

SWAPS, BANKS, AND CAPITAL: AN ANALYSIS OF SWAP RISKS AND A CRITICAL ASSESSMENT OF THE BASLE ACCORD'S TREATMENT OF SWAPS

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1. INTRODUCTION

In recent years, banking regulators from the major industrialized nations have placed an emphasis on risk-based capital requirements as a primary means of ensuring a safe and sound banking system. Although economists have found no statistical correlation between bank capital levels and bank failures, it is difficult to argue with the proposition that higher capital requirements both increase a bank's stability and lower the expected cost of bank failures.¹ Capital requirements which reflect the riskiness of a bank's assets and activities provide assurances to depositors and enable banks to incur unanticipated losses with enough margin to continue as a going concern. Additionally, mandatory capital requirements subject these institutions to greater market discipline and counteract the moral hazard implicit in a system marked by deposit insurance.²

The capital required to be held by many of the world's most prominent banks is strongly influenced by an international agreement known as the Basle Accord ("Basle" or "the accord").³ By establishing uniform risk-based capital

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¹ Ethan B. Kapstein, *Supervising International Banks: Origins and Implications of the Basle Accord*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 3, 27 (Charles A. Stone & Anne Zissu eds., 1994).

² When a bank's capital has been impaired, there are incentives to engage in risky projects because all gains accrue to the equity holders, while most losses will be borne by the deposit insurer. Capital acts as a deductible in this insurance policy, and higher deductibles counteract such incentives. See George J. Benston, *The Purpose of Capital for Institutions with Government-Insured Deposits*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 342, 353-54 (Charles A. Stone & Anne Zissu eds., 1994).

³ See *Committee on Banking Regulations and Supervisory Practices: International Convergence of Capital Measurement and Capital Standards*

guidelines, this landmark agreement seeks to promote the convergence of capital requirements for internationally active banks. While fashioning an agreement to accomplish this goal is no small task, it was clear from the beginning that establishing capital requirements for off-balance-sheet items, such as derivative instruments, would pose unique problems.

Although the proliferation of derivative financial products over the last several decades has redefined the way in which risks are controlled and has revolutionized the development and efficiency of the global capital markets, their increased usage by many of the world's banks and securities firms has been a cause of concern for the regulators of these institutions. Since derivatives are novel, complex, and opaque, they appear risky. Some believe that derivatives could be the cause of the next banking crisis.⁴ In spite of this, banks continue to shift away from traditional deposit taking and lending and now derive substantial revenue and profit from derivatives. Therefore, the importance of designing proper risk-based capital requirements for these activities has never been more apparent.

The purpose of this Article is to examine the risks which banks face with respect to swaps, one of the most important types of derivative instruments, and to determine whether Basle's risk-based capital requirements accurately reflect swap risks. Market participants believe that the capital now required to support swap activities is too high and, in light of increased competition and declining spreads in the swap market, fear that such requirements will hinder their profitability and drive them from the swap marketplace.⁵ Many regulators, however, believe the contrary. Whether or not swaps are properly capitalized relative to their risks is a difficult issue which is vital to the health of individual banks across the globe, as well as to the global financial system.⁶

(July 1988), reprinted in 51 Banking Rep. (BNA) 143 (July 25, 1988) [hereinafter *BIS Accord*].

⁴ See Henry T.C. Hu, *Misunderstood Derivatives: The Causes of Informational Failure and the Promise of Regulatory Incrementalism*, 102 YALE L.J. 1457, 1459-60 (1993).

⁵ See Kerry Tremble & Arun Sarwa, *Happiness Is a Full Net*, EUROMONEY, Apr. 1991, at 34, 34.

⁶ This does not dispute the fact that other measures and regulations aside from capital requirements, which are not the focus of this Article, play

This Article is divided into four main parts. Following the introduction, Section 2 briefly explains the structure and general provisions of the Basle Accord. Section 3 discusses the role of financial intermediaries in the swap market, and then examines the major risks inherent in swap activities, most notably credit risk and market risk. Section 4 discusses the treatment of swaps under the Basle Accord, as well as under recently enacted and proposed amendments, and analyzes whether the accord's provisions accurately reflect swap credit and market risks. Section 5 discusses the consequences of imposing capital requirements which do not reflect swap risks and sets forth several recommendations to prevent these consequences.

2. BANKS AND CAPITAL: THE BASLE ACCORD

The Basle Accord, a product of the Basle Committee on Banking Regulations and Supervisory Practices, operates under the auspices of the Bank for International Settlements ("BIS") and is composed of representatives from the Group of Ten countries and Luxembourg.⁷ Established in 1975, the committee's twin objectives are to strengthen the safety and soundness of the international banking system and to remove competitive inequalities resulting from the imposition of divergent capital requirements by regulatory authorities in different countries.⁸ The initial accord, signed on July 15, 1988, provides a common basis for defining the elements of capital, relating capital to banking risks, and establishing

an important role in bank safety.

⁷ The Group of Ten ("G-10") countries include Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States.

⁸ See *BIS Accord*, *supra* note 3, at 143. Although national regulators in each country have an interest in the maintenance of a healthy international financial system, they may have an even stronger interest in enhancing the competitiveness of their own nation's banks by minimizing regulatory costs, perhaps resulting in overly lenient regulation. Many think that international coordination is needed to prevent this kind of "race to the bottom." See Henry T.C. Hu, *Swaps, the Modern Process of Financial Innovation and the Vulnerability of a Regulatory Paradigm*, 138 U. PA. L. REV. 333, 371-72 (1989). Higher leverage translates into a lower cost of funds for banks and may result in competitive advantages.

minimum risk-based capital requirements.⁹ Effective January 1, 1993, it requires that "international banks" maintain a minimum level of capital equal to 8% of "risk-adjusted assets."

The measure of risk-adjusted assets is computed by assigning one of five different risk weights to the book value of each bank asset, depending on the perceived credit risk of the obligor. The five weight categories are: 0, 10, 20, 50 and 100%.¹⁰ Guidelines developed by Basle specify the risk weight to be assigned to different categories of assets. For example, assets in the 0% category, meaning that no capital must be held against these assets, include cash, balances at and claims on the domestic central bank, and loans to domestic central governments.¹¹ Assets weighted at 20% include claims on foreign banks with an original maturity of less than one year, claims on domestic banks, and loans guaranteed by domestic banks.¹² Assets weighted at 50% include mortgage loans.¹³ All other assets, such as commercial loans to private parties, are generally assigned a 100% risk weight, meaning that capital equal to 8% of the asset must be held.¹⁴ Off-balance-sheet activities, such as swaps and other derivatives, are incorporated into this framework by first converting them into "credit equivalents" reflecting the credit exposure of the activity, and then multiplying them by risk weights.¹⁵ The total risk-adjusted net asset figure is calculated by adding the products of each asset multiplied by its appropriate risk weight. Under Basle, a bank must hold 8% of this figure as credit risk-based capital.¹⁶

⁹ See Paul S. Pilecki et al., *BANKING LAW* §216-21 (1994).

¹⁰ See *BIS Accord*, *supra* note 3, at 147.

¹¹ Other assets may also be placed in the 0% risk category at the discretion of national regulators. See *id.* at 152.

¹² See *id.*

¹³ See *id.* at 153.

¹⁴ See *id.*

¹⁵ For a complete description of Basle's treatment of swaps, see *infra* Section 4.1.1.

¹⁶ However, capital is given a rather expansive meaning and is subdivided into two tiers. Half of the required capital must be in the form of tier one or core capital, which includes tangible shareholders' equity (excluding goodwill) and disclosed reserves. The remainder may be in the form of tier two or supplementary capital, which includes loan-loss reserves, certain unrealized gains on marketable securities, certain subordinated debt, and certain hybrid debt instruments. See *BIS Accord*, *supra* note 3,

Although the accord applies to internationally active banks operating in the G-10 countries and Luxembourg, it is not self-executing. Therefore, the accord is not legally binding unless each country passes the appropriate laws or adopts the appropriate rules implementing its specific provisions. Since the purpose of the accord is to establish "minimum" capital requirements, national regulators are free to impose more stringent provisions. In addition, there are many areas of the accord which grant discretion to national regulators. For example, national regulators have wide latitude in determining which financial institutions will be subject to the accord's provisions.¹⁷ In actuality, most of the Basle signatory countries have adopted the provisions, and many other jurisdictions observe the requirements as well.¹⁸

Many have criticized the original 1988 accord. It has been argued that the risk categories are very broad, and therefore the characteristics of the obligor are not taken into account except at a crude level.¹⁹ In addition, it is claimed that the risk weights chosen have little or no empirical content.²⁰ Furthermore, Basle assumes that credit risks are additive, ignoring the teachings of modern portfolio theory and the benefits of diversification.²¹

at 144-46.

¹⁷ The accord merely states that it applies to "international banks" with no attempt at defining the term. *See id.* at 143.

¹⁸ *See* Maximilian J.B. Hall, *The Measurement and Assessment of Capital Adequacy for Banks: A Critique of the G-10 Agreement*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 270, 270 (Charles A. Stone & Anne Zissu eds., 1994).

¹⁹ For example, in spite of the fact that the risk profile of individual borrowers varies tremendously, all commercial loans are weighted 100%. If the riskiness of the assets within risk categories varies, banks can easily alter the amount of risk without changing the amount of capital required. *See* Eric Hirschhorn, *Interactions Between Risk Based Capital Requirements, Risk Based Deposit Insurance Premiums, and Bank Risk*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 528, 530 (Charles A. Stone & Anne Zissu eds., 1994).

²⁰ *See* Edward L. Golding & Robert Van Order, *A Critique of Risk Based Capital Guidelines*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 477, 481 (Charles A. Stone & Anne Zissu eds., 1994). The weights are further distorted by the use of book values, which are measured at historical cost, rather than current market values. *See id.*

²¹ *See id.* at 482. Another criticism is that subordinated debt is relegated to secondary importance, yet in many ways is preferable to equity because debtholders are not affected by the moral hazard created by deposit

Perhaps the main criticism of the accord is that its requirements are designed solely to guard against credit risks, even though most assets contain other substantial risks, such as interest rate risk, foreign exchange risk, and other types of market risks. The 1988 accord, however, does not take these risks into account, nor does it consider how all these risks interact. For example, although government debt may have no default risk, it has a considerable amount of interest rate risk.²² "[I]t is not difficult to argue that the introduction of [risk-based capital requirements] in their present form is, at best, a half-finished job and, at worst, a regulatory measure whose undesirable side effects may be more far-reaching than originally expected."²³

In light of these criticisms, the Basle Committee released for comment several reform proposals in April 1993. One proposal, which was adopted pursuant to amendments to the accord in July 1994 and April 1995, relates to the use of bilateral netting for determining credit risk for certain derivatives. A second proposal, which did not envision a separate capital charge, sets forth a common approach for measuring interest rate risk in order to identify those institutions that are extremely vulnerable to changes in interest rates. The third proposal, which was revised in April 1995, is to incorporate minimum capital requirements for

insurance. See *supra* note 2 and accompanying text; Douglas D. Evanoff, *Capital Requirements and Bank Regulatory Reform*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 511, 514 (Charles A. Stone & Anne Zissu eds., 1994). As pointed out by Scott and Iwahara, Basle's attempts to create a level playing field may be unsuccessful because of differences in national capital market development, tax and accounting rules, and other banking regulations such as the extent of deposit insurance and other safety nets. See HAL S. SCOTT & SHINSAKU IWAHARA, IN SEARCH OF A LEVEL PLAYING FIELD: THE IMPLEMENTATION OF THE BASLE CAPITAL ACCORD IN JAPAN AND THE UNITED STATES, (Group of Thirty 1994). For other criticisms of Basle's provisions, see generally Hall, *supra* note 18 (finding fault with the risk assessment techniques adopted by Basle).

²² A one percentage point change in interest rates could cause approximately a 10-20% change in the value of a thirty-year treasury bond. Yet, government treasuries do not generally require any bank capital. See Golding & Van Order, *supra* note 20, at 482.

²³ Pier Luigi Gilibert, *Promoting Regulatory Convergence: A Comparative Assessment of European Bank Capital Regulation*, in 1 GLOBAL RISK BASED CAPITAL REGULATIONS 196, 205 (Charles A. Stone & Anne Zissu eds., 1994).

market risks.²⁴ Before discussing and critiquing Basle's treatment of swaps, the next section will provide an explanation of the swap risks that banks face.

3. SWAPS AND BANKS: ROLES AND RISKS

3.1. *A Brief Introduction to Swaps*

A swap belongs to a class of financial instruments known as derivatives. In contrast to a stock or a bond which represents financial claims with intrinsic value, a derivative instrument is a financial contract which *derives* its value from an underlying asset, reference rate, or index.²⁵ The most common derivative instruments are options, forwards, futures, and swaps.

Derivatives are extremely important because they facilitate the ability to transfer and accept risks, enabling entities to hedge against fluctuations in profits which may be caused by changes in exchange rates, interest rates, commodity prices, or equity prices. Complex risks that are bound together in traditional instruments can be teased apart and managed more effectively and inexpensively because transaction costs in the derivatives markets are very low.²⁶ Efficiency gains are created when risks are shifted to those best able to bear them. In the last 20 years, prices, interest rates, and exchange rates have been extremely volatile, and derivatives have made it possible to hedge against the risks which accompany such volatility.²⁷ Swaps have played an integral role in this market development.

²⁴ These proposals and amendments are discussed *infra* Section 4.

²⁵ A share of stock, for example, is valuable because it entitles the holder to dividend payments and to a percentage of the firm's net assets upon dissolution. A stock option (which entitles the holder to buy or sell shares of stock at a predetermined price prior to a certain expiration date), however, derives its value from the price of the underlying stock on which the option is written.

²⁶ See GLOBAL DERIVATIVES STUDY GROUP, THE GROUP OF THIRTY, DERIVATIVES: PRACTICES AND PRINCIPALS 2 (1993), [hereinafter G-30 REPORT]. In addition, such markets are often more liquid than the markets for the underlying assets, and therefore the prices tend to be more efficient. See *id.* at 46.

²⁷ See *You'd Better Ask Murphy*, THE BANKER, Feb. 1993, at 48.

A swap is a contract whereby two counterparties agree to exchange future cash flows at periodic intervals during the life of the swap according to a prearranged formula.²⁸ These cash flows are determined by applying the prearranged formula to the "notional" principal amount of the swap. In most swaps, such as interest rate swaps, this notional amount never changes hands and is merely used as a reference for calculating the future cash flows. In other swaps, including most currency swaps, this notional amount will be exchanged at the inception and at the completion of the swap. Consider the following paradigm.

3.1.1. Swap Paradigm: The "Plain Vanilla" Interest Rate Swap

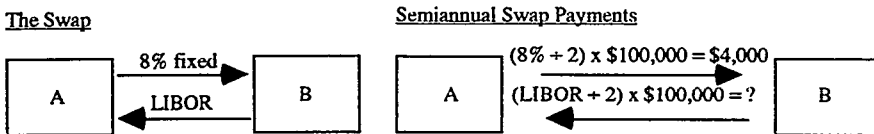
Company A and company B enter into a five-year fixed-floating interest rate swap on a \$100,000 notional amount. A thereby agrees to pay B a fixed interest rate of 8% semiannually, in exchange for B's promise to pay A semiannual floating-rate interest equal to the six-month LIBOR rate (see Figure 1).²⁹ Both interest payments are based on the \$100,000 notional amount. The swap rates agreed upon by these counterparties typically will be set such that the value of the swap to either party at inception is zero. In other words, the present value of the fixed-rate payment stream promised by company A is equal to the *expected* present value of the floating-rate payment stream promised by

²⁸ The maturity of the swap is known as the tenor.

²⁹ In this swap, A is referred to as the fixed-rate payer, and B is referred to as the floating-rate payer. Although the floating rate of a swap can be based on any floating rate available in the market, it is most often based on the London Interbank Offer Rate ("LIBOR"), which is the rate of interest offered by London banks on deposits from other banks. One month LIBOR is the rate offered on one-month deposits, six-month LIBOR is the rate offered on six-month deposits, etc. LIBOR is a frequently used reference rate for loans in the international financial markets. JOHN HULL, INTRODUCTION TO FUTURES AND OPTIONS MARKETS 141 (1991).

company B.³⁰ Therefore, there is generally no exchange of payments when the contract is formed.³¹

Figure 1: Anatomy of a Swap.



At the end of each six-month period, A will pay B \$4,000, and B will pay A the product of the LIBOR rate which existed at the beginning of the current interest period times the notional amount.³² Assume that the end of the first interest period is approaching, and that LIBOR was 7% at the inception of the swap.³³ Company A will pay B \$4,000, and B will pay A \$3,500. In practice, a net payment from A to B in the amount of \$500 would be made. These net payments

³⁰ Since swaps essentially involve the buying and selling of cash flows, they can be valued using a standard discounted cash flow analysis. Strictly speaking, the value of a swap to a financial intermediary will be slightly positive when first negotiated because of the bid-ask spread. *Id.* at 148 n. 5. See *infra* note 59.

³¹ The swap rates [also referred to herein as “underlying swap rates,” “underlying rates,” or “underlying reference rates”] are structured by the market such that the fixed and floating rates at inception are market equivalents. This is known as a “par swap.” In a non-par swap, the rates are structured such that the swap has a positive value to one party and a negative value to the other at inception, and, therefore, the party with negative value will require an up front premium equal to this amount.

³² The floating rate is generally “pegged” at the beginning of each interest period, and “reset” at the end of every interest period. Therefore, the LIBOR rate at inception will be used to calculate the first swap payment by the floating-rate payer. The LIBOR rate in effect at the end of six months will be used to calculate the floating payment at the end of year one, and so forth.

³³ It may appear contradictory to say that the swap has zero value at inception when the fixed rate is initially higher than the floating rate, resulting in a net payment by the fixed-rate payer to the floating-rate payer at the end of the first interest period. This is because the value of the swap is the present value of the expected net future cash flows over the life of the swap. If the fixed long-term rate is higher than the short-term floating rate, the swap counterparties “believe” that short-term rates will rise in the future. Consider the analogy of obtaining a mortgage, in which the bank offers the option of an adjustable rate or a higher fixed rate.

will vary as LIBOR changes, and will continue every six months for the life of the swap. Note that the notional amount used to compute each semiannual swap payment never changes hands, but is simply used as a basis for calculating the interest payments between the parties.³⁴

This simple interest rate swap is a very powerful tool which allows the counterparties to alter the character of their assets and liabilities, fine tune their risk exposure, lower their cost of capital, or speculate on interest rate changes. For example, if A had floating-rate debt previously outstanding, and was concerned about rising interest rates, the transaction above would allow it to swap itself out of a floating rate and into a fixed rate.³⁵ Alternatively, if A's business profits were negatively correlated with interest rates, it could utilize the swap above to hedge this risk exposure.³⁶ In addition, this swap could be used to lower borrowing costs by capitalizing on market imperfections.³⁷ Swaps are particularly important to companies with a poor credit rating, because such companies generally are unable to borrow from banks at a fixed rate. Swaps enable these companies to simulate fixed-rate borrowing.³⁸

³⁴ A reason that this notional principal never changes hands is that this swap is equivalent to parallel loans, a transaction in which B borrows from A at a floating rate and simultaneously makes a fixed-rate loan to A for the same principal amount. Since the principal amount of these "loans" is the same, there is no point in exchanging exactly offsetting cash flows at the inception and completion of the swap. HULL, *supra* note 29, at 145.

