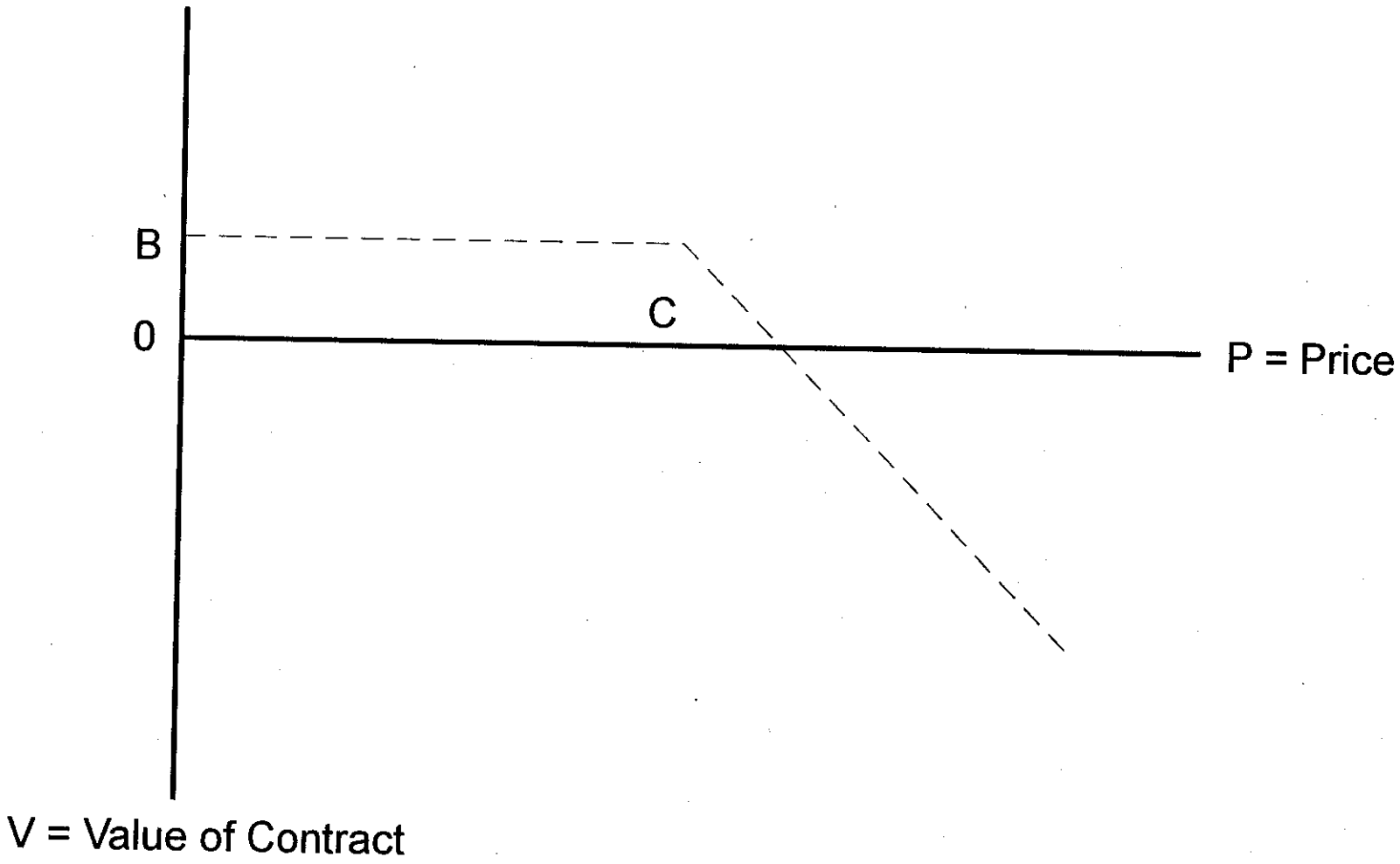
R(6) and R(12) denote LIBOR at months 6 and 12, respectively

