INSTITUTIONAL BACKGROUND IN FINANCIAL RISK MANAGEMENT

What is Trading?

Trading is that branch of the financial business in which firms attempt to make profits by buying and selling.

Trading activities may be subdivided into two principal types:

- **Market making** (also called book running or the “sell” side) consists of making two-way markets by engaging in (nearly) simultaneous buying and selling the same instruments, attempting to keep position holdings to a minimum and to profit primarily through the difference between (nearly) simultaneous buy and sell prices.

- **Position taking** (also called market using, price taking, speculation, or the “buy” side) consists of deliberately taking positions on one side or the other of a market for substantial time periods, hoping to profit by the market moving in your favor between the time of purchase and the time of sale (Note: time of purchase may be before or after time of sale). Positions may be taken on behalf of a firm (in which case it is often labeled “proprietary” trading) or on behalf of an individual client, or group of clients, such as a mutual fund, hedge fund, or managed investment account.

There is nearly always some time lag between purchase and sale involved in market making. Depending on the length of time and degree of deliberate choice of the resulting positions, these may be labeled position taking aspects of market making. Market making almost always involves risk because you can’t often buy and sell exactly simultaneously. The market maker makes a guess on market direction by its posted price, but bid-asked spread can outweigh even persistent error in directional guess as long as the error is small. And the experience and information gained from seeing so much flow means you most likely will develop ability to be right on direction on average. But the position taker has the advantage over the market maker of not needing to be in the market every day and so can stay away from the market except when possessed of a strong opinion. The market maker can’t do this; staying away from the market would jeopardize the franchise.

Arbitrage is a particular type of position taking in which offsetting positions are taken in closely related markets with the intention of generating low risk (but also generally low return) net positions.

**Classic example** — FX arbitrage between quotations in two different centers. This type of pure informational arbitrage has been largely eliminated by the power of modern technology which gives rapid access to information.

**Second example** — buy a basket of stocks which mimics an index and sell the future on the index. Depends on capital investment in computers and people to simultaneously purchase a large number of stocks. Might invest in a statistical model to determine a smaller, more manageable basket which closely tracks index, but this introduces some risk.
Third example — you are the first firm to figure out that some complex set of trades is actually equivalent to another trade – for example, currency crosses. This is one place where investment in modeling comes in.

Very frequently the arbitrage is a tax or regulatory arbitrage (Taleb example p. 86-87)

- For example, Merrill Lynch figuring out the way around regulatory caps on interest rates paid for small deposits by invention of the money market account
- The firm can make money off of this only till other firms learn how to copy
- This is the source of a lot of the arbitrage profit of investment firms
- As other firms copy an arbitrage idea, profit margins shrink, it becomes more necessary to take some risk

Risk management is very different for a trading desk which is primarily focused on proprietary or arbitrage trading on the one hand versus one which is primarily focused on market making. A trader who is primarily a proprietary or arbitrage trader wants to take certain risks on which he or she expects to make a good return. Risk management in this context primarily focuses on making sure that the risks being taken closely match the desired risks. A market maker, on the other hand, is primarily interested in minimizing the risk taken while at the same time being able to maintain an active market. But since risk cannot be eliminated completely, risk management for market making must also focus on the selection of risks to be taken.

All instruments traded by financial firms are “commodities”, in the sense of not being individually identifiable (if I borrow – i.e., rent – a house from you, you expect me to return that exact same house, so houses are not a commodity; this is not true for dollar bills, bars of gold, barrels of oil, shares of IBM stock, specified amounts of a given bond, etc.). This commodity feature means that a trader is free to sell before he buys, since he can always borrow the instrument in order to make delivery. In this way financial markets are more “symmetrical” than non-commodity markets such as houses, where you must build up an inventory by buying before you can sell.