³⁵ In practice, A would use the floating-rate swap payments from B to service the required payment on the floating-rate debt, in effect converting floating-rate debt into a fixed-rate swap obligation.

³⁶ When interest rates rise, profits from the swap contract would offset the business operating losses.

³⁷ The capital markets may not be equally receptive to fixed-rate and floating-rate debt by the same issuer, perhaps resulting in a situation where A has a comparative advantage in the floating-rate capital markets relative to B, while B has a corresponding comparative advantage in the fixed-rate debt market (or vice versa). Therefore, analogous to the concepts that underlie international trade theory, gains can be captured by both parties if each issues capital in the market in which it has a comparative advantage and then "trades" by executing a swap contract. These "arbitrage" opportunities often exist as a result of regulatory or tax differences among various countries.

³⁸ SCHUYLER K. HENDERSON & JOHN A.M. PRICE, CURRENCY AND INTEREST RATE SWAPS vii (1984).

3.1.2. Other Types of Swaps

Almost any kind of swap can be created. Interest rate and currency swaps are the most common, and comprise over 90% of all swap transactions (as a percentage of notional principal amount). However, the use of commodity and equity swaps continues to grow at a rapid rate.

In a standard currency swap, one counterparty agrees to make fixed interest payments in one currency according to a prearranged formula calculated on a specific notional amount, and the other counterparty agrees to make fixed interest payments in *another* currency based on a different, yet equivalent, notional amount. In a currency swap, the notional principal must be specified in each of the two currencies, such that these amounts are approximately equal given the exchange rate at the inception of the swap.³⁹ Unlike an interest rate swap, a currency swap usually involves the exchange of these notional principal amounts at the inception and maturity of the swap in addition to the exchange of interest payments.⁴⁰ Currency swaps, similar to interest rate swaps, can be used to alter asset and liability characteristics, hedge currency exposure,⁴¹ arbitrage market imperfections,⁴² or speculate on currency fluctuations.

A less common type of swap is an equity swap, in which the swap payments are determined according to the future performance of certain equity products. For example, one party could swap payments of the appreciation in the S&P 500

³⁹ See HULL, *supra* note 29, at 152.

⁴⁰ See *id.* at 145 and note 34 and accompanying text. Since the principal amounts of these "parallel loans" are specified in two different currencies, they will not be equivalent at the completion of the swap if exchange rates change. See *id.* at 151.

⁴¹ For example, if an American company expects future revenues from a foreign subsidiary and wants to avoid the risk of fluctuating exchange rates, it could use a currency swap to hedge this exposure.

⁴² A currency swap can be used to lower borrowing costs by exploiting international capital market imperfections. For example, an American company's debt may command a premium if issued in a foreign country such as Japan due to regulatory or other reasons. The company can issue yen denominated bonds in Japan and then enter into a currency swap whereby it receives yen and pays dollars to the swap counterparty. In the end, the company has a dollar denominated liability at a lower economic cost than it would have had if it issued fixed-rate debt in the U.S. See G-30 REPORT, *supra* note 26, at 35. See also *supra* note 37.

stock index for fixed interest rate payments. An equity swap may be particularly advantageous if there are significant costs associated with entering and exiting a foreign stock market.⁴³ Similarly, a commodity swap links payment to the value of certain underlying commodities. Firms that use commodities as inputs can utilize such swaps to hedge the risk that the prices of these inputs will fluctuate.⁴⁴

Within these broad categories, infinite variations can be created. For example, the fixed-floating interest rate swap demonstrated in Figure 1 can also be structured as an exchange of two floating-rate payments, each based on a different reference rate.⁴⁵ The possibilities are limited only by imagination and the availability of a willing counterparty. Careful specification of the nature, timing, and amount of the swap can insulate the end-user from an adverse movement in interest rates, exchange rates, commodity prices, stock prices or other variables on a long-term basis by changing the characteristics of assets and liabilities in ways that were previously believed "inconceivable."⁴⁶ Like other derivatives, swaps allow for efficient tailoring of risk preferences through asset and liability management, reduce borrowing costs, and promote efficiency among the markets as a whole. They also allow entities to arbitrage subtle economic, regulatory, or tax differences across various capital markets.⁴⁷

3.1.3. Size and Growth of the Swap Market

Since the first major swap in 1981,⁴⁸ the market has

⁴³ For more information on equity swaps, see William D. Falloon, *How Appetites Are Growing for OTC Equity Derivatives*, FUTURES, Jan. 1992, at 26; Claire Makin, *Hedging Your Derivatives Doubts*, INSTITUTIONAL INVESTOR, Dec. 1991, at 113.

⁴⁴ For example, numerous U.S. municipal governments, whose expenditures are subject to an annual budget, use oil swaps in order to lock in or cap fuel costs. See G-30 REPORT, *supra* note 26, at 39.

⁴⁵ This is known as a basis swap. See HULL, *supra* note 29, at 156; see also Robert H. Litzenger, *Swaps: Plain and Fancyful*, J. FIN., July 1992 (describing other swaps variations).

⁴⁶ See Hu, *supra* note 8, at 346.

⁴⁷ See *id.* at 350.

⁴⁸ Although the date of the first swap is disputed, the first large scale, widely publicized swap was a currency swap between IBM and the World Bank. Others, however, point to a 1976 transaction between Royal Bos

grown dramatically from a notional amount of \$865 billion interest rate and currency swaps outstanding in 1987 to approximately \$7.1 trillion in 1993.⁴⁹ Interest rate swaps comprised about 87% of this total in 1993.⁵⁰ Hundreds of billions of dollars in new contracts are negotiated each year.

Swaps are not just used by large, sophisticated firms, and the volume of transactions should continue to grow as more potential users learn of the vast benefits of swaps. Users include banks and corporations,⁵¹ insurance companies, state and local governments, international agencies, and foreign states.⁵² Although the market is concentrated in New York and London, transactions take place around the globe.

3.1.4. *The Participation of Financial Intermediaries in the Swap Market*

Swap contracts trade on the over-the-counter ("OTC") market.⁵³ Although the OTC market provides flexibility to create customized contracts that are unavailable on an organized exchange,⁵⁴ it lacks a clearinghouse.⁵⁵ Therefore,

Kalis Westminster Group NV and ICI Finance Limited (brokered by Continental Illinois and Goldman Sachs). See HENDERSON AND PRICE, *supra* note 38, at 4. For a history of the origins of the swap market, see *id.* at 1.

⁴⁹ See INTERNATIONAL SWAPS AND DERIVATIVES ASSOCIATION, INC. & ARTHUR ANDERSEN & CO., S.C., MARKET SURVEY HIGHLIGHTS, YEAR ENDED 1993 (1994) [hereinafter ISDA 1993 REPORT]. These figures are derived by converting all swaps to their U.S. dollar equivalents.

⁵⁰ See *id.* Equity and commodity swaps are negligible in comparison to interest rate and currency swaps, amounting to \$10 billion and \$18 billion notional amount outstanding respectively as of year-end 1992. See G-30 REPORT, *supra* note 26, at 57.

⁵¹ According to the Survey of Industry Practice conducted by the Group of Thirty, roughly 87% of the private sector corporations surveyed used interest rate swaps and 64% used currency swaps. See *id.* at 34-35. The survey was conducted pursuant to the G-30 Report among a group of eighty dealers and seventy-two end-users of derivatives. See *id.* at 7.

⁵² See Bank for International Settlements, *Recent Innovations in International Banking*, in INTEREST RATE AND CURRENCY SWAPS 1988, PRACTISING LAW INSTITUTE 56 (1988).

⁵³ The OTC market is a decentralized market in which transactions are privately negotiated and conducted among dealers, brokers, and the public off of an organized exchange.

⁵⁴ An exchange is a legal entity organized for the purpose of trading securities, options, or futures. It provides a central physical trading facility and stipulates rules and standardized terms which govern all transactions involving the instruments being traded thereon.

unlike exchange-traded contracts, swaps must be individually negotiated with a particular counterparty,⁵⁶ and the ability of the specific, identifiable counterparty to honor its contractual commitments is a vital issue. "[T]he price of contractual freedom is a greater risk of default."⁵⁷ Other prices of contractual freedom are the loss of liquidity offered by an exchange and the burden of searching for a willing counterparty. Financial intermediaries, however, have assumed a special role in the swap market, ameliorating some of these costs and drawbacks.

Contrary to the example outlined in Figure 1, rarely will the needs of two counterparties exactly coincide as to the desired type of swap, the notional amount, and the size and timing of the swap payments. Even if two parties did have exactly complementary needs, there is no reason to believe that they would find each other, nor that they would be willing to enter into an agreement if they did find each other.⁵⁸ Instead, they would interpose a bank or investment bank to intermediate the transaction in order to reduce credit risks.

During the market's infancy, intermediaries facilitated swaps by acting as brokers or agents for a fee, matching counterparties with offsetting requirements, without taking a principal position in the transaction. The intermediary's role, however, slowly evolved into one of a dealer attempting to match offsetting counterparties by acting as a principal and earning a bid-ask spread (see Figure 2).⁵⁹

⁵⁶ A clearinghouse is a corporation that is separate from, but associated with, an exchange, and it is composed of the member brokers and dealers transacting on the exchange. After a buyer and seller enter into a trade, the clearinghouse steps in and is interposed as a principal to every contract, becoming the "buyer's seller" and the "seller's buyer"; the buyer and seller no longer deal directly with each other. The existence of a clearinghouse eliminates the need for participants in the market to examine the credit quality of the actual counterparty, and therefore makes the market accessible to members of the general public. The impersonality of the clearinghouse also enables participants to close out their positions at any time.

⁵⁶ Despite recent efforts, a large-scale clearinghouse for swaps and other OTC contracts has yet to materialize.

⁵⁷ Hu, *supra* note 4, at 1465.

⁵⁸ See Hu *supra* note 8, at 355.

⁵⁹ Also known as a bid-offer spread, the bid-ask spread in this context represents the slight differential between the price at which the bank is willing to buy a specified cash flow, and the price at which it is willing to

Figure 2: An Intermediated Swap.



These intermediaries, known as swap dealers, now stand ready to “make markets” in swaps, and therefore provide liquidity, by entering into a swap agreement with one party as principal in the anticipation that a matching counterparty can be located in the future.⁶⁰ For certain swaps, the swap dealer may never find a perfect match, and therefore must use dynamic hedging to neutralize its risk exposure throughout the life of the swap. In other instances, the dealer may have other assets which provide a natural hedge, or it may simply remain unhedged with the expectation of profiting from favorable movements in the underlying swap rates.⁶¹

Intermediaries provide the swap market with liquidity. Without them, it would be difficult for market participants to find willing counterparties in a timely and efficient fashion. Intermediaries also simplify credit evaluation, because counterparties need only evaluate the credit quality of the intermediary, which is generally an institution whose creditworthiness is well known and of high quality. While the intermediary still must evaluate the credit risk of the individual counterparties, these institutions specialize in this determination. Additionally, banks already lend to some of the participants in the OTC market, and therefore already possess more knowledge than other market participants about the credit risk of certain counterparties.⁶²

sell it. In Figure 2, the bank bid 8% fixed payments to buy LIBOR, yet to sell LIBOR the bank asked 8.10%. In other words, the spread is the 10 basis point differential between the fixed rate the bank is receiving from A and the rate it is paying B.

⁶⁰ This is known as “warehousing,” which requires that the intermediary hedge the market risk that is inherent in this swap until a counterparty desiring an opposite position can be found.

⁶¹ Methods used to hedge market risks are discussed *infra* Section 3.3.2.

⁶² See Sean Beckett, *Are Derivatives Too Risky for Banks?*, ECON. REV., FED. RESERVE BANK OF KANSAS CITY at 27, 33 (3d Quarter 1993).

Aside from acting as swap dealers, financial institutions also act as end-users by entering into swaps to hedge their own business risks, or to accept certain risks by speculating or trading. In particular, banks are normally exposed to substantial interest rate risk, because most of their assets earn a fixed and long-term rate, while most of their liabilities tend to be floating and short-term.⁶³ Rather than rearranging its entire balance sheet, a bank can use interest rate swaps to immunize its exposure to interest rates caused by this mismatch and lock in a fixed spread return on its assets. To the extent that a bank's assets are denominated in a foreign currency, currency swaps can be used to eliminate the risk of exchange rate fluctuations. Over 92% of the financial institutions who responded to the G-30 Industry Survey used interest rate swaps, while approximately 46% utilized currency swaps.⁶⁴

As more intermediaries have entered the swap market, it has become increasingly more competitive and efficient. In the early 1980s, bid-ask spreads as high as 100 basis points⁶⁵ were not uncommon.⁶⁶ For most competitive transactions, these spreads have narrowed to five or ten basis points, although unique and illiquid contracts will generally have higher spreads.⁶⁷ "From a handful of rudimentary deals in the 1970s, swaps have mushroomed into one of the largest and most efficient financial markets on earth . . ."⁶⁸

Despite the scope of the market, most swap activities are concentrated among the world's largest banks. Of the 5000 banks that report international banking activity, approximately fifty worldwide report OTC market-making

⁶³ The volatility of interest rates in the late 1970s and early 1980s and the corresponding losses experienced by banks and S&Ls in the United States demonstrates that this type of mismatch between assets and liabilities is a recipe for disaster.

⁶⁴ See G-30 REPORT, *supra* note 26, at 40-41.

⁶⁵ A basis point equals one-hundredth of one percent (.01%).

⁶⁶ See HULL, *supra* note 29, at 145.

⁶⁷ *Id.* See also Keith Schap, *When Domino Theory Meets OTC Credit Risk*, FUTURES: MAGAZINE OF COMMODITIES & OPTIONS, Aug. 1992 at 38, 42.

⁶⁸ William Glasgall & Bill Javetski, *Swap Fever: Big Money, Big Risks*, BUS. WK., June 1, 1992, at 102.

swap activity, and of these fifty, about twenty conduct the lion's share of the business.⁶⁹

Swaps account for a growing share of revenues and profits for banks and securities firms,⁷⁰ present opportunities to strengthen relationships with customers, and provide clear benefits to the marketplace. However, swaps do involve risks. The most notable risks are credit risk, or the possibility that a counterparty to a contract will default on its obligations, and market risk, or the possibility that a swap's value will fall. As will be explained *infra*, these risks, in the context of swaps, are two sides of the same coin. A counterparty is exposed to credit risk when a swap increases in value, yet will be exposed to market risk by the potential that the swap may decline in value. However, almost every banking activity involves these risks, even basic transactions such as lending money or investing in securities. The next few sections will explore, among other things, whether swap risks are in any way more complex or difficult to manage than the risks presented by more traditional banking activities.⁷¹

3.2. *Swap Credit Risk*

3.2.1. *Credit Risk Defined*

Any time a contract involves the payment of sums in the future, the party to whom such payments are due is exposed to credit risk. While counterparties to an exchange-traded derivatives contract are partially protected against this risk by the guarantee of the clearinghouse and the use of margin requirements,⁷² counterparties to an OTC swap are exposed

⁶⁹ Global leaders include J.P. Morgan, Bankers Trust, Merrill Lynch, Citicorp, Chemical Bank, Paribas, Chase Manhattan, Swiss Bank, Barclays, Midland, Société Générale and Deutsche Bank. See Michelle Celarier, *The Biggest Banks in Derivatives*, GLOBAL FIN., Aug. 1993, at 27, 27-32.

⁷⁰ A bank earns profits when it acts as a broker/dealer by earning the bid-ask spread. Other sources of profit include transaction fees, trading profits, and advisory fees.

⁷¹ Although swaps come in numerous forms, the underlying analysis of the risks each type of swap entails is substantially similar. Therefore, the following risk analysis will focus mainly on the interest rate swap paradigm presented above, with certain specific references to currency swaps.

⁷² Those who enter into an exchange-traded derivatives contract must post a certain amount of earnest money as "margin." This amount functions

to substantial credit risk because there is a danger that a counterparty may default on its obligations prior to the completion of the swap.⁷³ This risk is so important that many users restrict their swap dealings to intermediaries with AAA or AA credit ratings. Despite this, creditworthiness can deteriorate drastically over the life of a swap, as evidenced by the bankruptcy and subsequent swap defaults suffered by Olympia & York.⁷⁴

Although it is clear that swaps pose this risk, its measurement is less straightforward. When a bank makes a loan, its maximum exposure is readily quantifiable, and is equal to the amount of the loan plus the promised interest payments. A swap's credit exposure is difficult to determine, however, because the future obligations of each party under the swap contract will vary depending on changes in the underlying reference rate(s).⁷⁵

The value of a swap to each party at inception is usually zero (referred to as "at the money").⁷⁶ However, as the underlying reference rate(s) change over the life of the swap, the swap will have positive value to one of the parties (referred to as "in the money") and a corresponding negative

as collateral, and is used to ensure that the parties will be able to fulfill their future obligations under the contract. In the event that an individual defaults on his or her obligation and the margin payments are insufficient to cover the losses on the contract, the remaining loss will be borne by the reserves of the clearinghouse. There is a possibility that the clearinghouse itself will go bankrupt, but this generally is considered to be a remote possibility.

⁷³ See *infra* Section 3.2.5. for a discussion of swap defaults.

⁷⁴ Despite the importance of credit risk, swap rates do not generally vary with the creditworthiness of the counterparty. Most dealers have historically offered the same swap rate to any investment grade counterparty, such that the swap is made on an all or none basis. A poorer credit counterparty will be refused the swap unless it posts collateral. See Robert W. McLeod & D.K. Malhorta, *Emerging Trends in Interest Rate Swaps*, BANKERS MAG., May/June 1993, at 44, 49. For further explanation of this phenomenon, see Litzenberger, *supra* note 45, at 836. Certain institutions, however, recently have begun to "price" credit risk differentials into their swap rates.

⁷⁵ See Figure 1 *supra* Section 3.1.1. Swap payments between A and B vary according to changes in LIBOR over time.

⁷⁶ See *supra* note 30 and accompanying text.

value to the other counterparty (referred to as “out of the money”).⁷⁷

Not only will the credit exposure vary in magnitude over time as market rates change, but, in contrast to a loan in which only the lender bears credit risk, the party bearing the credit risk in a swap can shift over time. Yet, at any particular point in time, only the “in the money” counterparty will be exposed to credit risk,⁷⁸ because this positive value would be lost if the other counterparty were to default on the swap. An alternative expression of this loss is what it would “cost” the non-defaulting party to replace a defaulted swap with its economic equivalent.⁷⁹ This is known as the swap’s replacement cost, which is the cost of obtaining a replacement swap on the same terms and for the time remaining on the initial swap in the event of the counterparty’s default. This replacement cost is normally measured by the swap’s mark-to-market value.⁸⁰

As an example, consider the interest rate paradigm represented in Figure 2.⁸¹ The bank is acting as an intermediary between two matching counterparties, and is therefore perfectly hedged against any market risks caused by changes in interest rates. Any change in the value of the bank’s swap agreement with company A will be perfectly offset by the change in the value of the mirror swap with company B. However, since *one* swap of the pair will have positive

⁷⁷ As interest rates fluctuate, the swap indicated in Figure 1 may be “in the money” for the fixed-rate payer at one reset date and for the floating-rate payer at the next reset date.