Figure 4: Long European Call Option
Value at Expiration



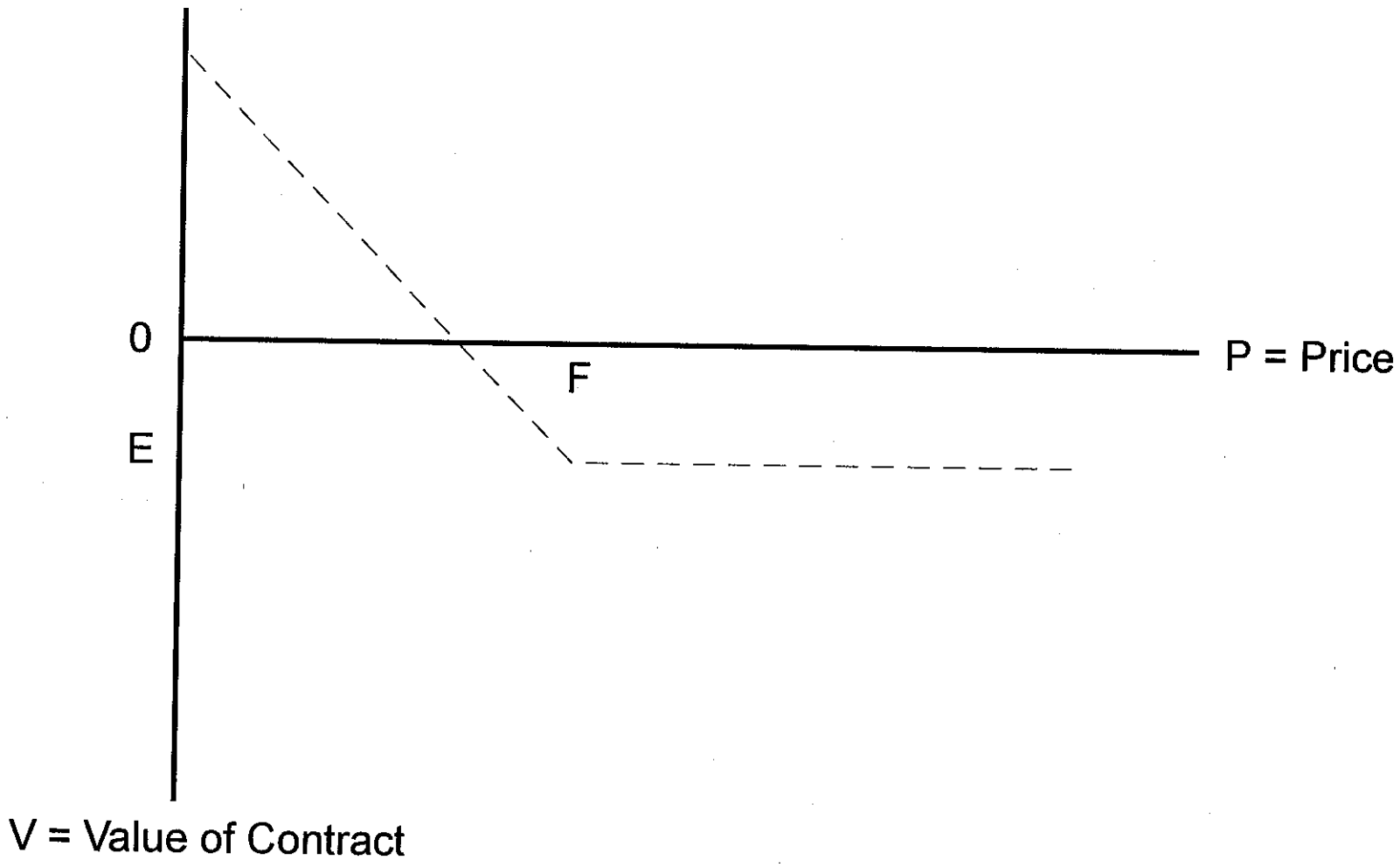
Strike Price = C

Figure 5: Short European Call Option
Value at Expiration



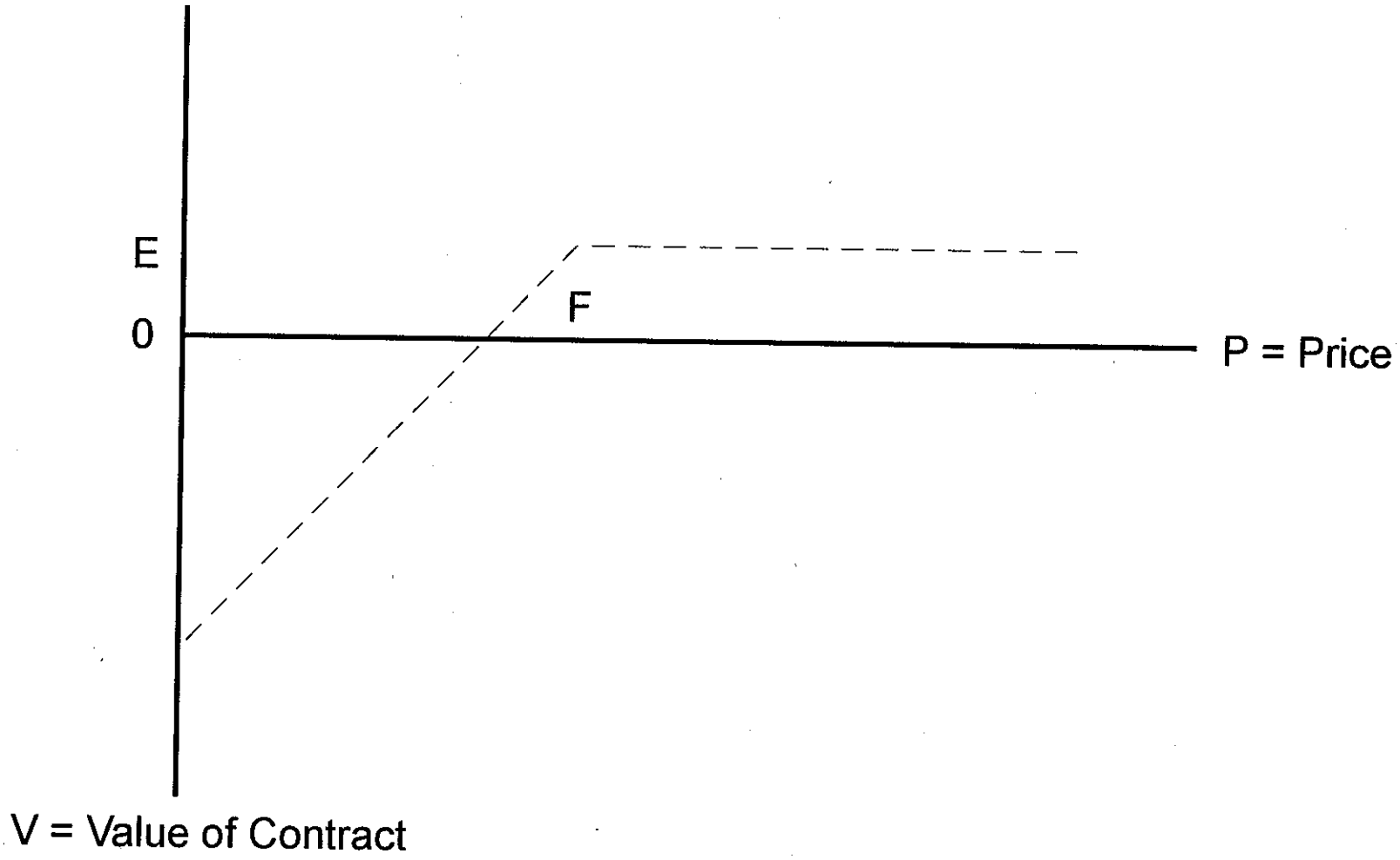