Commodities can be divided into physical commodities, such as gold and oil, and financial commodities, which can be further subdivided into equities and fixed income. Equities are shares in the future profits of firms while fixed income consists of payments based on a contracted formula. Fixed income can be further subdivided into three parts:

- Exchange rates between currencies (also called “foreign exchange”, abbreviated as “FX” or “forex”)
- Credit risk-free interest rates, i.e., interest rates on Government-backed debt (promises by a Government to make payments in the currency which that Government controls)
- Credit spreads, the differential between interest rates paid on non-Government-backed debt and Government-backed debt, representing the premium paid for uncertainty of contract fulfillment
The following chart classifies the major traded products:

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<th>Positions</th>
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<tr>
<td>Futures Exchanges</td>
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<tr>
<td><strong>New Products</strong></td>
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<td>Structured &amp; hybrid securities</td>
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<td>Over-the-counter Derivatives</td>
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**What types of risk are there in trading?**

1. **Categorization of Risk Types**

   **Market Risk**
   - Spot Risk
   - Forward Risk
   - Option Risk
   - Liquidity Risk
• Basis Risk
• Asset-Liability Mismatch Risk
• Model Risk

Credit Risk
• Country Risk
• Settlement Risk
• Counterparty Risk

Operational Risk

Operations Risk
• Disaster Risk
• Personnel Risk

Legal Risk
• Litigation Risk
• Regulatory Risk
• Tax Risk
• Reputational Risk

Accounting Risk

Funding Liquidity Risk

Enterprise Risk

2. DEFINITIONS OF RISK TYPES

Market risk — The potential that changes in the market prices of an institution’s holding may have an adverse effect on its financial condition.

Spot risk — Market risk in the spot markets: the cash or physical markets of the various asset classes; i.e., the markets for (almost) immediate delivery of assets.

Forward risk — Market risk in the forward-based instruments such as swaps, forward rate agreements, forwards, and futures; i.e., the markets for future delivery of assets. As used here, includes all interest rate risk, since a bond or loan is just an agreement for future delivery of an asset: a fixed amount of currency.

Option risk — Market risk specifically due to the non-linear price profile of an option or any other instrument with non-linear price profile. As defined here, options risk includes the convexity (i.e., non-linearity) risk of ordinary bonds and interest rate swaps.
**Liquidity risk** — the risk of being unable to close out open positions quickly enough and in sufficient quantities at a reasonable price. In dealer markets, the size of the bid/ask spread of a particular instrument provides a general indication as to the depth of the market under normal circumstances. However, disruptions in the marketplace, contraction in the number of market makers, and the execution of large block transactions are some factors which may result in the widening of bid/ask spreads. Liquidity risk is also associated with the probability that large transactions in particular instruments, by nature, may have a significant effect on the transaction price.

**Basis risk** — the risk that arises when a hedge and the instrument being hedged are imperfectly matched; since their prices may not move in tandem, there is a possibility of losses arising. This is from a market-making or arbitrage viewpoint. For a proprietary trader, basis risk is the risk that arises when an instrument used to approximate a desired position fails to move in tandem with the desired position.

**Asset-Liability Mismatch risk** — specific type of forward market risk which arises from mismatches in the sensitivity of assets and liabilities to changes in interest rates. Segmented because of different accounting treatment (accrual rather than mark-to-market), making the firm sensitive to the timing of recognition of earnings as well as the total amount.

**Model risk** — the risk that theoretical models used in pricing, trading, hedging, and estimating market risk will turn out to be imperfect.

**Credit Risk** — the risk of economic loss from the failure of an obligor to perform according to the terms and conditions of a contract or agreement. Failure of an obligor to perform can be due to its financial inability to perform and/or its unwillingness to perform.

**Country risk** — credit risk arising from the possibility that all firms, individuals, and government bodies within a given country will be prohibited from meeting their contractual obligations. This can arise from the imposition of exchange controls by the government as a defensive measure against adverse currency flows, or from government renunciation of foreign debts, or from the disruption of normal contractual relationships due to war or revolution. It can also refer more broadly to the credit risk arising from the correlation of economic performance between firms and individuals within a given country. This would just be a particular instance of risk from correlation, which could also arise from economic correlation of firms within a particular industry or region.

**Counterparty risk** — credit risk arising as part of a derivatives transaction from the risk that one of the parties to the derivative contract will not perform according to its terms.

**Settlement risk** — risk of credit loss when an institution meets its obligations under a contract (though either an advance of funds or securities) before the counterparty meets its obligations. Most common example is delivery of one currency under a foreign exchange contract in a different time zone than the delivery of the other currency.
Failures to perform can arise from counterparty default, operational problems, or market liquidity constraints. Also known as Herrstatt risk, after its most famous historical occurrence (the German government closed the Herrstatt Bank at the close of the German business day, but prior to the time of day when Dollar payments were being settled in New York, leaving some firms which had paid or received Deutschemarks to or from Herrstatt and were waiting for the offsetting Dollar part of an FX trade with a claim which needed to be resolved in legal proceedings).