⁷⁸ This refers to a swap’s *current* credit exposure, which simply depends on the value of the swap. It is possible, however, for both parties to be simultaneously exposed to *potential* future exposure. See *infra* Section 3.2.4.

⁷⁹ See Hu, *supra* note 8, at 359.

⁸⁰ A swap’s mark-to-market value is a measure of its current value, and is calculated by taking the present value of the net payments the holder expects to receive over the life of the contract. This measurement can be calculated by conceptualizing the swap as two bonds. A fixed-rate payer has purchased (is “long”) a floating-rate bond and has sold (is “short”) a fixed-rate bond. The value of the swap is the difference between the value of these two bonds. See HULL, *supra* note 29, at 146; Hu, *supra* note 8, at 359-60. A currency swap can be evaluated in a similar manner. See HULL, *supra* note 29, at 153.

⁸¹ See Figure 2, *supra* Section 3.1.4.

value at any point in time,⁸² the bank is unable to eliminate its exposure to credit risk. Assume that each swap represented in Figure 2 has a five year maturity and that at the end of the second year of the swap, the market rate for a three year swap (the remaining life on the initial swap) is 10% fixed for LIBOR.⁸³ As long as both parties continue to make their promised payments, the change in interest rates will not affect the bank. However, if B were to default on its swap (and if the bank wanted to remain hedged), the bank would have to pay a new counterparty an up front premium to "assume" B's swap position. Alternatively, the bank could enter a new swap and pay the higher current market rate of 10% fixed in order to receive the same LIBOR payments it was receiving under its initial swap agreement with B. The replacement cost of the swap is the present discounted value of this 2% differential (multiplied by the notional amount of the swap) over the remaining three years of the swap.⁸⁴

To summarize, credit risk materializes only when one counterparty fails to make its agreed upon swap payments *and* the rates underlying the swap have changed such that the non-defaulting party can arrange a replacement swap only on terms that require it to make a payment to its new counterparty.⁸⁵ Since the contract can only be "in the money"

⁸² Ignoring the effect of the bid-ask spread and the potential for either swap to be "at the money".

⁸³ In other words, fixed interest rates have risen, such that A's swap with the bank is "in the money", because A's fixed-rate swap payments of 8.10% are below the current market rate. Conversely, B's swap with the bank is now "out of the money" for the same reason.

⁸⁴ Should B default, the bank would have to pay \$2,000 more each year. The replacement cost can be calculated by discounting these payments using the current market swap rate as the discount rate: $= 2,000/1.10 + 2,000/(1.10)^2 + 2,000/(1.10)^3 = \$4,974$.

The mark-to-market value can also be determined by valuing the swap as two bonds. The present value of the fixed-rate portion of the swap at the end of the second year equals the remaining payments discounted by the current swap rate. $8,000/1.10 + 8,000/(1.10)^2 + 108,000/(1.10)^3 = \$95,026$.

The present value of the floating-rate bond simply equals par of \$100,000, because the swap has just completed its second year, and the floating rate has just been reset to the current market rate. The \$4,974 difference between the floating bond and the fixed bond is the mark-to-market value of the swap.

⁸⁵ There is no current credit exposure when a contract has negative value, because if the counterparty defaults, the non-defaulting counterparty could arrange a replacement swap identical to the old while receiving a

for one party at any particular moment, only one party to the swap can be exposed to actual credit risk at any one time. However, an intermediary with a matched swap arrangement will always be exposed to credit risk.

3.2.2. *Methods to Mitigate Credit Risk*

Although all swaps have inherent credit risk, various methods can be used to mitigate such risk. One common method of mitigation is to require that a swap counterparty have a high credit rating. According to a 1991 survey by the International Swaps and Derivatives Association, Inc. ("ISDA"), 91% of all swaps executed by ISDA members were with investment grade counterparties.⁸⁶ In response to this, several financial intermediaries have established separately capitalized AAA or AA rated derivatives subsidiaries.⁸⁷ A second way to minimize credit risk is by limiting exposure to any one counterparty. Diversifying the swap portfolio geographically and by industry can minimize credit risk as well.

Even though swap counterparties generally have better than average credit ratings, swap participants may utilize bilateral and unilateral collateral agreements to further protect their interests.⁸⁸ In most instances, a counterparty that has a poor credit rating will be unable to enter into a

"windfall" payment from its new counterparty.

⁸⁶ Arthur Andersen & Co., S.C., ISDA Default Survey, at 4, Dec. 31, 1991 (on file with the *Journal*). ISDA is an international organization comprised of approximately 250 of the world's largest commercial banks and securities firms involved in OTC derivatives transactions. ISDA members also include end-users and consultative firms that provide accounting, systems and legal support for derivatives activity. Practically all swap dealers are members of ISDA.

⁸⁷ Some examples include the establishment of GS Financial Products International, L.P. (by Goldman Sachs Equity Markets L.P.) and Merrill Lynch Derivative Products, Inc. (by Merrill Lynch & Co.). See John P. Behof, *Reducing Credit Risk in Over-the-Counter Derivatives*, ECON. PERSP.: REV. FROM FED. RESERVE BANK CHI., Jan.-Feb. 1993, at 21, 22. In addition, similar subsidiaries have been formed by Credit Suisse, First Boston and National Westminster. See McLeod & Malhorta, *supra* note 74, at 50.

⁸⁸ In a bilateral agreement, both counterparties to the swap exchange collateral. A unilateral agreement requires only one counterparty, generally the one with a lower credit rating, to post collateral. See Behof, *supra* note 87, at 26.

swap without posting collateral. Collateral agreements generally require the transferral of cash or liquid securities to the "in the money" counterparty when the swap's mark-to-market value reaches certain thresholds, or at regularly scheduled intervals. In the event of a swap default, the collateral will be used to compensate the non-defaulting party to the extent of any losses incurred. Therefore, collateral reduces the current credit exposure of the swap and reduces the length of future exposure to the period between collateral calls.⁸⁹ Despite the benefits of collateral, most dealers reported in 1993 that less than 5% of their gross credit exposure was collateralized.⁹⁰ Nonetheless, since that time, the use of collateral to reduce credit risk has dramatically increased.⁹¹

Another method of minimizing credit risk, analogous to the treatment of futures contracts, is to periodically mark the swap contract to market at specified time intervals. At each interval, the "out of the money" counterparty is required to make a cash payment equal to the mark-to-market exposure, after which the terms of the swap are reset to market rates.⁹² However, this process requires that both parties agree on a common measurement of the mark-to-market value, which may be difficult in the case of innovative or complex contracts. In addition, the counterparties will remain exposed to changes in the value of the swap in-between the mark-to-market intervals. Alternatively, parties may provide for contractual termination and mandatory cash settlement of the mark-to-market value upon the occurrence of a triggering event, such as a credit downgrade.⁹³ Similarly, some swaps allow for discretionary cash settlement by including an option to

⁸⁹ See Letter from Joseph Bauman, Chairman of ISDA, to Office of the Comptroller of the Currency 4 (Sept. 17, 1993) (on file with author).

⁹⁰ See GLOBAL DERIVATIVES STUDY GROUP, *THE GROUP OF THIRTY, DERIVATIVES: PRACTICES AND PRINCIPLES, APPENDIX I: WORKING PAPERS 37* (July 1993) [hereinafter G-30 APPENDIX].

⁹¹ See Alice Ratcliffe, *U.S. OTC Market Seen Looking To Collateralize Swaps*, REUTERS, Nov. 3, 1994, available in LEXIS, World Library, Txtline File.

⁹² See Katerina Simons, *Interest Rate Structure and the Credit Risk of Swaps*, NEW ENG. ECON. REV., July-Aug. 1993, at 23, 33.

⁹³ See Behof, *supra* note 87, at 28.

terminate the swap prior to its maturity at predetermined settlement dates.⁹⁴

Other credit-reducing techniques include the use of guarantees, assignments, and private swap insurance.⁹⁵ However, it is expensive to assign swaps and difficult to find a buyer for swaps with low-rated counterparties. Although swap insurance is obtainable, it is not widely available or utilized.⁹⁶

3.2.3. *Bilateral Netting Agreements*

Perhaps the most aggressive push to reduce credit risk entails the use of netting agreements. Netting, which originated from the common law doctrine of set-off, is the reduction of credit risk between two parties through the offsetting of mutual obligations and liabilities.⁹⁷ One form of netting, payment netting, has already been mentioned.⁹⁸ Another more important concept is contractual netting upon termination, often referred to as “close-out” or bilateral netting. This provides that, in the event of a default or triggering event, all contracts subject to a valid netting agreement will be terminated and all mark-to-market positions will be netted, so that a single amount will be owed from one party to the other.

For example, if company A has two different swaps with company B, one “in the money” and one “out of the money,” and B defaults on the “in the money” swap, A is still obligated to continue payments on the “out of the money” swap absent an agreement to the contrary. If bilateral netting is applicable, however, the mark-to-market value of the “in the money” and “out of the money” contracts can be offset against

⁹⁴ *See id.*

⁹⁵ *See id.* at 30.

⁹⁶ For example, Deutsche Bank and the Capital Markets Assurance Corporation have been providers of swap insurance. For the proposition that swap insurance could be more widely used, see Hu, *supra* note 8, at 413-18. However, even if obtained, there would still be credit risk exposure to the insurer.

⁹⁷ *See* Edward J. Nalbantian et al., *Netting and Derivatives—a Practical Guide*, INT'L FIN. L. REV., Sept. 1993, at 38, 38.

⁹⁸ Under a single contract, the mutual payment obligations of each party are netted so that, on each payment date, the party with the larger payment obligation simply pays the difference. *See supra* Section 3.1.1.

each other in the event of default. This prevents the counterparty or bankruptcy trustee from retaining the positive contract while defaulting on the negative one.

In practice, counterparties who deal with each other on a regular basis will execute what is known as a "master agreement," which delineates standard terms for any future swaps between the parties, including the applicability of bilateral netting.⁹⁹ Future swaps are incorporated into this master agreement through the use of written confirmation statements. Some counterparties utilize cross-product bilateral netting, which nets swaps with other types of derivative contracts.¹⁰⁰

In order for bilateral netting to succeed in reducing credit risk, it must be legally enforceable under applicable bankruptcy and contract law. If a court were to disregard an otherwise valid netting provision, a bankruptcy trustee could default on any swaps with negative value (requiring the counterparty to file a bankruptcy claim), yet still require the performance of swaps that have positive value with the same counterparty. It is widely believed that the use of netting arrangements, assuming their legal validity, reduces actual credit risks by thirty to fifty percent.¹⁰¹ Their legality and applicability for capital adequacy purposes will be discussed below.

3.2.4. Swap Credit Risk Measurement

In order to determine whether Basle's provisions accurately reflect a swap's credit risk, it is first necessary to quantify this risk from a theoretical or normative perspective against which Basle can subsequently be compared. Although there are

⁹⁹ Master agreements will generally contain two parts. The first part sets forth the basic terms applicable to all transactions, while the second contains terms which may be complemented, supplemented, or varied for particular swaps. See Schuyler K. Henderson, *Swap Credit Risk: A Multi-Perspective Analysis*, 44 BUS. LAW. 365, 386 n.26. Most swaps are executed under a standard master agreement developed by ISDA, or a variation thereof. See *id.* at 386-87.

¹⁰⁰ See Behof, *supra* note 87, at 25-26.

¹⁰¹ Saul Hansell & Kevin Muehring, *Why Derivatives Rattle the Regulators*, INSTITUTIONAL INVESTOR, Sept. 29, 1992, at 49, 62.

numerous ways to think about swap credit risk, what follows is a commonly accepted method used to quantify it.

A swap's credit risk can be broken down into two related concepts, "current exposure" and "potential exposure." The current exposure of a swap is the value that would be lost if the other counterparty were currently to default on the swap. Potential exposure refers to the extent to which a counterparty could be exposed to credit risk in the future, depending on movements in the underlying swap rate(s) over the remaining life of the swap.¹⁰² The current exposure can be analogized to the temperature on a given day, while the potential exposure is akin to how hot it might reasonably get in the future.¹⁰³ As a first approximation, a swap's credit risk can be determined simply by multiplying the probability of a counterparty default by the sum of (1) the swap's current exposure and (2) the swap's potential exposure over the life of the swap.¹⁰⁴ As a practical matter, however, it is difficult to quantify swap credit risk.

Current exposure can be assessed by utilizing the concept of replacement cost, discussed earlier, which simply equals the greater of the swap's mark-to-market value or zero. However, this calculation assumes that there is a liquid market for the swap from which market rates can be obtained. This may not be the case for all swaps. In addition, this approach "is not 'bulletproof,' cautions one regulator, because it is based on what many believe to be the dubious assumption that there will in fact be market liquidity at the exact moment in a crisis when it is needed most."¹⁰⁵ Furthermore, in the event of an actual default, certain transaction costs which have not been accounted for will be incurred in the process of creating a replacement swap. In spite of this, the replacement cost is generally a reasonable estimate of a swap's current credit exposure, although adjustments would need to be made for any applicable credit enhancements. For example, the value of any collateral currently held should be subtracted from the swap's mark-to-market value, because it would offset the replacement

¹⁰² See Hu, *supra* note 8, at 360-61.

¹⁰³ See *id.* at 361.

¹⁰⁴ Credit mitigating methods are ignored for now.

¹⁰⁵ Hansell & Muehring, *supra* note 101, at 61.

cost to the non-defaulting party.¹⁰⁶ In addition, the net exposure with a particular counterparty, rather than the gross exposure, should be used if there is a legally valid bilateral netting arrangement.

The measurement of potential exposure is much more difficult to calculate because it requires the use of statistical techniques to forecast possible changes in a swap's value. A common method involves entering the parameters of the swap into a computer-generated model which, in turn, analyzes the credit exposure over the life of the swap under thousands of simulated movements in the underlying swap rate(s). These simulated movements will be a function of a given belief about the volatility of the underlying variable(s) and a given assumption about future movements. These "Monte Carlo" simulations can provide a measure of the *expected* future exposure over the life of the swap (which is the sum of all possible probability-weighted replacement costs), as well as the *maximum potential exposure* over the life of the swap within a certain confidence level.¹⁰⁷ Generally, these simulations will either utilize measurements of the historical volatility of the underlying rate(s), or incorporate assumptions about the distribution of expected future rates.¹⁰⁸ As an example of such a simulation, consider the following study by Katerina Simons, who performed a Monte Carlo simulation for interest rate swaps of various maturities.¹⁰⁹

Simons's simulation assumed that interest rates follow a random walk in accordance with historical volatility and a lognormal distribution.¹¹⁰ In order to isolate credit exposure

¹⁰⁶ Strictly speaking, the actual reduction in current exposure will depend on the type of collateral. A full offset would only be appropriate if the collateral were in the form of cash or short-term government securities.

¹⁰⁷ See G-30 APPENDIX, *supra* note 90, at 18.

¹⁰⁸ See Daniela Giberti et al., *The Valuation of Credit Risk in Swaps: Methodological Issues and Empirical Results*, J. FIXED INCOME, Mar. 1993, at 24, 28.

¹⁰⁹ See Simons, *supra* note 92, at 24, 29-31.

¹¹⁰ In a random walk of this nature, a simulated change in swap rates is independent of previous changes in rates. In addition, the rate has no implicit upward or downward trend; it is as likely to fall as it is to rise. See *id.* at 30.

The historical volatilities used in the study were calculated by ISDA based on the monthly difference of daily observations between January 1979 and March 1987. See *id.* at 30 n.3. The resulting annualized volatilities are

from market exposure, matched pairs of swaps were analyzed, simulating the credit exposure of an intermediary that is perfectly hedged with two matching swaps. The credit risk for the swap pair was calculated at each payment period (i.e. every six months) by calculating the replacement cost of the "in the money" swap using a string of generated future interest rates.¹¹¹ For example, to test a 10 year swap, Simons started with the current 10 year swap rate and then generated 20 different interest rates corresponding to the 20 payment periods over the life of the swap. This process was repeated 5,000 times.¹¹² All replacement costs in each period were discounted to the present and were represented as a percentage of the notional principal amount. The values generated by the simulation determined the expected replacement cost (Figure 3), the maximum replacement cost over the swap's life within a certain confidence level (Table 1) and the mean expected lifetime exposure (Table 1).

According to Table 1, for a ten year matched swap, the maximum exposure will be less than or equal to 8.28% of the notional amount in 95% of the cases. In other words, in only 5% of the simulations did the credit exposure rise above this value. For each interest period, the expected credit exposures in Figure 3 represent an average of the 5,000 simulated replacement costs, discounted to the present, as a percentage of the notional amount. For example, the expected exposure for the ten year swap in year 3 is approximately 6%. The mean expected lifetime exposure for this swap is 4.03%, which is calculated by averaging the expected exposure for each period.

as follows:

Swap Maturity	10-Year	7-Year	5-Year	3-Year	1-Year
Volatility	.142	.148	.160	.166	.195

Id.

A second simulation, not discussed here, used the forward interest rates implied by the shape of the swap yield curve as a forecast of expected future swap rates.

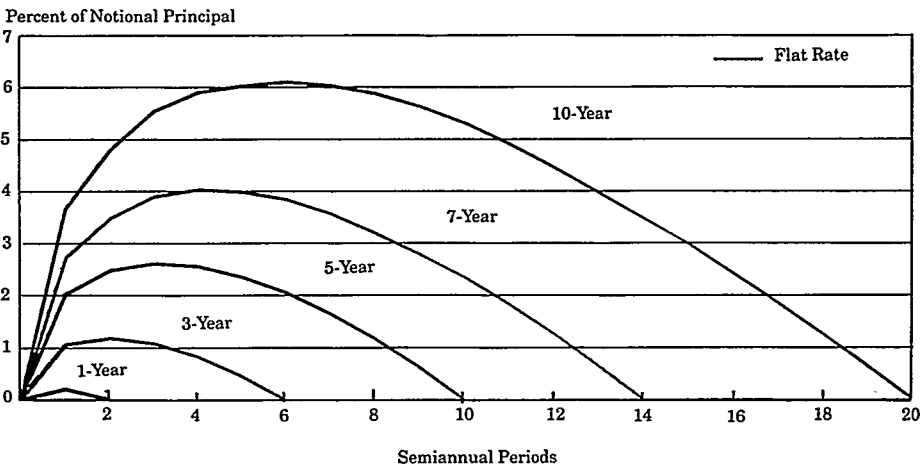
¹¹¹ See *id.* at 30-31.

¹¹² See *id.* at 31.