Strike Price = C

Figure 6: Long European Put Option
Value at Expiration



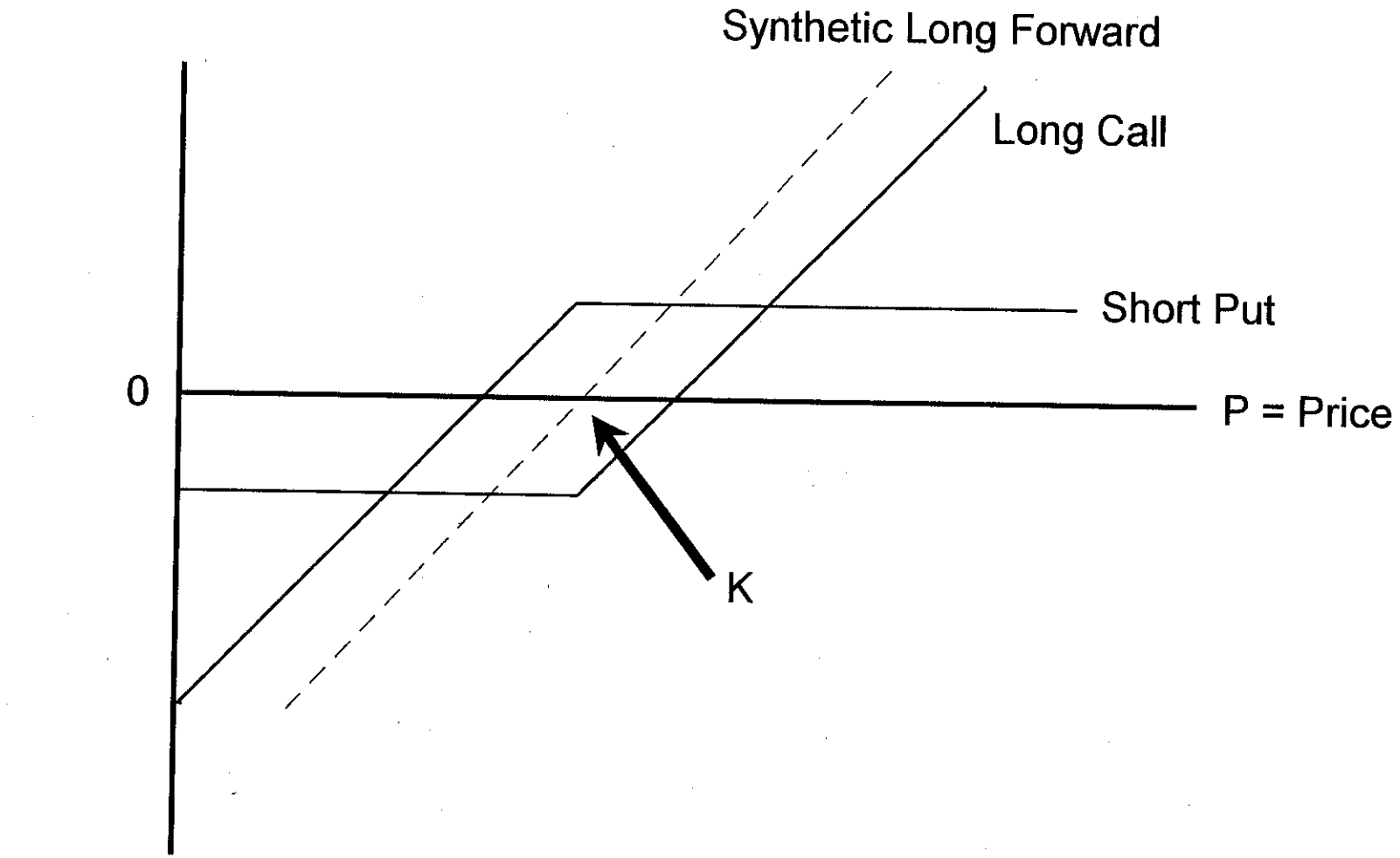
Strike Price = F

Figure 7: Short European Put Option
Value at Expiration