**Operational risk** — all risk other than market risk or credit risk.

**Operations risk** — the risk that deficiencies in information systems or internal controls will result in unexpected loss. This can be due to undesired positions being inadvertently taken on the basis of incorrect information (the classic case is a purchase entered into the system as a sale resulting in an intended hedge actually serving to double up a position). Or, it can be due to deliberate fraud intended to directly divert cash, deceive management about earnings in order to receive unearned compensation, or deceive management about positions in order to retain freedom of action. Includes Disaster risk — the risk that a physical event, such as a trading room fire or computer virus, could destroy information needed for correct position-taking. Includes Personnel risk — the risk of overdependence on key professionals who become “irreplaceable” in that their jobs cannot readily be assumed in the event of departure or incapacitation.

**Legal risk** — the risk that the terms or conditions of a contract or agreement will prove unenforceable due to legal defects in the contract or agreement in related documentation and procedures. Includes the risk that intended contract provisions will be invalidated or interpreted differently by a court or will require costly legal proceedings (Litigation risk), the risk that intended contract provisions will be ruled unacceptable by a regulatory body (Regulatory risk), and the risk that enforcement of contract provisions will prove too costly in terms of damage to the firm’s reputation as a desirable firm for customers to do future business with (Reputational risk). A particular aspect of litigation or regulatory risk is Tax risk, the risk that rulings by regulatory agencies or tax courts will differ from the tax treatment claimed, resulting in unanticipated tax payments which adversely impact transaction profitability.

**Accounting risk** — risk that an error in accounting policy will necessitate a restatement of earnings which adversely affects the perception of the firm by investors or customers.

**Funding liquidity risk** — the risk that an institution will have to pay higher than prevailing market rates for its funding due to either (1) the perception by investors that the credit quality of the institution is impaired, possibly due to earnings problems or capital structure problems, or (2) overly heavy use of particular funding sources within a given time period, with the large size of transactions impacting transaction cost.

**Enterprise risk** — risk of loss due to change in the overall business climate, such as the needs of customers, actions of competitors, and pace of technological innovation. This is also known as Strategic risk.
Who are the players?

1. Line Business/Front Office
   a) Traders / position managers / portfolio managers
      • Determine pricing and position sizes, execute transactions
   b) Sales / marketing / structuring
      • Arrange transactions with customers, negotiate the structure of a tailored transaction (such as an OTC derivative or a security upon original issue).
   c) Research / analysis
      • Builds models, uses models to analyze positions, supplies analysis for customers. Includes analysts who forecast the future performance of a country’s economy or a company’s earnings, as well as “quants.”

2. Support staff
   a) Back office / operations and systems
      • Trade processing, maintenance of records of positions, payments
   b) Middle office
      • Closer to the line, calculates mark-to-market, daily P&L, reports positions against limits, provides reconciliation between yesterday’s position and today’s position and P&L, analyzes sources of P&L and risk.
   c) Controllers
      • Responsible for accuracy of the firm’s books and records, P&L, and mark-to-market methodology.

3. Firm-level or Division-level Risk Management
   a) Market risk management
   b) Credit risk management
   c) Legal
   d) Audit — manages Operations risk
   e) Accounting policy
   f) Treasury — manages Funding Liquidity risk

4. Protection of Investors
a) Board of Directors
b) Independent accounting firm / Accounting Board
c) Investment analysts
d) Rating agencies
e) Securities and Exchange Commission

5. Governmental Regulation — protection of financial system

a) Bank examiners
   • for nationally chartered banks — Comptroller of the Currency
   • for state chartered banks — Federal Reserve System
   • for both nationally and state chartered — state bank examiners
b) Security firm examination by Securities and Exchange Commission
c) International standards set by Basle group of regulators
d) Management of system liquidity — Federal Reserve System

**Insiders vs. Outsiders**

To understand the relationship between the various players, must understand the concept of **moral hazard**. Definition (from the article “Moral Hazard” by Kotowitz in the NewPalgrave, Allocation, Information, and Markets, p.207):

Moral hazard may be defined as actions of economic agents in maximizing their own utility to the detriment of others, in situations where they do not bear the full consequences or, equivalently, do not enjoy the full benefits of their actions due to uncertainty and incomplete or restricted contracts which prevent the assignment of full damages (benefits) to the agent responsible. Agents may possess informational advantages or there may be excessive costs in writing detailed contingent contracts. Commonly analyzed examples are: workers efforts, which cannot be costlessly monitored by employers, and precautions taken by the insured to reduce the probability of accidents and damages due to them, which cannot be costlessly monitored by insurers. Adam Smith in Wealth of Nations: “The directors of such companies, however, being managers rather of other peoples’ money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private company frequently watch over their own.”