Table 1: Exposures on a Matched Pair of Swaps as a Percent of Notional Principal.¹¹³

Swap Maturity	10-Year	7-Year	5-Year	3-Year	1-Year
Confidence Interval					
99%	11.22	7.78	5.12	2.25	.34
95%	8.28	5.67	3.59	1.63	.24
90%	6.93	4.71	3.06	1.37	.20
75%	5.12	3.37	2.22	.98	.14
Mean Expected Lifetime Exposure	4.03	2.68	1.74	.77	.10

Figure 3: Potential Credit Exposure of Interest Rate Swaps.¹¹⁴



¹¹³ See *id.* at 32.

¹¹⁴ See *id.* at 33.

This study simulates the potential exposure over the life of each swap pair from its inception. Therefore, the original maturity for each swap also equals the residual maturity of the swap. The results, however, hinge on the residual maturity, and are applicable to swaps entered into previously. At inception, for example, the lifetime potential exposure for a ten year swap has a mean expected value of 4.03%. After three years (in which case the swap may also have current exposure), the potential exposure for the remaining life can be obtained from the seven year swap results, such that the swap's potential exposure would decline to 2.68%.

Several patterns are revealed by this analysis, including the obvious fact that the potential replacement cost, and therefore credit risk, varies over the life of the swap. Over time, the effect on the potential exposure is influenced by the "diffusion effect," which is the increase in the probability that the underlying variable will drift from its initial value, and the "amortization effect," which is the reduction in cash flows that need to be replaced as time passes. "As the swap approaches maturity, the exposure starts to decline, since fewer and fewer periods remain in which the difference between the initial and the current rates can accumulate."¹¹⁵ This basic pattern of a gradual increase followed by a decline holds for all par interest rate swaps.¹¹⁶ Another trend is that the longer the maturity of the swap, the greater the exposure because rates have a longer time to deviate from the initial rate.¹¹⁷

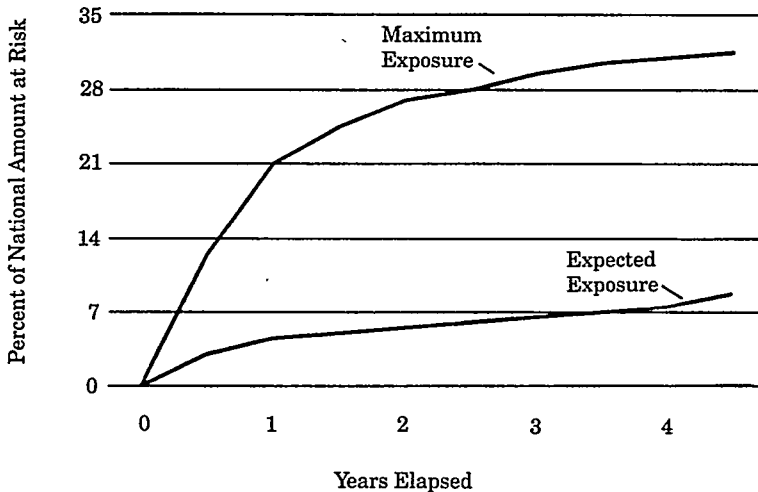
In contrast to interest rate swaps, the shape of a typical currency swap potential exposure profile (Figure 4) is upward sloping. This reflects the fact that the exchange of principal at maturity reduces the influence of the amortization effect. The upward-sloping shape also reflects the fact that currency exchange rates are generally more volatile than interest rates.

¹¹⁵ *Id.*

¹¹⁶ *See id.*

¹¹⁷ *See id.*

Figure 4: Potential Credit Exposure of Cross-Currency Swaps.¹¹⁸



One could refine this analysis of potential exposure by taking account of valid credit enhancements. For example, to the extent that a swap's collateral is greater than its current exposure, the amount of overcollateralization would offset the potential exposure.¹¹⁹ The effect of valid netting arrangements can also be incorporated by simulating the effect of rate changes on all swaps with a particular counterparty in order to calculate the net potential exposure with that counterparty. Further refinements could be made by analyzing an institution's entire portfolio of swaps under the simulation, rather than simply analyzing an individual swap or a matched swap pair.¹²⁰

¹¹⁸ See G-30 APPENDIX, *supra* note 90, at 20.

¹¹⁹ *But see* Hansell & Muehring, *supra* note 101, at 61 (noting that the actual reduction in current exposure depends on the type of collateral).

¹²⁰ A more complicated model would incorporate changes in interest rates and exchange rates, such that cross-currency swaps could also be incorporated. See generally, David A. Hsieh, *Assessing the Market and Credit Risks of Long-Term Interest Rate and Foreign Currency Products*, FIN. ANALYSTS J., July-Aug. 1993, at 75 (using such a model to analyze the risk exposures of long-term assets and liabilities).

These simulations, however, are only approximations. Their usefulness is predicated on the validity of the underlying assumptions, the most important of which will be the assumption about the movement in future swap rates. One typical assumption, found in Simons's study for example, is that changes are lognormally distributed around a mean corresponding to historical volatility. Nonetheless, rates may not display this property. Another approach is to develop future distributions based on historical data of past distributions.¹²¹ Yet another method is to assume that interest rates are mean reverting.¹²² The use of historical data itself presents a weakness, however, because there is no assurance that variables will behave as they did in the past. Historical volatility would have been a poor indicator, for example, of the actual volatility of European currencies during the currency crisis of September 1992.

Another issue is whether the expected exposure or the maximum exposure is a more appropriate measure of potential exposure. From a financial "pricing" perspective, the expected exposure seems more appropriate. However, from a regulatory perspective, where the concern is the potential for bank failure caused by extreme rate changes, the maximum exposure may be more suitable. If the latter measure is used, it is also necessary to stipulate an appropriate confidence interval. Any statistical simulation will have extremes to the distribution. To include those few extreme outcomes, however, is to effect a dramatic increase in the measure of potential exposure. For example, in Table 1, moving from the 95% confidence level to the 99% confidence level for a 10 year swap results in approximately a 36% increase in potential exposure. "Admittedly, the 99 percent confidence interval implies an

¹²¹ The method still utilizes a random walk, but rather than assuming a lognormal distribution, the random walk will follow a reference distribution derived from historical data. See Giberti et al., *supra* note 108, at 28 (using historical data to quantify the credit exposures of various swaps). See also Hsieh, *supra* note 120, at 76 (using a monthly model of global interest rates and exchange rates by using historical data to describe the statistical behavior, and then using a simulation algorithm to generate future outcomes).

¹²² Interest rates tend to display mean reverting behavior, such that the higher they rise, the more pressure there is for them to fall to a lower level, and vice versa. This method assumes that there is some natural level that interest rates tend toward over time.

extremely cautious measure of lifetime credit exposure, and less cautious estimates may be appropriate."¹²³ Although capital requirements based on higher confidence intervals would reduce the probability that a bank would default, there are real costs to maintaining higher levels of capital.

Another issue is the appropriate time horizon for assessing the potential exposure. Although Simons examines the potential exposure over the remaining life of the swap, a shorter time frame may be appropriate for regulatory purposes if a swap's current exposure is updated frequently.¹²⁴

Once the measures of current and potential exposure for a swap are identified, these measures must be combined with a credit analysis of default probability. The simplest way to take default into account is to multiply the sum of the current and potential exposures by a probability of default depending on the perceived credit quality of the counterparty and the maturity of the transaction.¹²⁵ This method assumes that this probability is constant over the life of the swap and is independent of changes in the underlying swap rate(s). An alternative and more refined method is to treat default and underlying rate movements as dependent events by incorporating the probability of default into the simulation of potential exposure.¹²⁶ In addition, a further distinction can

¹²³ Simons, *supra* note 92, at 32.

¹²⁴ The concern from a regulatory standpoint is that the value of the swap will increase over time and the counterparty will default, causing a loss equal to the mark-to-market value at the time of default. Therefore, capital is assessed against the current credit exposure to protect the bank against a default today, and it is assessed against some measure of potential exposure, to protect the bank from a possible default in the future. Nonetheless, in an extreme case where the current exposure, and hence the amount of capital assessed against such exposure, is continuously and instantaneously adjusted, potential exposure would theoretically be irrelevant, because the continual updating of the capital required for the current exposure would always be sufficient to cover a loss in the future. The real concern is that the swap's value will change before the current exposure component of capital can be updated, and that the bank will be unable to acquire such capital at the time of default. Capital for future potential exposure is set aside as a precautionary measure to guard against this contingency.

¹²⁵ The longer the maturity of the swap, the greater the probability that a counterparty's credit rating may deteriorate over time.

¹²⁶ See G-30 APPENDIX, *supra* note 90, at 25. For example, since weaker counterparties to an interest rate swap tend to pay fixed and receive floating, they are unlikely to default when rates move higher. See Simons,

be made between the current probability of default, which would be applied to the current exposure, and the future probability of default, which would be applied to the potential exposure.

Although the calculation of current and potential exposure seems like an abstract and technical academic exercise, banks often perform this kind of simulation or a comparable model-based analysis to manage their own credit exposure. Sophisticated dealers will calculate credit risk on a daily or even intra-day basis, while less sophisticated end-users may only recalculate credit risk exposure on a monthly or quarterly basis. Dealers and end-users without the sophistication to perform these types of analyses often utilize tables of factors developed under the same principles as a full sensitivity analysis.¹²⁷

It is essential to realize that while the notional values of these swaps are extremely large, they bear little relation to the amount of credit risk. A pilot study by ISDA surveyed 14 leading swap dealers at year-end 1993 and found that their net replacement value of outstanding interest rate and currency swaps was \$101.3 billion or 1.22% of the total notional amount of all such swaps outstanding. The gross replacement value was \$178.4 billion or 2.15%.¹²⁸ In fact, despite the concerns, swap defaults have been minimal.

3.2.5. Actual Default Experiences

In 1992, ISDA conducted a default survey in order to assess the true level of credit risk and loss experiences in the swap market. The swaps entered into by the survey respondents represented 70% of the total volume of outstanding swaps.¹²⁹ At December 31, 1991, cumulative losses in swaps totaled

supra note 92, at 33.

¹²⁷ G-30 REPORT, *supra* note 26, at 14.

¹²⁸ *Study Clarifies Credit Risk*, DERIVATIVES WEEK, June 13, 1994 at 2, available in LEXIS, Banking library, II file. Recall that the notional amounts are never exchanged in an interest rate swap. The exposure for a currency swap is greater, because the notional amounts will change hands, but the exposure is still much less than the principal amount, because the notional amounts are *exchanged* at maturity. If one party fails to make the notional payment at maturity, the counterparty is relieved of its obligation to deliver its notional payment.

¹²⁹ See ISDA Default Survey, *supra* note 86.

\$358.36 million.¹³⁰ This loss represented .0115% of the \$3.105 trillion notional principal amount then outstanding, and .46% of the gross mark-to-market value of the swaps on the books of survey respondents.¹³¹ The notional principal amount of defaulted¹³² transactions was \$12.8 billion.

Of these losses, almost 50% were caused by a rather unusual set of circumstances involving the default of swaps entered into by the London Borough of Hammersmith and Fulham. In 1991, Hammersmith and Fulham repudiated numerous losses from swap contracts, and was able to convince the House of Lords (England's highest court) that it was *ultra vires* (beyond their authority) to have entered into the contracts in the first instance. The Law Lords determined that the swaps were more akin to gambling than insurance, and therefore ruled that they were beyond the powers of the local government, thereby voiding the contracts. If these unusual losses are excluded from the above figures, total swap losses amount to less than .01% of the outstanding notional amount. Table 2 describes other aspects of the default survey.¹³³

Table 2: Net Loss by Counterparty Type.

	Amount (in millions)	Percent
UK Local Authorities	\$177.7	49.6%
Corporate	94.5	26.4
Other Non-Dealer Financial		
Institutions	60.1	16.8
Savings & Loans	20.3	5.6
Other Governmental Entities	3.0	0.8
Non-ISDA Dealers	2.1	0.6
ISDA Dealers	<u>0.6</u>	<u>0.6</u>
TOTAL	\$358.2	100.0%

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² "Defaulted" refers to the legal definition of default under the ISDA Master Agreement and includes failure to pay as well as other non-payment breaches. *Id.*

¹³³ See G-30 APPENDIX, *supra* note 90, at 135.

Despite the concerns expressed by regulators and others, very few defaults have occurred, and those that have occurred have been dealt with successfully. Morgan Guaranty had swaps worth an estimated \$10 million with Olympia & York when they filed for bankruptcy in 1992. The Federal Reserve had to unravel billions in swaps left behind by the failure of the Bank of New England.¹³⁴ Swaps worth \$30 billion left behind by the collapse of Drexel Burnham Lambert were also liquidated or transferred successfully,¹³⁵ which is particularly noteworthy because Drexel's derivatives subsidiary was essentially unregulated. Other successful liquidations include Development Finance Corp. of New Zealand and British & Commonwealth in the U.K. Even Hammersmith and Fulham's defaults did not overwhelm the system. However, other than Hammersmith and Fulham, these portfolios were relatively balanced, and regulators are still wary of the effects of a default involving a large unbalanced portfolio.¹³⁶

3.3. Swap Market Risk

3.3.1. Market Risk Defined

Market risk is the risk that an asset will decline in value. Such risks can be caused by changes in equity prices, commodity prices, exchange rates, interest rates, or any other variable that affects the value of a real, financial, or derivative asset. Almost all assets are vulnerable to market risks, including many normally thought to be risk-free, such as long-term government securities.¹³⁷

¹³⁴ When the Bank of New England was declared insolvent in 1991, it had a derivatives portfolio of \$7 billion with 387 counterparties. The portfolio was transferred to the FDIC and then sold to Fleet-Norstar. See Simon Brady, *The Ref Gets Rough*, EUROMONEY, Apr. 1992, at 25, 28. -

¹³⁵ See Glasgow & Javetski, *supra* note 68, at 103.

¹³⁶ See Brady, *supra* note 134, at 28.

¹³⁷ See *supra* note 22 (noting the effect of interest rate changes on the value of long term treasury bonds). Market risks are often categorized according to the factor which underlies the potential change in value. A change in value caused by a change in interest rates is referred to as interest rate risk, while the potential for loss caused by a change in exchange rates is referred to as foreign exchange risk, etc.

For swaps and other derivatives, market risk and credit risk are two sides of the same coin. The potential for a rise in market value exposes a counterparty to credit risk; this risk will only be realized if the other counterparty defaults. The potential for unexpected and negative changes in market values is market risk. While credit risk depends on the likelihood that the swap will have positive value, market risk is simply the potential for the swap to lose value.¹³⁸

When two counterparties enter into a swap, they are both exposed to market risks. For example, the fixed-rate payer of an interest rate swap will suffer unrealized losses if interest rates decline, while the floating-rate payer will suffer unrealized losses if rates increase. But, unlike swap credit risk, swap market risk can be hedged completely.

3.3.2. Methods to Mitigate Market Risk

Consider the swap paradigm represented in Figure 2, in which a bank simultaneously enters into a fixed-floating swap with one party, and a floating-fixed swap with another counterparty for the same notional amount and on the same terms.¹³⁹ By matching mirror swaps in this fashion, a bank can theoretically eliminate market risk completely, because any change in the underlying reference rate causing one of the swap pairs to be out of the money, will cause the other matched swap to be in the money by an equal and offsetting amount. In practice, however, it is very difficult to run a swap portfolio that is entirely matched. As discussed *supra* Section 3.1.4., the swap dealer has evolved into an institution ready to enter into a swap with a counterparty in the absence of an immediately available offsetting swap. While an offsetting swap may be found in the future, the dealer will be exposed to market risks in the interim, as well as over the life of the

¹³⁸ Although these risks are two sides of the same coin, a party can be exposed to both risks at the same time. For example, if a swap is in the money, a counterparty is exposed to current credit risk, but it is also exposed to the potential for a decline in the value of the swap. Realization of either of these risks would result in a real economic loss to the value of the entity.

¹³⁹ See *supra* Section 3.1.4. One discrepancy, which does not undermine the hedge, is the bid-ask spread. See *supra* note 59 (describing the bid-ask spread).

swap to the extent it is unable to find an exactly offsetting hedge.

In the absence of a matching swap, an intermediary can hedge its risk exposure by creating a synthetic swap through the use of treasury bills, futures, forwards, or other financial instruments.¹⁴⁰ Nonetheless, such hedging may involve a dynamic strategy which requires adjustment over time. In addition, limitations on the terms and liquidity of such instruments may impede the construction of a perfect hedge.

Rather than actively hedging a swap's exposure, a bank may have a position in other derivatives, assets, or swaps, which act as a natural hedge. Recall that swaps themselves are often used to hedge risks of other assets on the balance sheet. If an intermediary enters into swaps in order to hedge its exposure to interest rates caused by a duration mismatch of its assets and liabilities, its effective market risk exposure as a whole will be minimized. In other words, the swap itself is acting as a hedge against other on or off-balance-sheet market risks. As a practical matter, a swap dealer will generally incorporate swaps into its existing portfolio and use synthetic instruments to hedge the residual risk.

3.3.3. *Swap Market Risk Measurement*

The potential market risk of a swap can be analyzed in much the same way that credit risk was analyzed *supra* Section 3.2.4., because credit risk itself is a function of changes in market value. Recall that swap credit exposure was determined by adding the swap's current mark-to-market value to a measure of the swap's potential credit exposure over some future time period. Similarly, assessing market risks involves marking the contract to market, and determining the potential for a future decline in value over a specified time frame. The same type of Monte Carlo simulation used in connection with calculating credit exposures can therefore be used to determine market risk.

¹⁴⁰ Since a swap involves a series of cash flows at future dates, those cash flows can be replicated through the use of other derivatives. It is beyond the scope of this paper to explain how this would be accomplished, *but see generally* Keith Schap, *Swaps III: Reducing Risks With Synthetic Swaps*, FUTURES: MAGAZINE OF COMMODITIES & OPTIONS, Aug. 1990, at 42 (describing how synthetic swaps can reduce risks).

Despite the ability to isolate the market risk for a particular swap contract, it is imprudent and meaningless to assess the market risk of a swap in isolation, because this risk may be hedged with other swaps, other derivative positions, or other financial or tangible assets. Therefore, when evaluating market risk, it is essential that all the assets exposed to the same underlying risk factor be analyzed together. For example, instead of analyzing the market risk of a single interest rate swap or a group of swaps, it is necessary to examine the interest rate risk of the institution as a whole, by analyzing all of the institution's assets that are influenced by interest rates under future simulations. An institution's market risk exposure is too complex and intricate to be determined by simply summing individual risk assessments of each asset.

Most banks already employ this kind of factor analysis by determining the sensitivity of asset values and earnings to interest rate or exchange rate changes. One such type of analysis for interest rate risk is called gap analysis, which is a rudimentary tool that segregates assets and liabilities into time frames in order to determine mismatches.¹⁴¹ More sophisticated banks use duration analysis, an approach which is based on cash flows.¹⁴² Other banks use a Monte Carlo simulation analysis similar to that discussed above to determine the change in value of all the assets that are sensitive to changes in interest rates and other variables.