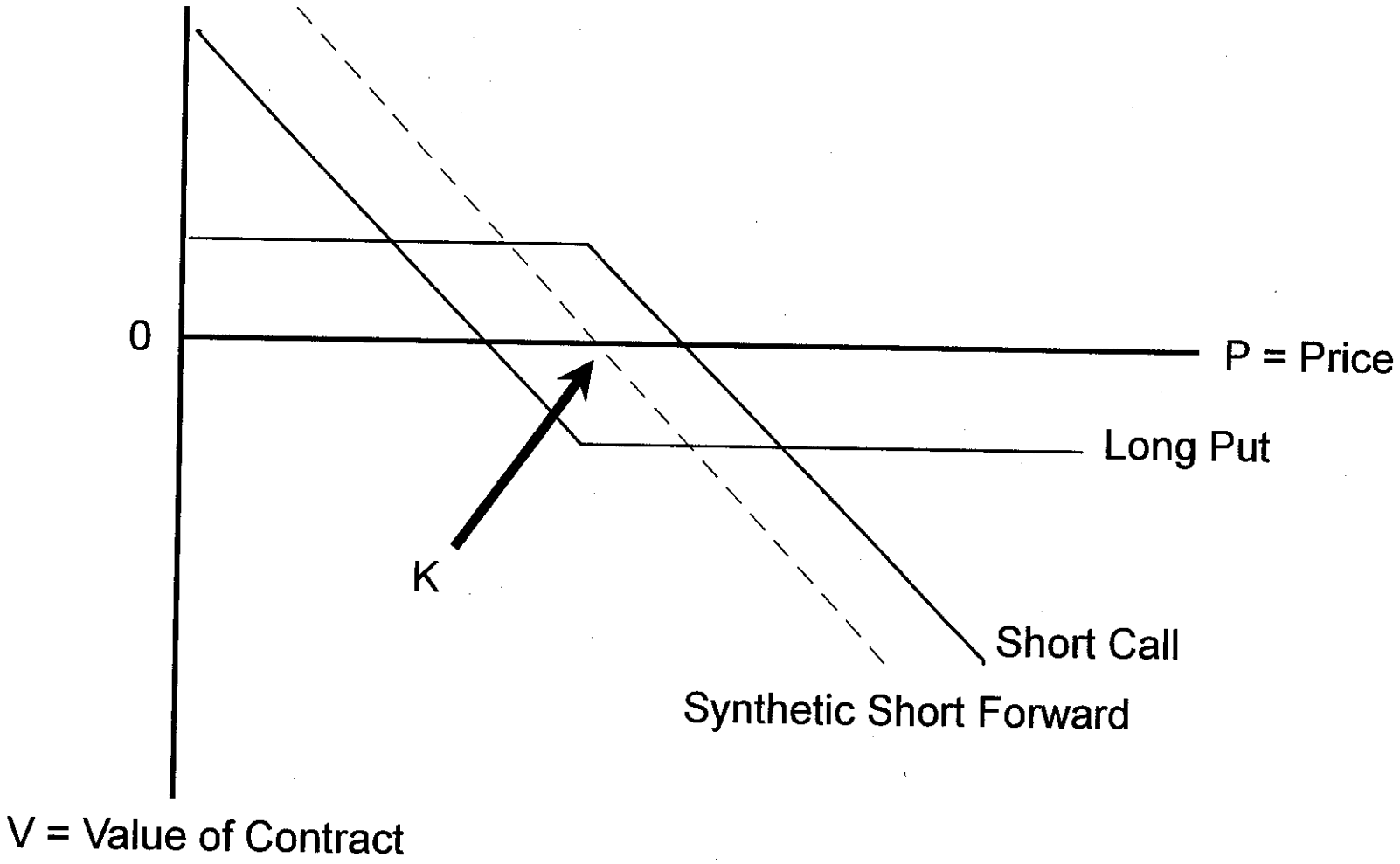
Strike Price = F

Figure 8: Synthetic Long Forward Contract



Strike Prices of Options = K

Figure 9: Synthetic Short Forward Contract



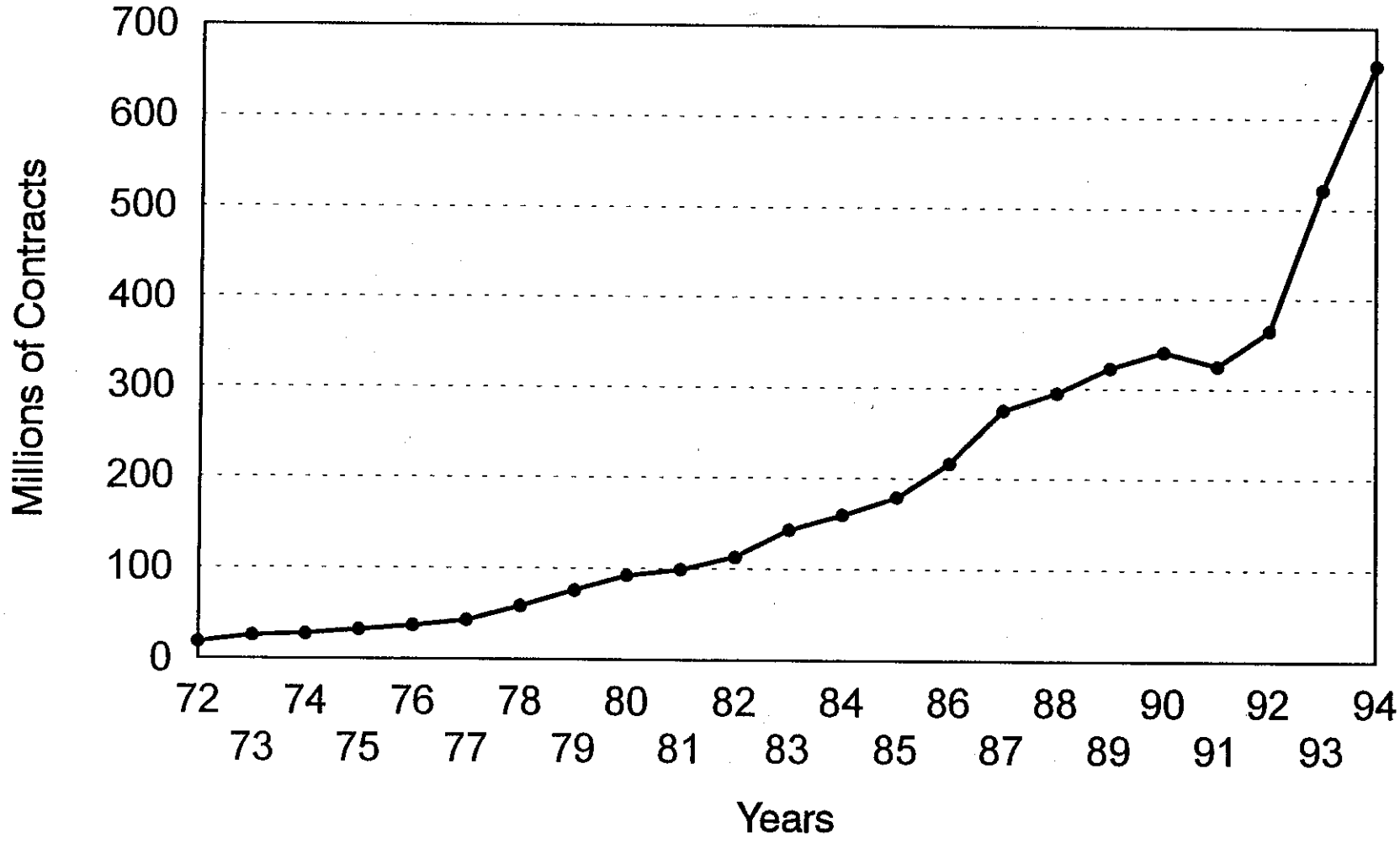
Strike Prices of Options = K

Figure 10: Classification of Financial Institutions

Transparent			Translucent					Opaque
Govt. Bond Markets	Stock Markets	Futures & Optns Markets	Unit Trusts	Mutual Funds	Pension Funds	Finance Cos.	Insur-ance Cos.	Commercial Banks

Source: Merton (1993, p.18)

Figure 11: Total U.S. Futures and Futures Options



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