Traders will always have greater participation in the upside of their trades than in the downside. You can give a positive bonus but not a negative one. Even firing does not have that large an effect — the tendency is for firms to hire traders who have had spectacular blowups elsewhere, figuring they’ve learned a lesson (at someone else’s expense). Nick Leeson going to jail was an aberration (possibly due to different attitudes in Singapore than in the West). Firms and their stockholders are shielded from full
negative consequences of their actions by bankruptcy laws, limited liability, deposit insurance, need of the government to maintain orderly markets.

Compare a trader’s viewpoint from Taleb’s sections on Proprietary Departments, p. 54, and “The Fair Dice and Dubin-Savage Optimal Strategy”, p. 65. In these quotations Taleb is admirably frank about the advantage that traders possess relative to the firms they work for, of having participation in upside return which is not balanced by their participation in downside returns. His advice to traders is Machiavellian: they should increase their own advantage at the expense of their firm’s by increasing the riskiness of their positions as much as possible, and the less favorable the odds, and hence the less favorable the position is to the firm, the greater the risk that should be taken. (As with Machiavelli, one can speculate as to whether Taleb’s advice is cynically sincere or something of a comic parody). This is advice (which ought to be) known to every gambler and is well-founded in statistical theory — when the odds are in your favor, place many small bets; when the odds are against you, place one large bet. Essentially you are attempting to minimize the length of time you are playing against “the house” since you are paying a “tax” to the house, in the form of an expected loss, for the privilege of playing.

Traders always have an informational advantage over those who are monitoring them, just as people inside the firms have an informational advantage over those who try to monitor the firm from the outside (accountants and investment analysts on behalf of investors, and regulators on behalf of the government). The insiders tend to view the outsiders as “not understanding my business” (examples from Taleb: top of p. 4), the outsiders tend to view the insiders as wanting to “hide” what’s going on. Key is to understand the asymmetry between knowledge and incentive. Those with the most knowledge have the narrower set of incentives. Those with the broader incentives (having to worry about the downside as much as the upside) have less access to knowledge.

You could argue that firms should just worry about expected value and not about volatility, since the market should only place a risk premium on risk which it cannot hedge away (if investor wants less risk, he’ll just take the highest expected return stock and diversify by mixing with governments). But empirical evidence is that the market places a stiff discount on variable trading earnings. The reason may be information asymmetry. It is hard for outsiders to tell whether a firm is taking sound gambles to maximize expected value or is maximizing insiders’ option on one-way bets. Andre Perold of Harvard Business School, in a 1998 working paper on “Capital Allocation in Financial Firms” states that:

“I view financial intermediaries as being special in several ways: First, these firms are in credit-sensitive businesses, meaning that their customers are strongly risk-averse with respect to issuer default on contractually promised payoffs. (For example, policyholders are averse to having their insurance claims be subject to the economic performance of the issuing firm, and strictly prefer to do business with a highly-rated insurer). The
The creditworthiness of the intermediary is crucial to its ability to write many types of contracts, and contract guarantees feature importantly in its capital structure.

“Second, financial firms are opaque to outsiders. They tend to be in businesses that depend vitally on proprietary financial technology and that cannot be operated transparently. In addition, the balance sheets of financial firms tend to be very liquid, and are subject to rapid change. Financial firms, thus, are difficult to monitor, and bear significant deadweight costs of capital. Guarantors face costs related to adverse selection and moral hazard . . .

“Third, financial firms are also internally opaque. Information tends to be private at the business unit level, or even at the level of individual employees such as traders. Efficient management of these firms thus involves significant use of performance-related compensation to mitigate against monitoring difficulty.”

**Importance of measuring success of trading strategies**

Insiders have an inherent bias against controls and against sharing knowledge with outsiders, since this can help the outsiders control them. Part of the motivation is that narrowing the range of actions available is sub-optimal, but part of the motivation is that the upside asymmetry makes riskier action more rewarding to insiders than outsiders.