Measuring market risk presents the same, if not greater, technical challenges as those presented by credit risk measurement. Dealers must evaluate risk across a wide variety of derivative and other assets, and must make assumptions about underlying volatilities and correlations across instruments and markets.¹⁴³ In addition, certain illiquid positions may be difficult to value.

¹⁴¹ See *Corralling the Interest Rate Risk*, BANK MGMT, Feb. 1993, at 26, 30. For example, all assets and liabilities with a maturity between 1 and 2 years will be analyzed together, as will other assets and liabilities within other maturity bands.

¹⁴² For an explanation of duration, see *infra* note 229.

¹⁴³ See G-30 APPENDIX, *supra* note 90, at 4.

3.4. Other Swap Risks

While swap credit risk and market risk can be substantial, other risks also exist. Many of these “other” risks, however, are less subject to measurement and quantification, and many are really subcategories of credit risk and market risk.

3.4.1. Liquidity Risk

An institution is generally affected by the liquidity and marketability of its assets. A lack of liquidity may prevent an institution from buying or selling certain assets, or may result in a disadvantageous price when doing so. With regard to swaps, liquidity risk could affect the ability of a bank to replace a defaulted swap or its ability to synthetically hedge swaps through the use of market instruments. It is likely that liquidity will dry up in the aftershock of a swap default, which could prevent a bank from acquiring a new swap, or from continuing a synthetic and dynamic hedging strategy (or it may simply make these actions very costly).¹⁴⁴ But as mentioned previously, the liquidity of the swap market has withstood the test of several failures. In addition, since a variety of tradable instruments can be used to synthetically hedge and replicate swaps, liquidity risks will be limited. Last, liquidity risk is a risk with which banks are very familiar because their main assets, commercial loans, are very illiquid.¹⁴⁵

3.4.2. Legal Risk

The greatest legal risk is that a swap or any of its specific provisions, such as the close-out netting provisions discussed *supra* part 3.2.3., will be unenforceable in the event of default or counterparty bankruptcy. It is feared, for example, that, in the wake of a default, a particular jurisdiction may declare netting invalid, thus exposing swap counterparties to great losses. Although most swap agreements specify that the

¹⁴⁴ In other words, a swap’s mark-to-market value may not be a good indication of the true cost of replacing a defaulted swap.

¹⁴⁵ See Beckett, *supra* note 62, at 35. However, the recent development of the asset securitization market has enhanced the liquidity of certain loans.

contract will be governed by New York state law or English law, jurisdictions which have specifically validated contractual netting, it is questionable whether such a choice of law provision would be enforceable if neither party to the swap has any connection with the stipulated jurisdiction. Additionally, in the event of a counterparty bankruptcy, the validity of netting would be determined by the bankruptcy laws of the counterparty's domicile, which supersede contract law. Many have questioned the validity of bankruptcy netting in jurisdictions other than the United States and England. Although ISDA has obtained legal opinions from various jurisdictions regarding the validity of netting in bankruptcy,¹⁴⁶ such opinions are not based on adjudicated precedents, and the bankruptcy laws of most jurisdictions do not specifically provide for the validity of netting.

The statute of frauds presents other legal risks. The common practice of consummating swap agreements over the phone, followed by a written confirmation, may give grounds for a party to repudiate a contract *ex post*. If the follow up documentation is deemed to be insufficient, or is non-existent, the statute of frauds may not be satisfied. Nevertheless, New York specifically amended its statute of frauds in September 1994 to facilitate compliance for swaps and other derivative transactions.¹⁴⁷ The doctrine of *ultra vires*,¹⁴⁸ the cause of the Hammersmith and Fulham defaults, presents another risk to the extent that an agent or entity enters into swaps without the proper authority to do so.¹⁴⁹ To safeguard against this risk, standard documentation has been developed, and due diligence will be carried out by the intermediary to assess the capacity of the swap counterparty to enter into the swap. Bankruptcy and fraudulent conveyance laws also present legal risks. It is possible that pre-petition payments on settled swap agreements could be voidable as preferences or fraudulent

¹⁴⁶ See *infra* Section 4.1.2.

¹⁴⁷ N.Y. GEN. OBLIG. § 5-701(B) (McKinney Supp. 1995).

¹⁴⁸ *Ultra vires* refers to "[a]cts beyond the scope of the powers of a corporation, as defined by its charter or laws of state incorporation." BLACK'S LAW DICTIONARY 1522 (6th ed. 1990).

¹⁴⁹ For example, an agent of a corporation may only act on the corporation's behalf to the extent permitted by the articles of incorporation or bylaws. If a court finds the contract *ultra vires*, the contract will be voided.

transfers, providing the bankruptcy trustee the ability to seek indemnification for those payments.¹⁵⁰

A further source of legal risk recently became apparent in the wake of substantial losses reported by Proctor & Gamble, Gibson Greetings and other entities from derivatives contracts. Although many of the facts are unclear, several of these entities have alleged that the swap dealer which sold them the contracts did not fully disclose the risks involved in the complex arrangements. Although such a suit may not ultimately succeed, there is a danger that any counterparty with large losses will automatically bring suit, thus pressuring swap dealers to settle such claims. Such risks create costs and uncertainties, which could hinder the development of the swap market.

Realizing that these legal risks and uncertainties are detrimental to the financial markets, certain countries have sought to clarify the existing treatment of swaps both through amending existing legislation and enacting new legislation.¹⁵¹

3.4.3. Settlement Risk

Swaps, like all financial transactions, expose counterparties to various types of settlement risk. The typical example of settlement risk arises when one party remits funds to a counterparty before receiving other funds due from the same counterparty.¹⁵² This situation could be caused by technical problems with the payment system, or by the sudden failure of the counterparty. These risks are reduced dramatically for an individual swap through the use of payment netting discussed *supra* Section 3.2.3. There is, however, the risk that a delay in the settlement of one swap may hinder a bank's ability to fulfill its own obligations on

¹⁵⁰ Thomas Given, *Protecting Swap Agreements From Bankruptcy Risks*, FAULKNER & GRAY'S BANKR. L. REV., Spring 1991 at 48. Under certain bankruptcy laws, transfer of a bankrupt's property (such as swap payments) for little or no consideration at a time when the debtor is insolvent, or for so little consideration that it renders a debtor's capital unreasonably small, is considered a fraudulent conveyance and may be avoided by the trustee. BLACK'S LAW DICTIONARY, *supra* note 148, at 662.

¹⁵¹ See *infra* note 186 and accompanying text.

¹⁵² See Beckett, *supra* note 62, at 36.

swaps with other counterparties, thereby causing a ripple effect throughout the payment system.

While the possibility of a payments breakdown exists, many are quick to point out that the daily flow of payments on swap transactions is unlikely to exceed \$2 billion, which, in the context of the overall financial markets, is not a large amount.¹⁵³

3.4.4. Operational Risk

Swaps are very complex instruments which require a tremendous amount of back-office support in order to price them, mark them to market, and keep track of collateral, margin calls, and payments. In addition, sophisticated internal controls are necessary to manage swap credit and market risk properly. Operational risk is the possibility that such controls and operations may prove inadequate as a result of human error or management failure.¹⁵⁴ The swap portfolio must be constantly monitored,¹⁵⁵ and "the cost of mistakes can mount rapidly."¹⁵⁶ It is also essential both that internal controls properly manage credit and market risk, and that the traders and writers of these instruments are properly supervised.

3.4.5. Systemic Risks

Regulators are concerned that any of the foregoing risks, especially credit and market risks, could lead to a failure or liquidity crisis, thereby precipitating a collapse of the banking system. This systemic risk, or the risk that a disruption at a bank or investment bank could reverberate to other such institutions and across various financial markets,¹⁵⁷ is

¹⁵³ Contrast this figure to the approximately \$640 billion in foreign exchange transactions that are settled each day. See Brady, *supra* note 134, at 26.

¹⁵⁴ See G-30 REPORT, *supra* note 26, at 50.

¹⁵⁵ See Beckett, *supra* note 62, at 37.

¹⁵⁶ See *id.* at 37.

¹⁵⁷ The tendency for derivatives to be used for arbitrage strengthens linkages between markets, and increases the possibility that disruptions may spill over into other markets and countries.

heightened by the fact that a large portion of swap activities are concentrated in a handful of large banks.

Nevertheless, ISDA notes that although the top eight dealers accounted for 58% of interest rate and currency swaps at year-end 1991, no single firm had over 10% of the market.¹⁵⁸ In addition, despite the fact that the swap market is relatively concentrated, the 250 or so ISDA dealers comprising the majority of the market is large in comparison to the much smaller number of dealers allowed to transact in the government bond market.¹⁵⁹ Last, the ability of the financial markets to survive a major disruption was evidenced by its handling of the recent Barings PLC failure (as a result of extreme losses from exchange traded derivatives) and the Orange County investment fund debacle (which involved extreme losses resulting from the use of highly leveraged derivatives contracts).

Whether or not the previously discussed risks have the potential to undermine the global financial system will be a function of the magnitude of the risks, the management of the risks by those transacting in the swap market, the liquidity of the market, and the ability of regulators to set sensible and prudent regulations which safeguard against the possibility of a systemic catastrophe.

4. SWAPS AND CAPITAL

Ideally, Basle's provisions should reflect the foregoing normative assessment of swap risks. While the Basle Accord represents an important step towards creating a safer and more competitive world banking system, its treatment of swaps has been heavily criticized.

4.1. Basle's Treatment of Swap Credit Risk

4.1.1. Basle's Treatment of Swaps Under the 1988 Accord

Recognizing that a swap's credit risk is not equal to its notional value, Basle incorporates swaps into its risk-based capital approach by first converting them to "credit risk

¹⁵⁸ See G-30 REPORT, *supra* note 26, at 61.

¹⁵⁹ See *id.*

equivalents,” and then risk-weighting them according to the obligor of the swap. Basle allows two alternative methods for computing these credit risk equivalents: the current exposure method and the original exposure method.

Under the current exposure method—the preferred and recommended method—the credit risk equivalent is the sum of two components. Banks are first required to calculate the sum of the current replacement cost of all swap contracts with positive value by marking them to market.¹⁶⁰ Then, in order to reflect the potential future exposure over the remaining life of the contract, an “add-on” factor is added to the current replacement cost by multiplying the notional principal amount of each swap by the weights in Table 3 (depending on the type of contract).¹⁶¹

The second method, which may be used at the discretion of national supervisory authorities, is the original exposure method.¹⁶² Because there is no separate assessment of current and potential exposure, this method does not require that instruments be marked to market. Instead, the potential credit exposure is estimated by allocating a particular weight to the notional amount of each contract based on the type of contract and the original maturity, irrespective of what the market value of the contract might be on a particular date.¹⁶³ Accordingly, a slightly more cautious view is justified, since the current exposure is not being calculated on a regular basis.¹⁶⁴

¹⁶⁰ See BIS ACCORD, *supra* note 3, at 154.

¹⁶¹ See BASLE COMMITTEE ON BANKING SUPERVISION, BASLE CAPITAL ACCORD: TREATMENT OF POTENTIAL EXPOSURE FOR OFF-BALANCE-SHEET ITEMS (1995) annex at 2 [hereinafter 1995 NETTING AMENDMENT]. Under this method, no potential credit exposure is calculated for single currency basis swaps. See BIS ACCORD, *supra* note 3, at 154. Prior to the amendment of the accord in April 1995, the matrix in Table 3 did not contain add-on factors to account for equity, precious metal and commodity swaps.

¹⁶² Although national authorities may permit banks to choose which method to adopt, once a bank has chosen the current exposure method, it is not allowed to switch to the original exposure method. See *id.* annex at 3 n.3.

¹⁶³ See *id.* “For interest rate contracts, there is national discretion as to whether the conversion factors are to be based on original or residual maturity.” *Id.* at n.5.

¹⁶⁴ See BIS ACCORD, *supra* note 3, at 154.

Table 3: Conversion Factors for Potential Exposure: The Current Exposure Method.¹⁶⁵

<i>Residual Maturity</i>	<i>Interest Rate</i>	<i>Exchange Rate and Gold</i>	<i>Equity</i>	<i>Precious Metals (except gold)</i>	<i>Other Commodities</i>
One year or less	0.0%	1.0%	6.0%	7.0%	10.0%
Over one year to five years	0.5%	5.0%	8.0%	7.0%	12.0%
Over five years	1.5%	7.5%	10.0%	8.0%	15.0%

Table 4: Conversion Factors: The Original Exposure Method.¹⁶⁶

<i>Maturity</i>	<i>Interest Rate</i>	<i>Exchange Rate and Gold</i>
One year or less	0.5%	2.0%
Over one year to two years	1.0%	5.0%
For each additional year	1.0%	3.0%

The value obtained, using either of these two methods, is then risk-weighted by a factor reflecting the credit quality of the counterparty, in the same manner as in the main

¹⁶⁵ 1995 NETTING AMENDMENT, *supra* note 161, annex at 2.

¹⁶⁶ 1995 NETTING AMENDMENT, *supra* note 161, annex at 3. The original exposure method may only be used for interest rate, exchange rate and gold swaps. In addition, this method will cease to be available once the market risk capital requirements are implemented. *Id.*

framework. Nevertheless, because most swap counterparties tend to have a high credit rating, swaps with a commercial counterparty, which would otherwise receive a 100% risk weight, are weighted at 50%. A summary of the four levels of risk-weighting appears in Table 5. The weights appearing in Tables 3, 4 and 5 are not permanent, and will be adjusted by Basle if circumstances dictate.¹⁶⁷ Table 6 below provides examples of credit equivalent computations under these two methods.

Table 5: Risk Weights for Swaps.

<i>Risk Weight</i>	<i>Application</i>
0%	Central Governments of the OECD countries. National supervisors may assign to 10% category for maturities greater than one year.
10%	Certain public sector entities located in the same country as the bank.
20%	Banks incorporated in OECD countries. Multilateral development banks such as the World Bank. Those outside the OECD if less than one year.
50%	All other counterparties, including corporate users, non-bank financial institutions and banks incorporated outside OECD.

¹⁶⁷ For example, the conversion factors for calculating the credit exposure are subject to amendment as a result of changes in the volatility of interest rates and exchange rates. See BIS ACCORD, *supra* note 3, at 154.

Table 6: Sample Credit Equivalents for Swaps Under Basle.

Initial Swap	Years Re-main-ing	Mark to Market Value	Potential Exposure (Current Exposure Method) ¹⁶⁸	Credit Equivalent (Current Exposure Method) ¹⁶⁹	Credit Equivalent (Original Exposure Method) ¹⁷⁰
5 year \$500,000 interest rate	4	\$10,000	\$2,500	\$12,500	\$20,000
7 year \$200,000 interest rate	1	-\$1,000	\$3,000	\$3,000	\$14,000
8 year \$100,000 interest rate	.5	\$3,000	\$1,500	\$4,500	\$8,000
2 year \$700,000 cross cur-rency	2	-\$5,000	\$35,000	\$35,000	\$35,000
6 year \$400,000 cross cur-rency	5	\$17,000	\$30,000	\$47,000	\$68,000

Regardless of which method was used, risk-based capital was, until recently, assessed on the gross exposure, or the sum of all risk-weighted credit equivalents. In other words, except

¹⁶⁸ Calculated by multiplying the notional amount by the factors in Table 3.

¹⁶⁹ Equals the sum of (1) the swap's mark-to-market value, if positive (zero if negative) and (2) the potential exposure.

¹⁷⁰ Calculated by multiplying the notional amount by the factors in Table 4 corresponding to original maturities.

for swaps netted by "novation,"¹⁷¹ the 1988 Accord did not recognize a reduction in capital adequacy requirements for netting agreements with a particular counterparty.¹⁷² At the time, the Committee felt it was unclear whether close-out netting provisions would be legally enforceable.¹⁷³ Primarily, the Committee was concerned that a trustee in bankruptcy could unbundle the individual obligations under the netted contracts,¹⁷⁴ defaulting on those which were "out of the money" and requiring performance of those "in the money." Because a novated contract substitutes for and legally extinguishes all prior obligations, the Committee was less concerned about the legality of netting by novation. Basle's refusal to recognize netting in its framework was one of the main criticisms of the 1988 accord.¹⁷⁵

4.1.2. Basle Bilateral Netting Amendments

Although it took years longer than the industry would have liked, Basle finally amended the accord in July 1994 and April 1995 to recognize bilateral netting for capital adequacy purposes.¹⁷⁶ The July 1994 amendment (based on a proposal put forth in April 1993) implemented netting for current exposures, while the April 1995 amendment (based on a proposal put forth in July 1994) implemented netting for potential exposures. Bilateral netting for capital purposes,

¹⁷¹ Novation involves the formation of a new contract each time a new swap transaction is consummated with a particular counterparty which incorporates and amalgamates all prior commitments and obligations between the two parties, displacing and terminating all prior agreements. It is a form of payment netting whereby two or more transactions in the same currency and with common payment dates are deemed terminated and replaced with a new contract, requiring payments equal to the net difference of the payments of the novated transactions. See BIS ACCORD, *supra* note 3, at 155 n.6.

¹⁷² See *id.* at 155.

¹⁷³ See *supra* Section 3.4.2.; see also BIS ACCORD, *supra* note 3, at 155 (discussing the Committee's concerns with such enforceability).

¹⁷⁴ See BIS ACCORD, *supra* note 3, at 155.

¹⁷⁵ See *New Proposals on Netting and Supervisory Treatment of Risk*, FIN. REG. REP., May 1993, available in LEXIS, World Library, Allwld File.

¹⁷⁶ See BASLE COMMITTEE ON BANKING SUPERVISION, THE TREATMENT OF THE CREDIT RISK ASSOCIATED WITH CERTAIN OFF-BALANCE SHEET ITEMS 1 (1994) [hereinafter 1994 NETTING AMENDMENT]; 1995 NETTING AMENDMENT, *supra* note 161.

however, will only be allowed if the following conditions are met.

First, there must be a netting contract or agreement creating a single legal obligation such that, in the event of a default, bankruptcy, or liquidation, the bank would have an obligation to receive or pay only the net sum of unrealized gains and losses on the covered transactions.¹⁷⁷ Master agreements, such as those promulgated by ISDA, would satisfy this requirement. Second, there must be a written and reasoned legal opinion that supports the validity of netting under the laws of each concerned jurisdiction: (i) the jurisdiction where the counterparty is chartered and, if a foreign branch of a counterparty is involved, where such branch is located; (ii) the law that governs the individual transactions; and (iii) the law that governs the netting agreement.¹⁷⁸ Third, procedures must be in place to “ensure that the legal characteristics of netting arrangements are [constantly] under review in light of possible changes in relevant law.”¹⁷⁹

These requirements are intended to address Basle’s concern “that if a liquidator of a failed counterparty has (or may have) the right to unbundle netted contracts, demanding performance on those contracts favourable to the failed counterparty and defaulting on unfavourable contracts, there is no reduction in counterparty risk.”¹⁸⁰ Netting is a contractual provision similar to the common law doctrine of set-off, pursuant to which a creditor is relieved from making payments to a bankrupt debtor to the extent it can set-off other obligations owed to it from the debtor.¹⁸¹ Set-off is not universally recognized, however, and there is a concern that a

¹⁷⁷ See 1994 NETTING AMENDMENT, *supra* note 176, annex 1 at 1-2.

¹⁷⁸ See *id.* annex 1 at 2.

¹⁷⁹ *Id.* Swaps netted by novation can also be netted for capital purposes. See *supra* note 171 and accompanying text.

¹⁸⁰ 1994 NETTING AMENDMENT, *supra* note 176, annex 1 at 1.

¹⁸¹ The classic example of set-off is the case of Borrower who defaults on a loan from Bank, but also has funds in a checking account at Bank. In those jurisdictions which allow set-off, Bank would be entitled to seize the funds in Borrower’s checking account by setting it off against Borrower’s liability on the loan. If set-off were not applicable, Bank would be unable to seize the checking account, and would be forced to file a claim in bankruptcy for the entire amount of the loan.

country's statutory or common law bankruptcy provisions would allow a trustee to disregard the contractual netting provisions, and to treat the netted transactions as individual and separate contracts.¹⁸² Since in many countries the bankruptcy trustee has the power to accept or reject executory contracts, it would accept swaps that are in the money, requiring the non-defaulting counterparty to continue payments, yet would reject any out of the money contracts, forcing the non-defaulting party to file a bankruptcy claim for the swap's value. There is also a concern that bankruptcy laws could impede the termination of swaps provided for by most swap agreements in the event of insolvency, bankruptcy or liquidation.¹⁸³

A further condition set forth by Basle is that swaps subject to a netting agreement containing a "limited two-way payment" clause may not be netted for capital adequacy purposes.¹⁸⁴ This type of arrangement, otherwise referred to as a "walkaway clause," provides that the defaulting party will not be entitled to receive a net termination payment that is in its favor. Such clauses, more common in older master agreements, were intended to discourage default by providing a windfall to the non-defaulting party and to compensate the non-defaulting party for any limits resulting from inadequate set-off laws. Basle's rationale, from a regulatory standpoint, is a disaffection with depriving insolvent financial institutions of important assets. Some also believe walkaway clauses increase the legal uncertainty of netting because bankruptcy courts generally look unfavorably upon this type of "forfeiture."¹⁸⁵

¹⁸² See *id.*

¹⁸³ See G-30 APPENDIX, *supra* note 90, at 47. For example, prior to the 1990 amendments to the U.S. Bankruptcy Code, it was believed that termination rights under master agreements would be subject to the automatic stay, thus delaying the ability to terminate the master agreement and enforce the close-out netting provisions. See 11 U.S.C. §§ 101(55)(c), 362(b)(14), 546(g), 548(d)(2)(D), 560 (Supp. V 1993); See Given, *supra* note 150.

¹⁸⁴ See 1994 NETTING AMENDMENT, *supra* note 176, annex 2 at 2.

¹⁸⁵ Often, counterparties to defaulted swaps choose not to exercise their right to walk away under the limited two-way payment clause. See Brady, *supra* note 134, at 28 (quoting an ISDA member's observation that "[i]nternal moral and business pressures persuaded people to behave themselves").

Despite Basle's concerns, the United States, Canada, Germany, France, and Belgium all have passed legislation that reduces the legal uncertainty of a swap's treatment in bankruptcy by specifically allowing netting, and by validating termination provisions.¹⁸⁶ In addition, in its 1990 report, the Lamfalussy Committee on Interbank Netting concluded that bilateral master agreements and other bilateral netting by novation are likely to be enforceable in all countries where the 1988 accord is in effect.¹⁸⁷ Moreover, ISDA has obtained legal opinions from counsel in the G-10 countries, Australia, the Cayman Islands, Denmark, Hong Kong, Indonesia, Luxembourg, Malaysia, New Zealand, Singapore, and Thailand to the effect that netting provisions contained in ISDA's master agreements were likely to be upheld. Finally, there has yet to be a case in which netting was invalidated, and such arrangements were successful in the unwinding of Drexel and Development Finance Corp.¹⁸⁸ Because there have been few defaults,¹⁸⁹ and most have been settled out of court, netting agreements have yet to be tested in a hostile environment.

If all of the foregoing conditions are met, the credit equivalent computation under the current exposure method will be based on the net current exposure (ie. the net mark-to-market replacement cost) with each counterparty, rather than the gross exposure.¹⁹⁰ Basle initially rejected arguments by ISDA and others that the add-ons should also be based on net rather than gross notional principal amounts. In July 1994, however, they put forth a proposal to amend the treatment of add-ons, and in April 1995 they adopted a modified version of such proposal into the accord, which is due to become effective by the end of 1995.¹⁹¹ Once such provision is effective, the

¹⁸⁶ See Behof, *supra* note 87, at 25-26.

¹⁸⁷ See *id.* at 25.

¹⁸⁸ See Tracy Corrigan, *Risk and Reward: Growing Concern Over the Dangers of Counterparty Credit*, FIN. TIMES, Nov. 30, 1992, at 21.

¹⁸⁹ See Behof, *supra* note 87, at 26.

¹⁹⁰ See 1994 NETTING AMENDMENT, *supra* note 176, at 2. For the original exposure method, a reduction in credit conversion factors of approximately 25% would be allowed during the transitional period until the market risk capital requirements are implemented at which time the original exposure method will cease to be available. 1995 NETTING AMENDMENT, *supra* note 161, annex at 6.

¹⁹¹ See 1995 NETTING AMENDMENT, *supra* note 161, at 1.

accord will allow banks using the current exposure method to reduce the add-ons of transactions meeting the foregoing legal requirements by having an add-on equal to the following:

$$\text{Add-on}_{\text{net}} = .4 * \text{Add-on}_{\text{gross}} + .6 * \text{NGR} * \text{Add-on}_{\text{gross}}^{192}$$

where:

NGR = the level of net replacement cost/level of gross replacement cost for transactions subject to legally enforceable netting agreements.

Add-on_{gross} = the sum of individual add-ons calculated by multiplying notional amounts by the factors in Table 3 above.

Under this formula, the add-on for netted transactions equals a weighted average of the gross add-on and the gross add-on adjusted by the NGR.¹⁹³ If netting reduces the current exposure by 50%, the reduction in add-ons for potential exposure would be 30%. According to Basle:

The advantage of the formula from a supervisory perspective is that it uses bank-specific information (i.e. the NGR) but imposes greater stability over time and across banks than a formula giving full weight to the NGR. Moreover, using this formula banks will always hold capital against potential exposure as the net add-on can never be zero.¹⁹⁴

The 1994 proposal suggested that the NGR be weighted by .5 (instead of .6) in the formula above. In the 1995 amendment, however, the weight was increased to .6 in response to those who argued that the .5 weight would

¹⁹² *Id.* annex at 5.

¹⁹³ *Id.*

¹⁹⁴ 1994 NETTING AMENDMENT, *supra* note 176, at 3. The reason for using a weighted average approach such as that utilized by Basle, rather than giving full effect to the NGR, is that there is not an empirical linear relationship between reductions in current exposure and reductions in potential exposure. In other words, if the effect of netting with a counterparty happens to reduce the current exposure at a given point in time to zero, it does not mean that this exposure will remain zero over time.

significantly understate the reduction in potential exposure resulting from bilateral netting.¹⁹⁵ The current weighting formula “represents an appropriate compromise between recognising the effects of netting in the add-ons and providing a cushion against potential fluctuations in the net current exposure.”¹⁹⁶ National authorities may allow their banks to calculate NGR on a counterparty by counterparty or on an aggregate basis for all transactions meeting the foregoing criteria, so long as the institution calculates NGR on a consistent basis.¹⁹⁷

4.1.3. Criticism of Basle’s Treatment of Credit Risk

There are several possible criticisms of Basle’s treatment of swap credit risk. First, as discussed previously, the risk weights applied to the swap credit exposure are very crude. While Basle has been applauded for risk-weighting the credit equivalent of swaps with private counterparties at 50% rather than 100%, recognizing the fact that swap counterparties tend to have investment grade credit ratings, there is no pretending that this figure is an accurate assessment of default probabilities. This inaccuracy becomes evident through an examination of the volume of actual defaults and by the fact that the weighting does not vary according to the specific credit characteristics of each counterparty. Moreover, Basle’s approach assumes that the probability of default is constant throughout the life of the swap. In reality, the default probability will vary over the swap’s life and may depend on changes in the underlying swap rates.¹⁹⁸ Since most swap counterparties are investment grade, there is less of a likelihood that there will be a default early in the swap’s life.¹⁹⁹ In addition, Basle fails to take account of whether a

¹⁹⁵ 1995 NETTING AMENDMENT, *supra* not 161, at 1.

¹⁹⁶ *Id.*

¹⁹⁷ *Id.* annex at 5 n.10. Under the aggregate approach, however, net negative current exposures cannot be used to offset net positive exposures from other counterparties. *Id.*

¹⁹⁸ See *supra* Section 3.2.4.

¹⁹⁹ See HENDERSON AND PRICE, *supra* note 38, at 77 (providing figures suggesting that it is reasonable to assume that a party will not default on a swap within the first 2 years).

bank's swap portfolio is diversified across various counterparties and industries.

The calculation of a swap's credit exposure also has been criticized heavily. The original exposure method is inadequate because it does not reflect changes in the market value of the swap, and because it assigns the same capital requirement throughout a swap's life, despite evidence that exposures change dramatically over the life of a swap.²⁰⁰ "This original exposure approach to calculating credit equivalents will often generate numbers bearing only the most tenuous relationship to the true credit exposure on any individual swap."²⁰¹ The only justification for this approach is that the method provides estimates strong enough for regulatory purposes when applied to a swap portfolio in the aggregate.²⁰² Its simplicity is its virtue, which is why the "less sophisticated" members of Basle required its inclusion in the accord as an alternative to the current exposure method. This method is unsuitable in a netting environment, and many believe its use should be completely abandoned.²⁰³ From a regulatory perspective there is less concern about its inaccuracies because this method will likely overestimate the capital requirement, and because most major dealers use the current exposure method.²⁰⁴

Another criticism of Basle's calculation of credit exposures is that the factors for measuring potential exposure, under either method, do not reflect the fact that different interest rates and exchange rates have different volatilities and correlations. For example, all cross-currency swaps have the same coefficient applied to the notional amount. Certain currencies, however, are more highly correlated than others: the Canadian dollar and the U.S. dollar are more highly

²⁰⁰ See *infra* Figures 3 and 4.

²⁰¹ Hu, *supra* note 8, at 387.

²⁰² See *id.*

²⁰³ See BASLE COMMITTEE ON BANKING SUPERVISION, THE SUPERVISORY RECOGNITION OF NETTING FOR CAPITAL ADEQUACY PURPOSES 5 (1993).

²⁰⁴ See *id.* at 3. In addition, the original exposure method will cease to be an option once the market risk capital requirements discussed *infra* are implemented. See *supra* note 166.

correlated than the U.S. dollar and the Swiss franc.²⁰⁵ Similarly, different interest rates have different volatilities.

The general accuracy of the potential exposure weights has also been questioned. It is believed that the add-on weights instituted by Basle were developed by conducting various simulation exercises akin to those discussed *supra* Section 3.2.²⁰⁶ Nonetheless, Basle has not outlined its methodology. It is believed that the factors for the original exposure method rely on maximum exposures and confidence intervals between 70% and 90%,²⁰⁷ but it is unclear how Basle arrived at the add-ons under the current exposure method. Although the add-on is intended to reflect the potential exposure over the remaining life of the swap, the add-on is largely independent of the residual life of the contract.²⁰⁸ In addition, it is arguable that the add-on should instead reflect the potential exposure over some shorter period, reflecting the fact that the swap is periodically marked to market.²⁰⁹

There is also no empirical justification for the large differences which exist between the factors for interest rate swaps and those for currency swaps. Although exchange rates are more volatile, they are not, as the add-ons indicate, ten times more volatile. The inaccuracies of the interest rate swap add-ons, for example, become evident when Basle's conversion factors for potential exposure are compared to those which Simons computed in the study discussed *supra* Section 3.2.4. The methods also fail to consider different potential exposures for non-par swaps.²¹⁰

²⁰⁵ See Hu, *supra* note 8, at 396. Yet under the original exposure, a Swiss franc/U.S. dollar swap and a U.S. dollar/Canadian dollar swap require the same capital. This result improves under the current exposure method because differences in the mark-to-market value will reflect differences in volatility and correlation, but the add-on factor will be identical for both swaps.

²⁰⁶ See Simons, *supra* note 92, at 24; see also Giberti et al., *supra* note 108, at 28.

²⁰⁷ See Giberti, et al., *supra* note 108, at 28.

²⁰⁸ Under the current exposure method, Basle only distinguishes between those contracts one year and less, those over one year and less than five years, and those greater than five years. See *supra* Table 3 and Table 4.

²⁰⁹ See *supra* note 124 and accompanying text.

²¹⁰ See Giberti et al., *supra* note 108, at 27; see also *supra* note 31 (discussing the differences between par and non-par swaps).

Although the Committee should be commended for finally amending the accord in April 1995 to expand the potential exposure matrix to account for equity and commodity swaps, it is unclear how they arrived at the promulgated factors and whether the factors bear any relation to the potential credit risks posed by these instruments. It is doubtful, for example, that there is a firm empirical basis to support the magnitude of the add-ons assessed on "other commodities" and equity swaps. If the add-ons are inaccurate, they could counteract the recent proliferation of these innovative and beneficial types of swaps.

In addition, summing potential exposures dramatically overstates the actual exposure because it fails to account for offsetting exposures or the fact that different swaps will have peak potential exposures at different times.²¹¹ For example, assume that an intermediary has two offsetting, but otherwise identical, swaps with a counterparty. If the total maximum exposure for a certain confidence interval is \$2 million for each swap, then a system which sums the potential exposure would severely overestimate the potential loss at \$4 million because both of these swaps cannot be in the money at the same time. The proper exposure is really \$2 million, if netting does not apply, and \$0, if it does apply.²¹²

A similar problem occurs because of the mismatch in the timing of maximum exposures. As Figure 3 indicates, the timing of the peak exposure for swaps varies with their maturities. If maximum exposures are summed and the timing of peak exposures for each swap varies, then there is an overstatement of potential exposure because a default cannot simultaneously occur at the maximum exposure point for every swap. It is inappropriate to add the peak exposures of transactions that have different residual maturities.²¹³ These criticisms highlight the importance of analyzing exposure by using a simulation analysis of an entire portfolio, because it is the only way to directly measure the complex portfolio effects.

Until recently, the greatest criticism of Basle has been its reliance on gross exposures for capital purposes despite the

²¹¹ See G-30 REPORT, *supra* note 26, at 14.

²¹² See G-30 APPENDIX, *supra* note 90, at 22.

²¹³ See *id.* at 23.

proliferation of netting agreements. The amendments to the accord in July 1994 and April 1995 largely respond to these criticisms. It is unclear, however, whether the weighted approach used to calculate the add-on for netted transactions has an empirical basis. In addition, ISDA has criticized Basle's prohibition of walkaway clauses for netting purposes, and believes, based on legal opinions obtained from 23 jurisdictions, that whether a non-defaulting party is required to make a net payment to a defaulting party is a separate and distinct issue from whether the termination and bilateral close-out provisions are enforceable.²¹⁴

Since legal certainty exists in many jurisdictions for collateral arrangements, it is also vital that Basle implement standard provisions to recognize the reduction of credit risk afforded by the use of swap collateral. This would provide recognition to the economic function which collateral serves, and would encourage and reward the use of collateral for risk mitigation.

Finally, Basle should allow banks to use their own internal proprietary models to measure credit risk for capital purposes (subject to certain parameters instituted by Basle). Although Basle recently proposed such an alternative models-based approach for assessing market risks, as will be discussed *infra* Section 4.2.2., Basle has yet to expand this concept to credit risk calculations. Since changes in swap market values are in fact a determinant of credit risk, there is no reason why Basle should recognize such models for the former but not for the latter.

4.2. *Basle's Proposed Treatment of Market Risk*

Basle's current capital regime applies solely to credit risks, and was not intended to reflect an assessment of market or other risks. Nevertheless, in recognition of banks' increasing involvement in areas of foreign exchange, securities trading,

²¹⁴ See Letter from Joseph Bauman, Chairman of ISDA, to Basle Committee on Banking Supervision 10 (Dec. 28, 1993)(on file with author) at 7. In the case of *Drexel Burnham Lambert Products Corp. v. Midland Bank, PLC*, Judge Pollack of the United States District Court for the Southern District of New York affirmed the validity of the walkaway clause as a valid liquidated damages clause. See 1992 U.S. Dist. Lexis 21223, at 2 (S.D.N.Y. Nov. 9, 1992), *appeal dismissed per stipulation*.

and derivatives, the accord was consummated with the understanding that market risk would eventually be incorporated into the capital framework. In April of 1993, Basle introduced two new proposals aimed at incorporating market risks into the Accord. One proposal applies to the market risks of a bank's trading book (i.e. market risks on the banking book are not taken into account),²¹⁵ while the other applies to the interest rate risk of a bank as a whole. In April of 1995, Basle introduced a revised market risk proposal, with the anticipation that it would become effective by year-end.²¹⁶ National supervisors would have until 1997 to implement its specific provisions.²¹⁷

4.2.1. 1993 and 1995 Market Risk Proposals

The objective of the initial market risk proposal was to develop a framework for capital charges which would constitute a minimum prudential standard relative to the potential for losses that might be incurred for a given portfolio of debt, equity, or foreign exchange.²¹⁸ Ideally, this framework would ensure that artificial incentives were not created to favor one class of instruments over another.²¹⁹ The 1993 Market Risk Proposal segmented market risks into three categories, foreign exchange risk, equities risk and debt securities risk, and provided a standardized methodology for calculating the capital to be set aside for each of these risks. The major substantive revisions made by the 1995 amended

²¹⁵ A bank's trading book represents an institution's proprietary positions in financial instruments, which are taken on primarily with the intention of profiting from short-term price movements or which are intentionally held for short-term resale. This includes instruments that are used to hedge other elements of the trading book. BASLE COMMITTEE ON BANKING SUPERVISION, PLANNED SUPPLEMENT TO THE CAPITAL ACCORD TO INCORPORATE MARKET RISKS 1 (1995) [hereinafter 1995 MARKET RISK PROPOSAL]. The trading book is to be distinguished from the "banking book," which represents a bank's core business of making loans and other long-term investments or derivatives used to hedge banking book positions. *Id.* at 1.

²¹⁶ *See id.*

²¹⁷ *See id.*

²¹⁸ *See* BASLE COMMITTEE ON BANKING SUPERVISION, THE SUPERVISORY TREATMENT OF MARKET RISKS 1 (1993) [hereinafter 1993 MARKET RISK PROPOSAL].