1. Insiders want the most flexibility possible in recognizing earnings. A seemingly smooth flow of earnings can be used to make a case for looser controls. Front loading of earnings can be used to pay bonuses now and then gamble with the chance of losses later. This can lead to the (perhaps inadvertent) running of a **Ponzi scheme**.

   In its original meaning, a Ponzi scheme is a criminal enterprise in which investors are tricked into believing that they will receive very high returns on their investments by having early investors paid out at high rates of return with payment coming from the cash invested by later investors. The illusion of high return can be pretty convincing. After all, you can actually see the early investors receiving their high return in cash, and the “con men” running the scheme can produce very plausible lies about the purported source of the returns. As a result, the pace of new investment can be intense, allowing the illusion of profit to be maintained over a fairly long time period. It’s a vicious cycle — eagerness of new investors to place money in the scheme leads to heightened ability to make investments appear highly profitable, leads to even greater eagerness of new investors. But ultimately any Ponzi scheme must collapse as there is no ultimate source of investment return (in fact, investment return is quite negative, as the flow of new investment must also be partially diverted to the criminals profiting from it). Ponzi schemes are also sometimes called “pyramid schemes” and bear a close resemblance to chain letter frauds.

   The original meaning of Ponzi schemes has been broadened by risk managers to include situations in which firms are mislead as to the profitability of a business
line by inadequate segregation of profits on newly acquired assets and returns on older assets.

Example:

You initially overvalue a transaction relative to what it will cost you over the years. This encourages more transactions of this type, the overvaluing hides the losses being generated by the older trade. (Look at Taleb’s example from bullet point on p. 86, as well as second bullet point on p. 85, also the section “Market Making and the Illusion of Profitability” on p. 58)

2. Another insurance concept applicable to trading is adverse selection (see Taleb, pp. 60-61). The market may have information that the traders do not. The firms with the worse information get stuck with mispriced risks and don’t know it (Taleb compares market making to being short an option). Concern with the risk from adverse selection motivates risk managers’ concern about the composition of a trading desk’s customer base. The key question is what proportion of trades are with counterparties who are likely to possess an informational advantage relative to the firm’s traders. As a general rule, you prefer to see a higher proportion of trades with individuals and non-financial corporations, who are likely trading to meet hedging or investment needs rather than seeking to exploit informational advantage. Alarm is raised when an overwhelming proportion of trades are with other professional traders, particularly ones who are likely to see greater deal flow or have a greater proportion of trades with individuals and non-financial corporations that your firm’s traders. Seeing greater deal flow can give a firm informational advantage by having a more accurate sense of supply and demand pressures on the market. A greater proportion of individual and non-financial corporation customers yields two potential informational advantages: (1) at times, you work with such customers over a long period of time to structure a large transaction. This gives the traders advance knowledge of supply and demand which has not been seen in the market yet. (2) Working on complex structures with customers gives traders a more intimate knowledge of the structure’s risks. They can choose to retain those risks which this knowledge shows them are more easily manageable and attempt to pass less manageable risks onto other traders.

3. Even when the market does not have better information in aggregate, the mechanics of the winner’s curse cause firms to put on those trades which they tend to overvalue. Look at Taleb’s example from first bullet point on p. 85. The next 3 charts illustrate how the winner’s curse works.

<p>| Buyer 1 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Transaction | Realized Value | Sellers Asked Price | Buyers Bid Price | Purchase Price | Buyers P&amp;L |
| 1 | 1.56 | 2.1 | 2.0 | | | |
| 2 | 2.66 | 1.4 | 1.5 | 1.45 | 1.21 | |
| 2 | 2.66 | 1.4 | 1.5 | 1.45 | 1.21 | |</p>
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<th>Transaction</th>
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<th>Sellers Asked Price</th>
<th>Buyers Bid Price</th>
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**Buyer 2**