²¹⁹ *See id.*

proposal include the addition of market risk capital requirements for commodities and options, and the possible use of proprietary in-house models for measuring market risks as an alternative to the standardized measurement framework previously articulated in the 1993 proposal.²²⁰

If the 1995 amended proposal is implemented, two broad methodologies will be permitted in measuring market risks. Under either method, capital would be assessed on the market-to-market value of the instruments in question, and the capital charge for market risk would be a substitute for such instrument's credit risk capital charge (except for OTC derivatives, which will generate both a credit risk and market risk capital assessment, whether on the banking book or the trading book). Under the standardized framework, market risk capital would be assessed as follows.

Under the amended proposal, the capital required for foreign exchange risk is determined by first calculating the bank's net position in each currency by subtracting the nominal amount (or net present value) of all liabilities in that currency from all assets.²²¹ Next, the bank determines its total net open position by first converting all currency positions into the reporting currency at spot rates, and then taking the greater of the sum of the short positions or the sum of the long positions. The capital requirement would be 8% of this net open position.²²²

²²⁰ The 1993 and 1995 proposals are highly technical and complex, and therefore the following discussion is merely intended to summarize its main aspects. For a more complete summary of the 1993 proposal, see Robert Bergqvist and Mats Ericsson, *Capital Adequacy Rules for Market Risks*, RIKSBANK Q. REV., 3rd Quarter, 1993, at 5; HAL S. SCOTT & PHILIP A. WELLONS, *INTERNATIONAL FINANCE: TRANSACTIONS, POLICY, AND REGULATION* (1995) chapter 16. See also 1993 MARKET RISK PROPOSAL, *supra* note 218; 1995 MARKET RISK PROPOSAL, *supra* note 215. For a summary of the main differences between the 1993 and 1995 market risk proposals, see BASLE COMMITTEE ON BANKING AND SUPERVISION, *PROPOSAL TO ISSUE A SUPPLEMENT TO THE BASLE CAPITAL ACCORD TO COVER MARKET RISKS* (1995) [hereinafter 1995 MARKET RISK SUPPLEMENT].

²²¹ See Bergqvist & Ericsson, *supra* note 220, at 7. Forward obligations to receive or pay currencies, including the principal on currency swaps, are included in this net figure.

²²² For example, the bank calculates the net position in each currency, and then converts each position into the reporting currency (e.g., dollars). Assume that after this is done the bank has the following exposures: Yen +50, DM +100, SF + 150, FFR -20, GB£ -180. The capital charge would be

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The capital requirement for equity positions is based upon a "building block approach," which differentiates between requirements for specific risk and those for general market risk. The former is the risk of loss caused by adverse price movements as a result of issuer-specific factors, while the latter is the risk of loss caused by broad market movements as a result of changes in general economic conditions that affect the equity market as a whole. The charge for general risk is proposed to be 8% of a bank's net open position in all equities.²²³ The charge for specific risk will be a function of portfolio diversity and will be assessed on the sum, rather than the net,²²⁴ of all long and short positions.²²⁵

The proposed capital requirement for debt securities is also segmented into separate charges for specific risk and general risk. The specific risk charge is intended to protect against possible price changes of an individual security, and is dependent upon the residual maturity and the obligor of each instrument.²²⁶ The measure of general market risk is intended to capture the risk of loss arising from changes in

8% of the higher of the longs (300) and the shorts (200) = $300 \times 8\% = 24$. This method assumes some, but not perfect, correlation between movements of different exchange rates. See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 24.

²²³ The net position is the difference between the sum of the bank's long positions in all equities and the sum of its short positions. A separate calculation must be carried out for each national market in which the bank holds equities. *Id.* at 19.

²²⁴ However, long and short positions for the same issuer may be netted.

²²⁵ Poorly diversified portfolios would be charged 8% of the sum total, highly diversified and liquid portfolios 4%, and diversified equity index products 2%. See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 19. Each country must determine its own definitional criteria as to what constitutes a liquid and well diversified portfolio. *Id.*

²²⁶ The specific risk charge for debt securities is as follows:

Government Securities	0.00%
Qualifying securities with residual maturity:	
6 months or less	0.25%
>6-24 months	1.00%
>24 months	1.60%
Other	8.00%

See *id.* at 9. Qualifying securities include those issued by public sector entities, multilateral development banks, and securities which are rated investment grade by at least two credit rating agencies. A specific risk charge higher than 8% will be assessed against high-yield debt securities according to national supervisory discretion. *Id.* at 10.

market interest rates, and two methods have been proposed: the "maturity" method²²⁷ and the "duration" method.²²⁸

Under the maturity method, long and short positions in debt securities and debt related derivatives are slotted into maturity bands (depending on the residual maturity and coupon rate), each with a predetermined risk weight corresponding to the perceived price sensitivity²²⁹ of instruments within each band. Fixed-rate instruments are allocated among the maturity bands according to the residual term to maturity, and floating-rate instruments are allocated according to the next repricing date.²³⁰ These risk weights vary from 0% to 12.50%. The first step in calculating the capital charge is to weight the positions in each time band by the appropriate factor. The next step is to offset the weighted longs and shorts in each band, arriving at a net open position for each band. The total net open position is calculated by netting these positions across all the bands. Because within each time-band there are instruments of various durations, however, a "vertical disallowance" will be added to the total net open position.²³¹ A "horizontal disallowance" will also be

²²⁷ See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 11.

²²⁸ See *id.* at 13.

²²⁹ The price sensitivity of debt instruments is generally a function of an instrument's duration and volatility. Duration is a financial concept which quantifies the percentage change in an asset's value for a given percentage change in interest rates. An asset with a longer duration has a greater exposure to changes in interest rates. Duration is the measure of the *average maturity* of the stream of payments associated with an instrument, and should not be confused with nominal maturity. For example, a 30 year coupon-paying bond does not have a duration of 30 years because interest payments on the bond are paid periodically throughout its life, which are in a sense mini-repayments. The greater the intervening payments are prior to the stated maturity (ie. the higher the coupon rate), the lower the duration of an instrument will be.

²³⁰ See 1995 MARKET RISK PROPOSAL, note 215, at 11. For example, a floating rate based on six month LIBOR would reprice every six months.

²³¹ Since within each band there are securities whose price sensitivities are not identical, it is proposed that there be a 10% vertical disallowance (applied to the smaller of the long or short positions) within each time-band. See *id.* at 11. For example, if the sum of the weighted longs in a time-band is \$100 million and the sum of the weighted shorts is \$90 million, the vertical disallowance would be 10% of \$90 million. See *id.* The disallowance takes into account the fact that prices of long and short positions with the same maturity do not necessarily co-vary. See Bergqvist & Ericsson, *supra* note 220, at 11.

added to reflect the fact that movements in short-term rates are not exactly correlated to movements in long-term rates.²³² It should be noted that separate reporting ladders are used for each currency. As an alternative to the maturity method, it is proposed that those institutions capable of measuring duration more accurately could, with their supervisors' consent, use their own internal models to calculate separately the price sensitivity of each instrument.²³³

As an alternative to the standardized method just discussed, the 1995 Market Risk Proposal sets forth a models-based approach to market risk capital requirements which could be utilized subject to the approval of supervisory authorities and subject to meeting certain qualitative and quantitative standards.

Required qualitative standards include the establishment of an independent risk control unit with active involvement of senior management; integration of the model into day-to-day risk management; regular stress testing and back-testing of the model; the establishment of a routine for insuring compliance; and an independent review of risk management and measurement at regular intervals.²³⁴ In addition, certain other procedures are proscribed. For the quantitative standards, the measure of a bank's market risk exposure, typically expressed in terms of "value at risk," should be

²³² See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 12. By allowing positions among the different bands to net each other, the calculation of the total net open position implicitly assumes that changes in long-term rates correspond to changes in short-term rates. The horizontal offset is intended to provide for the fact that changes in such rates are not exactly correlated. Horizontal offsetting, a very technical process, is outside the scope of this paper. For a complete explanation and sample calculation, see *id.* at 12 and 50.

²³³ See *id.* at 13. The sensitivity measures would be slotted into duration based time bands with a modified measurement of vertical and horizontal disallowances. These institutions must demonstrate that their use of the duration method produces results that are consistently equivalent to those produced by the maturity method. The reader is referred to Basle's proposal for a discussion of the treatment of commodities and options as a brief summary here would not be meaningful. See *id.* at 26-37.

²³⁴ 1995 MARKET RISK SUPPLEMENT, *supra* note 220, at 3. Stress testing involves running a model with extremely volatile data, perhaps corresponding to an aberrational historical period. Back-testing involves an *ex post* assessment of a model's determination of potential market risk.

computed daily using a 99th percentile, one-tailed confidence interval. The minimum holding period should be ten trading days and the historical observation period for the data used in the model should be at least one year.²³⁵ A separate model must be used for each risk category described above, and the value at risk across the broad categories will be aggregated on a simple sum basis.²³⁶ Supervisors may insist on a period of monitoring and testing of a bank's model before it is used for supervisory capital purposes.²³⁷

Using a models-based approach, the capital charge will be the greater of (1) the previous day's value at risk as calculated by the model, or (2) an average of such calculation over the preceding 60 business days, multiplied by a factor based on the individual supervisor's assessment of the quality of each bank's risk management system (subject to a minimum of three).²³⁸ In addition, a "plus" will be added to the multiplication factor depending on the ex-post performance of the model, providing a built-in incentive to maintain model accuracy.²³⁹ Banks using this models-based approach will be subject to a separate charge to cover specific risk of traded debt and equity securities to the extent this risk is not already incorporated into the applicable model.²⁴⁰ A model's accuracy will also be subject to validation by external auditors and/or supervisors. It is expected that the banks who opt for a models-based approach will utilize models for all categories

²³⁵ *Id.* The holding period is the period over which potential price changes are measured. Many banks internally use a one day holding period for the measurement of potential changes in position value. BASLE COMMITTEE ON BANKING SUPERVISION, AN INTERNAL MODEL-BASED APPROACH TO MARKET RISK CAPITAL REQUIREMENTS 10 (1995). Such a short period is reasonable where trading managers can make day-to-day decisions to adjust risk. *Id.* A longer holding period reflects the possibility that markets may become illiquid, preventing the market participants from closing out positions quickly. *Id.*

²³⁶ *Id.* In other words, inter-correlation and offsetting of market risks among product types are ignored.

²³⁷ 1995 MARKET RISK PROPOSAL, *supra* note 215, at 38.

²³⁸ 1995 MARKET RISK SUPPLEMENT, *supra* note 220, at 3-4. Only those banks which satisfy all the qualitative criteria will be eligible for the minimum multiplication factor. 1995 MARKET RISK PROPOSAL, *supra* note 215, at 39.

²³⁹ 1995 MARKET RISK SUPPLEMENT, *supra* note 220, at 3-4.

²⁴⁰ 1995 MARKET RISK PROPOSAL, *supra* note 215, at 45.

of risks and, after a transitional period, will not be allowed to combine a models approach for some market risks with a standardized approach for others.

Because market risks tend to be more volatile than bank credit risks, the committee proposed a broader definition of capital by designating a third capital tier to include certain additional forms of subordinated debt. This subordinated debt may be used to cover capital requirements for market risk, subject to certain limitations.²⁴¹

If the market risk proposal were implemented, the bank's overall minimum capital requirement would be the sum of: (1) the existing credit risk requirements for the banking business, such as loans and investments considered part of the banking book and for OTC derivatives whether part of the trading book or banking book; (2) the proposed capital charge for debt and equity securities, commodities, options and derivatives in the trading portfolio; and (3) the proposed capital charge for foreign exchange risk. Since the proposed market risk charges for debt and equity securities in the trading book would substitute for the credit risks currently applied to these assets, it is unclear whether, after implementation of this proposal, the capital requirements would be higher or lower than those to which banks are presently subjected.²⁴²

In addition to the market risk proposal, which is meant to primarily address market risks on a bank's trading book, in April 1993 Basle proposed a common approach to measuring the interest rate exposure of a bank as a whole, in order to roughly determine changes in net worth for a specified change in interest rates. However, because interest rate mismatching is a normal feature of the banking business, and because the existing and proposed capital requirements cover a certain

²⁴¹ See *id.* at 7; see also BIS ACCORD, *supra* note 3, at 145 (noting that capital is generally divided into two tiers).

²⁴² See 1993 MARKET RISK PROPOSAL, *supra* note 218, at 8. This will also depend on the risk profile of the particular institution in question. It should be noted that the specific risk component of the market risk charge for debt and equity is essentially a credit risk component. This explains why the market risk charge, when implemented, will replace the credit risk charge for these instruments. This also explains why OTC derivatives on the trading book will be treated under both the credit risk and market risk capital regimes, as such instruments do not receive a specific risk charge under the market risk proposals.

amount of the interest rate risk to which banks are exposed, Basle has not articulated a separate capital charge for overall interest rate risk. The purpose of the proposal is to enable banks to measure this risk, so that supervisors can identify those assuming an excessive amount of interest rate risk on the banking book. The supervisory response to these outliers would be left to national discretion. Basle has indicated that its priority at this point is to implement a market risk-based capital regime, and it plans to return to the question of overall interest rate risk at a later date.²⁴³

4.2.2. *Treatment of Swaps Under the Market Risk Proposals*

A swap's treatment under the market risk proposals utilizing the standardized methodology depends on the underlying swap variable. Interest rate swaps are incorporated into the debt securities segment of market risk, currency swaps are incorporated into the foreign exchange risk regime, equity swaps are incorporated into the equity market risk provisions, etc. Since interest rate and currency swaps relate to an underlying variable not bearing an identifiable specific risk, they will not be subjected to specific risk charges.²⁴⁴

Under the general market risk debt provisions, interest rate swaps held as part of the trading book would be treated as two notional positions in government securities with relevant maturities.²⁴⁵ The market risk of these "government securities" would then be determined under the market risk regime for debt securities, as described above. For example, a fixed-floating interest rate swap would be broken down into a fixed bond and a floating-rate bond.²⁴⁶ If the bank is the fixed-rate payer, it would treat the swap as a short position in a government fixed-rate debt instrument of a maturity equal to the residual maturity of the swap and a long

²⁴³ 1995 MARKET RISK SUPPLEMENT, *supra* note 220, at 7.

²⁴⁴ See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 16; *supra* note 242 and accompanying text.

²⁴⁵ See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 15.

²⁴⁶ Recall that swaps can be re-characterized as parallel loans. See *supra* note 34 and accompanying text.

position in a floating-rate instrument of maturity equal to the period of the next repricing date. Institutions with large swap books could use alternative methods of including their positions into the maturity or duration ladders.²⁴⁷

For an equity index swap, whereby the bank pays a fixed rate against a certain index, the interest component would be handled as discussed in the preceding paragraph, while the equity component would be treated as a long position under the equities framework. Pure equity swaps would be treated as two notional equity positions. Separate legs of cross-currency swaps would be reported in the relevant maturity ladders for the currencies involved.²⁴⁸ The principal of currency swaps would be treated as long or short forward positions in the relevant currencies.

As an alternative to the standardized methodology, swaps could be incorporated into the models-based regime discussed above. This could be accomplished by dissecting a swap into its constituent parts and incorporating each part into the model of the appropriate risk factor, or, presumably, by modeling swaps as a whole similar to the methods outlined in Section 3.2.4.

It is unclear how large a role the capital charge for swap market risk will play. The charge would apply only to swaps on the trading book. Presumably, most end-user banks which use derivatives to hedge business risks on the banking book would not characterize their swap positions as short-term trading instruments.²⁴⁹ Nevertheless, swap dealers would presumably characterize their swaps as part of the trading book, and would incur both a credit risk and market risk capital charge against such positions.²⁵⁰

²⁴⁷ See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 16.

²⁴⁸ See *id.* at 15.

²⁴⁹ See *supra* note 215 for a discussion of what constitutes a bank's trading book.

²⁵⁰ However, closely matched swaps which meet certain conditions will be allowed to fully offset one another, and therefore would not be subject to the vertical disallowance. See 1995 MARKET RISK PROPOSAL, *supra* note 215, at 16. This would apply if, for example, the reference rate for the floating-rate positions is identical and/or the coupon for fixed-rate positions are closely matched (i.e. within 10-15 basis points). *Id.*

4.2.3. *Criticism of Basle's Proposed Treatment of Market Risk*

Although a detailed analysis of the market risk proposals is beyond the scope of this paper since the treatment of swaps plays a minor role in the overall proposals, there are several criticisms which can be made of Basle's overall treatment of market risk.

Basle's treatment of market risk focuses on specific products, rather than on underlying risk factors. Even the new models-based approach forces banks to model according to product type and does not allow for cross-correlations among these products. ISDA, on the other hand, has recommended merging potential changes in market rates and prices into common denominators that transcend contract or product type, such as interest rates, foreign exchange rates, equity prices and indexes, commodity prices, etc.²⁵¹ These risk factors are not the equivalent of measuring risk in terms of product type, because more than one risk factor can affect the valuation of a particular product.²⁵² Since each product may include several common denominators of risk, summing across products rather than across risks will overstate the capital requirement. Basle's proposed provisions will not account for the fact that hedges to certain types of risk may exist across different product types.²⁵³

The financial world is continually developing new products. Basle's product approach is also problematic because it lacks the flexibility necessary to deal with innovative products. Assessing capital requirements for new instruments would require a new policy from Basle for each new product, even if

²⁵¹ See Letter from Joseph Bauman, Chairman of ISDA, to Basle Committee on Banking Supervision 1 (Dec. 28, 1993) (on file with author) [hereinafter ISDA Market Risk Letter] at 4. Within each of these factors there are also several sub-categories of risk which could be examined. These include outright or parallel shift risk, term structure or yield curve risk, basis or spread risk, volatility risk, and convexity risk.

²⁵² See *id.*

²⁵³ For example, aside from affecting the value of debt securities, interest rates will have a discernible effect on equity securities. A capital approach which does not take account of these interrelationships will not assess the proper amount of capital.

the new product constitutes a simple rearrangement of existing risk factors.²⁵⁴

Prior to Basle's 1995 amendment to the market risk proposal, the main criticism of the proposal was its incompatibility with the intricate internal models developed by most banks to manage their own market risks. Basle is moving in the right direction with its models-based approach, however, the constraints and parameters it has imposed on such method will overestimate the risks and result in an over-assessment of market risk capital. Basle has instituted a number of conservative parameters, which, although arguably defensible individually, are burdensome in the aggregate. For example, despite the fact that Basle has mandated a very conservative confidence interval of 99%, the market risk estimated under the models will likely be subject to a multiplication factor of at least 3.²⁵⁵ The required assumption of a ten day holding period is also very conservative, given the fact that instruments are marked to market daily, and assumes that all instruments will be fairly illiquid. Further, the aggregate value at risk is a simple sum of the individual assessments of the various product types and does not allow for any inter-correlation. This layering amounts to overprotectiveness. One appeal of a models-based approach is to provide an incentive for banks to develop models which more accurately assess risk by rewarding them with a more accurate capital assessment than under the standardized methodology. It is clear that the current proposal does not accomplish this objective.