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**Auction**

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</table>

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The “winner’s curse” is the economic anomaly which tends to cause winners of auctions to pay more for an item than it is actually worth. This demonstrates that even when a firm has information advantages over its customers and its competitors, it can still lose money as the result of the mechanics of the auction process. In our simple example, we consider a market with 3 firms, 2 buyers and 1 seller. There are 10 transactions which the seller might sell to the buyers. Neither buyers or seller is certain of the true value of these transactions (for example, they might depend on future dynamic hedging costs, which depend on the evolution of future prices, which different firms estimate using different probability distributions). After the fact, we know what the true realized value of each transaction is, shown in column 2 of each table. Buyer 1 has superior knowledge of this market to both his competitor, buyer 2, and his customer, the seller. This can be seen by the higher correlation between buyer 1’s estimates of transaction value and realized value (the correlation as shown as 83.3% for buyer 1, 72.2% for buyer 2, and 63.2% for the seller). The consequences of this informational advantage is that buyer 1 makes a profit at the expense of the seller in a situation where they are the only 2 players, and that buyer 1’s profit in this situation is higher than buyer 2’s profit in the parallel situation of buyer 2 and the seller being the only 2 players.

Chart 1 shows the situation where buyer 1 and the seller are the only 2 players. Note that the buyer, being risk averse, has successfully biased his bids down to be on average lower than the realized value and the seller, being risk averse, has successfully biased his asked prices up to be on average higher than realized value (buyer 2 shows a similar bias as buyer 1 in chart 2, where buyer 2 and the seller are the only 2 players). In these 2 player games, no transaction takes place if the buyer’s bid is lower than the seller’s asked. If the buyer’s bid exceeds the seller’s asked, we assume the transaction takes place at the average price between these two prices. In chart 1, buyer 1 has a total P&L of +1.09, reflecting his informational advantage over the seller. In chart 2, buyer 2 has a total P&L of +0.55, reflecting his informational advantage over the seller. Buyer 1 has a higher P&L than buyer 2, due to having informational advantage relative to buyer 2.

Now consider what happens in chart 3 when buyer 1 needs to compete against buyer 2 for the customer’s business, a situation very typical for market making firms which must offer competitive price quotations to try to win customer business from other market makers. The seller no longer relies on his own estimate of value but simply does
business at the better bid price between the two firms. Even though both firms continue
to successfully bias their bids down on average from realized values, both wind up losing money in total. The reason is that they no longer have gains on trades which they seriously undervalued to balance out losses on trades which they seriously overvalue, since trades which they undervalue they tend to lose to the other bidder.

All this shows the reason for importance placed on (1) independent valuation, (2) external and liquid valuation (what would someone else pay for it? — this is not the same as liquidation or “fire-sale” valuation). “What you can sell it for” avoids overvaluing due to adverse selection or winner’s curse. (3) valuation which takes long-term consequences into account.
Key principles for managing risk transparency: G–30

The recommendations for managing derivatives risk which were issued by the Group of Thirty in July, 1993 have proved very influential, not just for the management of derivatives risk, but for all trading risk. These recommendations address the issues of independence of risk management from trading, the use of valuation based on external prices to avoid being misled as to hedging effectiveness, and the need to measure and inform senior management of the risks being taken. The recommendations which relate most directly to the management of trading risk are shown in italics, with the original numbering they had in the G-30 report, followed by a brief discussion.

Recommendation 2: Marking to Market

*Dealers should mark their derivatives positions to market, on at least a daily basis, for risk management purposes.*

A policy of marking to market all derivatives positions, at least as often as the close of business each day, constitutes the essential foundation for managing trading risk. There are two primary reasons for this. First, without a nearly continuous mark to market, it would be possible that ineffective hedging strategies would not be recognized until long after their effectiveness had ceased. Second, without realistic marks to market, gains might be reported in one period which would later need to be reversed.

Recommendation 3: Market Valuation Methods

*Derivatives portfolios of dealers should be valued based on midmarket levels less specific adjustments, or on appropriate bid or offer levels. Midmarket valuation adjustments should allow for expected future costs such as unearned credit spread, close-out costs, investing and funding cost, and administrative costs.*

The Group of Thirty study recommends mark to market valuations based on either midmarket levels less specific adjustments, or on appropriate bid or offer levels. Either approach represents a means of adjusting the mark to market to reflect actual levels at which existing positions can be unwound. The approach based on bid or offer levels is geared more toward a liquidation approach, while the approach based on midmarket levels less specific adjustments reflects more of a going-business approach. An approach based on bid or offer levels requires a highly sophisticated computational technique for matching up transactions that substantially offset one another. Without such a computational ability, a trading book would get charged the full bid-offered spread on matched positions that would not need to be liquidated even in the event of wishing to unwind positions.

The specific adjustments approach, by contrast, can be applied at the portfolio level, largely based on summary portfolio statistics. The specific adjustments approach also offers a more flexible measure because it can distinguish between the cost of exposure to credit risk, exposure to future operating costs, and exposure to residual market risks not
captured by the valuation models. The bid-offered spread reflects all of these costs, whereas actual positions may be exposed to some of these costs but not others.

In addition to adjusting for expected costs, management must decide on the degree to which potential costs above the level of expected costs should be adjusted for. There does not appear to be any rationale for making such an adjustment for close-out costs for positions that can be hedged with liquid instruments or for administrative costs because both elements can be estimated to a reasonable degree of precision. But close-out costs for positions that require dynamic hedging, investing and funding costs, and credit costs are all subject to a significant degree of uncertainty. Management needs to make a decision concerning the degree of its willingness to recognize earnings in one time period and then later have these revenues reversed due to adverse market conditions.

**Recommendation 4: Identifying Revenue Sources**

*Dealers should measure the components of revenue regularly and in sufficient detail to understand the sources of risk.*

The Group of Thirty study states that “measuring the components of profit helps participants to understand the profitability of various activities over time relative to the risk undertaken, as well as to gain insight into the performance of hedges.” A basic justification of using mark-to-market valuation in the management of derivatives is that it will lead to early identification of ineffective hedging strategies, which can in turn trigger experimentation with alternative hedges or changes in the mix of products being offered. This can only happen if an effective and frequent analysis is made of what is causing changes in profit and loss (P&L). In particular:

1. P&L must be segregated by product line to identify which products may be encountering hedging difficulties.

2. P&L must be broken out into that part attributable to newly booked business versus that part due to hedging activity on existing business. This assures that hedging problems will not be masked by the offset of profits from new business. A persistent pattern of profitable new business offset by hedging losses is an indication either that traders have chosen to take positions which (at least temporarily) have had bad results, or that the adjustments made for expected future costs (as per Recommendation 3) have been inadequate.

3. To distinguish between these two cases, it is important to identify what portion of hedging profits is due to movements against which risk factors, such as delta, gamma, vega, and theta. In this way, losses stemming from deliberately taken positions can be distinguished from those that arise from risks such as correlation exposure, which the trader cannot hedge. This analysis is also important in confirming that risk positions are reported correctly. If daily P&L swings cannot be accounted for by the reported size of risk positions and the daily changes in market variables, this is a warning that reported risk measurements may be incorrect. This should lead to
investigations of whether some transactions have been misrepresented in the reporting systems, or whether additional or more detailed risk measures are required. Particular attention should be paid to unexplained P&L swings that take place around a date on which a payment is made or determined; if a model is not properly valuing a payment which has already been determined or is very close to it, the probability is very high that the trade has been misrepresented.

4. It is extremely important to highlight any P&L changes due to changes in those assumptions that cannot be directly tested against available market prices or changes in models. This eliminates the possibility that P&L due to such changes will mask the results of ineffective hedging strategies.

5. Significant differences between official P&L changes and informal trading desk estimation of these changes should be investigated. Such differences can be an indicator of hedges that are not performing as indicated.

Recommendation 5: Measuring Market Risk

_Dealers should use a consistent measure to calculate daily the market risk of their derivatives positions and compare it to market risk limits._

- **Market risk is best measured as “value at risk” using probability analysis based upon a common confidence interval (e.g., two standard deviations) and time horizon (e.g., a one-day exposure).**

- **Components of market risk that should be considered across the term structure include:** absolute price or rate change (delta); convexity (gamma); volatility (vega). Time decay (theta); basis or correlation; and discount rate (rho).

Recommendation 6: Stress Simulations

_Dealers should regularly perform simulations to determine how their portfolios would perform under stress conditions._

While the analysis discussed in measuring market risk (Recommendation 5) gives a good idea of what the value at risk is over a large percent of market conditions, it cannot assess the maximum degree of losses that could be possible in extremely unlikely circumstances. While it might appear that these techniques could just be extended by raising the confidence level to a very high probability close to 100 percent, the value at risk approach almost certainly breaks down under such circumstances. First, almost all financial market have historically shown a tendency to have rare violent moves on the order of 5 to 10 standard deviations or even more (to see how pervasive this tendency is, look at Exhibit 23-3 in my article “Managing the Market Risk of Derivatives.”) Such events are so rare and so large that statistical models do not throw much light on them. Second, during these violent fluctuations historical relationships between variables break down, and otherwise uncorrelated or negatively correlated markets may show close to
perfect correlation. Third, under such circumstances normal market liquidity may disappear, invalidating the assumptions used when calculating close-out cost adjustments to valuation.