Finally, it is essential that those bank end-users who employ swaps to hedge interest rate, exchange rate, and other risks are not penalized for doing so. Although Basle has stated that market risk capital will not be assessed against swaps utilized for this purpose, it is unclear how regulators will be able to determine whether or not a bank is using a swap to hedge risks or to augment them. A factor-based approach would obviate the need for making such a distinction.

²⁵⁴ See ISDA Market Risk Letter, *supra* note 251, at 8. For example, until 1995, the accord did not delineate capital requirements for commodity swaps.

²⁵⁵ See *supra* note 121 and accompanying text; see *supra* Section 4.2.1.

5. WHAT'S AT STAKE?

5.1. Do Banks and Regulators Understand the Product and the Risks?

In light of the sheer size and complexity of the swap market, many are concerned that neither regulators nor bank management truly understand what swaps are or how to control swap risks. There is a fear that the same industry which brought us the LDC debt crisis and the real estate loan debacle is unable to comprehend and effectively monitor swap risk exposure, for “[i]n the early days of the swap market some institutions did not even recognize swaps as having any credit risk at all.”²⁵⁶ This concern is heightened by the fact that derivatives reduce the transparency of a bank’s balance sheet, thus making it difficult for the capital markets and for bank regulators to monitor these institutions. While most sophisticated dealers have developed intricate models to understand and manage their swap exposure, there is still a concern that these models will not prevail under stress.

Aside from the concern about the banks themselves, there is also concern about the regulators. As the world of finance becomes more arcane, complicated, abstract, and theoretical, there is concern that regulators will be unable to keep pace. Establishing capital requirements for swaps, enforcing the requirements, and ensuring that banks have adequate risk management requires a certain degree of sophistication. Improperly assessed risk-based capital may potentially harm banks, the financial system, and society as a whole.

5.2. What are the Concerns?

5.2.1. Bank Failure and Systemic Risks

A foremost concern is that imprudent management of swap risks will cause bank failures, sending ripples throughout the world financial system. If a large bank were to fail, substantial disruptions in the global capital markets would result. Paradoxically, the efficiencies in the global capital markets which have been achieved over the last decade

²⁵⁶ Hu, *supra* note 4, at 1480.

heighten this risk, because financial markets in different countries are more connected than ever before. In fact, derivatives have been a major contributor to the bridging of disparate markets.

Derivatives such as swaps, however, do not introduce risks of a fundamentally different kind, or of a greater scale, than those which banks currently face from more traditional bank activities.²⁵⁷ Derivatives dealers understand the risks because it is their business to manage them. "Swap guys may be clever characters, but [they] haven't been able to invent new kinds of risks."²⁵⁸ Whether a bank makes a fixed-rate loan or enters into an interest rate swap, it is subject to interest rate risk. Similarly, when a bank enters into an oil swap it is exposed to the same type of oil price risk as making a loan to an oil producer.²⁵⁹

With respect to swaps, the greatest concern has been about credit risk, yet a bank's expertise lies in its ability to make such credit assessments. While swaps add some complexity in calculating the amount at risk, the fundamental credit analysis remains the same. Although notions of marking-to-market would seem to be a concept more suitable for investment banks than commercial banks, the banking industry has undergone tremendous changes in the last decade and the distinction between investment banks and commercial banks is difficult to discern. In addition, banks are actively working on ways to hedge these risks through bilateral netting, collateralization, and marking-to-market.

Efficiencies in the capital markets have disintermediated banks from lending to high credit quality borrowers who now meet their financing needs in the securities markets. Therefore, swaps have actually increased the average quality and diversity of the credit risk to which banks are normally exposed in their traditional lending activities. If banks do not introduce innovative ways to offer services to these high quality borrowers, then the quality of their assets will continue to deteriorate.

²⁵⁷ See G-30 REPORT, *supra* note 26, at i.

²⁵⁸ Hansell & Muehring, *supra* note 101, at 53 (quoting Mark Brickell, vice president of J.P. Morgan & Co.).

²⁵⁹ See *id.*

For those who still cannot envision banks performing functions and inventing products which seem more appropriate to investment banking, it is essential to realize that banks are no strangers to OTC derivatives, which are more a part of a bank's traditional business than one may realize. For example, when a bank makes a pre-payable loan, such as a mortgage loan, the bank is really selling a loan plus an option contract; if interest rates fall, the option will be exercised and the homeowner will refinance at lower prevailing interest rates. Similarly, standby letters of credit, revolving credit lines, and other guarantees are merely types of options. When a bank makes a commitment to lend in the future at a predetermined rate, it essentially has entered into a forward contract.

Many who have sounded the alarm against swaps often get their ammunition purely from the size and complexity of the market. Nonetheless, the market is neither as large as the numbers suggest, nor as complex as it appears. To put the swap market in perspective, in 1992 approximately 184,000 swaps were written with a notional principal of approximately \$4.7 trillion. Yet, in the same year, more than 600 million exchange-traded futures and options contracts were traded, representing a face value or notional amount exceeding \$140 trillion.²⁶⁰ The swap market is also dwarfed by comparison to the \$14.4 trillion of bonds and \$10.1 trillion in equity outstanding at the end of 1991.²⁶¹ Furthermore, although these instruments are sometimes complex, even the most complicated swaps can be broken down into individual and well-understood building blocks of options and forwards.

"Publicly, most dealers claim the talk of a meltdown to be greatly overblown, partly because they believe each institution in this business to be diligently doing the right thing by intensely monitoring its own risks."²⁶² It is in the self-interest of dealers and end-users to ensure no problems develop because a disaster would ruin dealer profitability and almost certainly hasten new, harsh regulations.²⁶³ The

²⁶⁰ See G-30 REPORT, *supra* note 26, at 58.

²⁶¹ See *id.*

²⁶² Carol J. Loomis, *The Risk That Won't Go Away*, FORTUNE, Mar. 7, 1994, at 40, 42.

²⁶³ See *id.*

major swap market participants possess the sophistication and resources to manage swap risks, while most banks have negligible holdings.²⁶⁴

There is, however, a concern that banks less able to evaluate swap risks will enter the fray in the future. Since returns on capital deployed in the derivatives business average 30-40%, and sometimes approach 100%,²⁶⁵ there is a concern that neophytes and less sophisticated banks will become actively involved in the swap market and will be more concerned with being competitive than with containing risks. This danger is mitigated, however, by the fact that counterparties will generally deal only with well-known intermediaries.

5.2.2. *Adverse Effects of Excessive Capital Requirements*

Although swap risks are real and substantial, and regulators have reason to keep a watchful eye, they must exercise restraint. Capital adequacy requirements will not contribute to the safety and soundness of these institutions if they are set at inappropriate levels. To the extent that the risk-based capital requirements are not accurately correlated with the underlying riskiness of the assets, they will cause a number of harmful distortions. First, inappropriate capital requirements will induce a misallocation of capital resources within the banking industry, as well as between bank and non-bank commercial sectors. Second, they will induce distortions in bank pricing and business decisions, resulting in a misallocation of resources due to balance sheet restructuring. Third, they may cause a global credit crunch. Fourth, they may induce banks to increase portfolio risk or acquire the riskiest assets within each asset classification. Last, setting inappropriate capital requirements will drive certain business from the regulated sector to the unregulated sector.²⁶⁶

Since spreads on swaps are low to begin with, an assessment of capital which is too high relative to its risks has real cost consequences for dealer banks. "In the same way

²⁶⁴ See Beckett, *supra* note 62, at 33.

²⁶⁵ See You'd Better Ask Murphy, *supra* note 27, at 51.

²⁶⁶ For additional commentary on these five effects, see Hall, *supra* note 18, at 272.

that uneven regulation distorted the deposit and lending markets, disintermediating banks in favour of money market funds . . . banks will be disintermediated from the swaps market. Swaps will simply go where regulations are most liberal”²⁶⁷ “Spread differences among competing swap dealers are wafer-thin, and capital adequacy costs could disadvantage the regulated dealers. Accordingly, not only would banks from countries not embracing the Basle Accord have a competitive advantage, but so would unregulated investment banks, insurance companies and other dealers.”²⁶⁸ If the capacity of such non-banks is insufficient to support the market, there will be an increase in the cost to end-users, and certain products may simply become unavailable.²⁶⁹ Alternatively, swaps may be driven away from banks and onto exchanges, which would harm banks by eliminating a source of profits and be disadvantageous for customers by eliminating the one characteristic which was initially responsible for the creation of the OTC swap market—the ability to customize risk exposure.²⁷⁰

Overly conservative credit calculations squander capital and risk a credit gridlock.²⁷¹ This effect is worsened by the fact that stock markets have sometimes been unreceptive to banks’ attempts to raise capital. Because most counterparties will only deal with intermediaries rated A or better, and since there is a limited quantity of such institutions, the capacity of the swap market is limited. Increased capital requirements may decrease that capacity, and may force parties to deal with lesser credits—increasing the potential for problems.²⁷²

5.3 Recommendations

It is clear that bank end-users benefit from the type of inexpensive hedging that swaps provide, and equally clear is that banks provide a needed service (and profit accordingly) by

²⁶⁷ Brady, *supra* note 134, at 30.

²⁶⁸ Barry W. Taylor, *Swap Risk: Public and Private Regulation in INTEREST RATE AND CURRENCY SWAPS* 1988, at 89, 98 (PLI Corp. Law & Practice Course Handbook Series No. B4-6832, 1988).

²⁶⁹ *See id.*

²⁷⁰ *See* Brady, *supra* note 134, at 30.

²⁷¹ *See id.*

²⁷² *See id.*

intermediating the swap market. The challenge is to maintain a balance between prudent regulation of swap risks, without discouraging their use or affecting banks' ability to compete as swap dealers. Although this is a difficult challenge, what follows are several possible suggestions which deserve further exploration.

5.3.1. *Subject Securities Firms to Basle-Like Provisions*

Although the foregoing discussion of swap risks has been countenanced in terms of banks and Basle, securities firms should theoretically be subject to similar capital requirements. The risks are the same regardless of whether the swap dealer is a bank or a securities firm, and therefore prudent regulation and concern for the global financial system requires that both industries have similar capital requirements. Otherwise, swap activities will simply migrate to securities firms, and if the capital held by them is inadequate, we are left with greater systemic risk exposure than that with which we started.

In the past, banks and securities firms have been regulated very differently, especially for capital purposes, because of fundamental differences in the nature of their businesses. In addition, the idea behind bank regulation is to prevent bank failures and ensure a healthy banking system, while regulation of securities firms operates with a view towards an orderly liquidation and payment of customer claims if and when a firm fails. Global disintermediation and the increased integration of financial markets and services, however, have blurred the distinction between banks and securities firms. Securities firms now offer bank-like services, such as checkable money market mutual funds, while banks have increased their off-balance-sheet and fee-driven activities. To the extent that banks and securities firms provide the same or similar services, there is less force to the argument that they should be regulated differently.

The international securities industry has established an organization akin to Basle, known as the International Organization of Securities Commissions ("IOSCO") in order to standardize regulations among international securities firms.²⁷³ Thus far, however, efforts by Basle and IOSCO to

²⁷³ See 1995 MARKET RISK SUPPLEMENT, *supra* note 220, at 7; see also <https://scholarship.law.upenn.edu/jil/vol16/iss2/2>

coordinate capital regulations have been unsuccessful.²⁷⁴ Such coordination will gain an even greater importance once Basle implements market risk capital requirements.

5.3.2. *Explicit Explanation of Basle's Methodologies*

Basle has not been forthright in disclosing the assumptions and methodologies utilized in arriving at the various factor and risk weights which have been discussed. Thus, it is difficult to assess whether Basle's factors for potential swap credit risk, or its factors for risk-weighting under the market proposal, are accurate because they do not explain where these numbers originate. If Basle were to explicitly explain the methodology and assumptions, then input and comments from practitioners would be more constructive and meaningful, and would stimulate feedback and discussion on the relevant issues.

5.3.3. *Refine Basle's Treatment of Swaps*

In light of the criticisms set forth above and the consequences of inaccurate capital standards, I suggest that an effort be made to refine the capital requirements for swaps. It is essential, for example, that Basle continue to refine its treatment of netting for potential exposure while recognizing collateral and other credit-mitigating techniques. It is also vital that Basle develop more realistic measures of default probabilities.

As discussed *supra* Section 4.2.4., Basle's reliance on a product-based approach rather than a factor-based approach is inadequate. This approach results in double counting of risks for capital purposes, and makes Basle's provisions unaccommodating to financial innovation. An attempt to

PRICE WATERHOUSE, THE REGULATION OF MARKET RISK 3 (1984).

²⁷⁴ It should be noted that because Basle's provisions are applied on a consolidated basis, the provisions already apply to a substantial percentage of securities firms because in countries other than the United States it is common for banks and securities firms to be affiliates. Further, the European Union ("EU") has established a capital framework similar to Basle. This European framework applies to both EU banks and securities firms. See PRICE WATERHOUSE, *supra* note 273. See also Gilibert, *supra* note 23, at 219.

segment the many interacting risks which banks face into separate components will merely result in over-regulation.

[T]he BIS Accord's reliance on legalistic solutions - rigid, classification-based rules administered and maintained by government regulators - is reflective of a simpler, more static financial era. The process of financial innovation is now far too institutionalized and complex to be so confined. The science which started to drive finance this past decade has, in the paradigmatic case, outrun the art of financial regulation.²⁷⁵

A factor-based approach would be more consistent with current internal systems, would be more accurate, would be better able to incorporate new products, and would allow banks and regulators to analyze risks at the bank level, rather than separating the bank book from the trading book.

Basle has finally recognized the merit of banks' proprietary models instead of mandating complicated, yet inadequate, tables and charts. Basle's recent models-based proposal for dealing with market risk, however, needs to be refined to better reflect the risks at hand. If a stringent set of quantitative and qualitative parameters for such models is mandated, one must question the prudence of then multiplying the assessment produced by such models by a factor of three. Such model-based regulation should be encouraged to ensure that these institutions have appropriate controls to monitor credit and market risks. In addition, Basle should work in conjunction with these institutions to develop more accurate methods and tables for those institutions ill-equipped to operate their own models. While there is always the danger that this models-based approach could lead to "capture" of the regulators by the regulated, the set of guidelines and audit procedures put forth by Basle should ensure that this will not occur. Basle should also expand the models-based approach to the calculation of credit risk capital requirements.

²⁷⁵ Hu, *supra* note 8, at 435.

5.3.4. *Noncapital Based Regulation: Market Discipline*

Capital is not a panacea for swap risks, and Basle-based corrections are but one of several possible alternatives. Minimum capital will not ensure the stability of banks simply because "there is no substitute for good management."²⁷⁶ The importance of internal controls was highlighted recently by the failure of Barings PLC, caused by billions of dollars of unauthorized derivatives trades.²⁷⁷ Therefore, it is essential for dealers to monitor their credit risk and market risk exposures on a continuous basis, and ensure that back-office operations are adequate. To the extent dealers utilize their own models, it is essential to re-evaluate continually the parameters. Supervisors must make frequent on-site examinations for purposes of auditing bank procedures and operations.

The problem, however, is that no supervisor can adequately monitor all banking risks, because the risks are constantly changing. In this regard, market discipline of banks should be encouraged. Capital requirements are an integral part of this market discipline, for any time a bank accesses capital markets, it will be subject to scrutiny. Disclosure of the accounting procedures for swaps must be improved so market forces can operate properly. In addition, bank issuance of subordinated debt should be encouraged because it is precisely the holders of these instruments who are most likely to monitor and least affected by moral hazard. Although Basle's market risk proposal would incorporate a third tier of capital composed of subordinated debt which could be used to satisfy market risk capital requirements, Basle should increase the role of such debt as satisfaction of credit risk requirements as well.

Some have suggested that the role of market forces would be enhanced by severing the applicability of deposit insurance to derivatives and other bank activities.²⁷⁸ Although the viability of this alternative is beyond the scope of this paper, severance of deposit insurance from derivatives would enhance

²⁷⁶ Michael Blanden, *No Time for Risks*, THE BANKER, Jan. 1993, at 24, 24.

²⁷⁷ See *A Tale of Two Banks*, ECONOMIST, Mar. 11, 1995, at 20-21.

²⁷⁸ See *New Rules for Banks*, ECONOMIST, May 8, 1993, at 20.

market discipline and is worth exploring. Perhaps all trading activities could be segregated into separately capitalized, non-insured subsidiaries.

5.3.5. *Enactment of Legal Reforms*

Certainty in the world of finance is a precious yet often scarce commodity. However, in order for swaps to be accurately priced and available, their legal status must be strengthened. It is important that countries with bankruptcy and other laws written prior to the proliferation of swaps and other derivatives amend such laws to clarify the treatment of swaps.

6. CONCLUSION

While derivatives have revolutionized finance, "they have yet to revolutionize regulation."²⁷⁹ Responding to the regulatory challenges that swaps present is not easy, and achieving harmony among national systems is a particularly difficult task. The main conflict is between providing an accurate assessment of risk while maintaining a system which can be readily administered and monitored. Basle should look beyond its building-block approach and learn from the methods that sophisticated banks use to manage their own risks.²⁸⁰

Basle's provisions were initially designed for simplicity, so that less sophisticated regulators and institutions subject to the Basle Accord could administer them.²⁸¹ There are real costs, however, when regulation is unable to parallel the sophistication of those subject to regulation, especially when the regulations are unable to keep pace with innovation.

Regulation should not discourage risk-taking, because that is a bank's function: to accept credit and market risks that others are unwilling to bear for an appropriate price. It should, however, ensure that risks are prudently managed through the implementation of appropriate capital, examination, accounting, and reporting requirements.²⁸²

²⁷⁹ Hansell & Muehring, *supra* note 101, at 61.

²⁸⁰ *A Simple Proposal*, *ECONOMIST*, Dec. 11, 1993, at 20, 21.

²⁸¹ *See* Hu, *supra* note 8, at 395.

²⁸² *See* Susan M. Phillips, *Derivative Markets-Challenges & Regulatory Issues*, *WORLD OF BANKING*, Mar.-Apr. 1993, at 4, 5.

Banks have shifted away from traditional deposit-taking and lending, and towards trading and market-making. This development, however, is not necessarily a cause for concern, because such activities may benefit banks and society. Swaps illustrate a case in point. By meeting a need not fully met by exchange-traded products, banks, through the creation of OTC swaps, provide a valuable service.²⁸³ In the process, swaps have enabled end-users, including banks themselves, to control their risk exposures in very precise ways. Standard documentation and price competition among dealers has minimized the cost of swaps, yet swap activities still provide profits to a once beleaguered banking industry. The benefits of such products should not be overshadowed by the occasional abuse by a swap dealer or the occasional imprudent use by an end-user.

While the concerns of regulators should not be disregarded, one should not lose sight of the benefits provided by these instruments. Regulators will continue to walk the tightrope separating the dangers from the opportunities, but must do so in recognition of the fact that the transformation in the nature of banking has been driven by market forces. Severe regulatory restrictions, which obstruct the evolution of banks, may instead drive banks to extinction.

²⁸³ Serge Ballanger, *Regulating the Derivatives Revolution*, THE BANKER'S MAGAZINE, Mar.-Apr. 1993, at 54, 58.