**Recommendation 7: Investing and Funding Forecasts**

*Dealers should periodically forecast the cash investing and funding requirements arising from their derivatives portfolios.*

Portfolios of derivatives can have reasonable large volumes of near-term cash flows that are known in advance, given the lags of three to six months often built in between the time payment sizes are calculated and when actual payments occur. Other near-term payments that are not yet set can still be projected to a fairly good degree of accuracy with the use of a probability range of future index values. Relatively straightforward computations can then be used to project funding surpluses or shortfalls by day and by currency. This information can be extremely useful to the firm’s treasury function in developing strategies to minimize funding costs and to maximize investment returns.

**Recommendation 8: Independent Market Risk Management**

*Dealers should have a market risk management function, with clear independence and authority, to ensure that the following responsibilities are carried out:*

- The development of risk limit policies and the monitoring of transactions and positions for adherence to these policies (See recommendation 4)

- The design of stress scenarios to measure the impact of market conditions however improbable, that might cause market gaps, volatility swings, or disruptions of major relationships, or might reduce liquidity in the face of unfavorable market linkages, concentrated market making, or credit exhaustion (See Recommendation 5).

- The design of revenue reports quantifying the contribution of various risk components, and of market risk measures such as value at risk, (See Recommendations 3 and 4.)

- The monitoring of variance between the actual volatility of portfolio value and that predicted by the measure of market risk.

- The review and approval of pricing models and valuation systems used by front-and back-office personnel, and the development of reconciliation procedures if different systems are used.

**Recommendation 16: Professional Expertise**

*Dealers and end-users must ensure that their derivatives activities are undertaken by professionals in sufficient number and with the appropriate experience, skill levels, and
degrees of specialization. These professionals include specialists who transact and manage the risks involved, their supervisors, and those responsible for processing, reporting, controlling, and auditing the activities.

Recommendation 17: Systems

Dealers and end-users must ensure that adequate systems for data capture, processing, settlement, and management reporting are in place so that derivatives transactions are conducted in an orderly and efficient manner in compliance with management policies. Dealers should have risk management systems that measure the risks incurred in their derivatives activities, including market and credit risks. End-users should have risk management systems that measure the risks incurred in their derivatives activities based upon their nature, size, and complexity.

It might be thought that the G-30 recommendations should apply primarily to the market making function of trading, with its emphasis on keeping position holdings to a minimum. But for the position taking function of trading, where positions may be held for very long time periods based on fundamental views of where market prices are headed, these recommendations may seem less relevant. Is it really important to measure short-term price fluctuations in positions being held for the long term? It is interesting to note that a recent SEC letter (December 8, 1999) has emphasized the obligation of mutual funds to value assets based on "fair value," the amount an arm's length buyer would currently pay for a security. The SEC letter specifically states that fair value cannot be based on "what a buyer might pay at some later time, such as when the market ultimately recognizes the security's true value as currently perceived by the portfolio manager" or "prices which are not achievable on a current basis on the belief that the fund would not currently need to sell these securities." These views reflect the G-30 principles.

Arguments for applying current market valuation to positions being held for the long-term include:

- The desire to hold positions long-term may reflect the motivation of fund or proprietary position managers, but they may not be the only constituency for valuation information on the fund. Fund investors, lenders to the fund, senior managers of the firm of which the proprietary position managers are a part, and regulators may all have an interest in knowing prices at which the positions may be exited in the near future. Investors may wish to exit the fund. Lenders may need assurance that margin calls can be met. Senior managers could decide that they wish to reduce the amount of risk taking authority being allocated to the position takers. Senior firm management will also want to view integrated risk reports for the entire firm, which will cover both market making and proprietary positioning functions. Regulators may be seeking assurance that fund withdrawals can take place in an orderly manner.

- It is possible to find anecdotal evidence of successful fund managers and proprietary traders who do not desire any feedback from market price changes. They view
themselves as investing for the long-run and they see short-term price changes as distracting "noise" which does not reflect changes in fundamental values but only short-lived shifts caused by supply and demand imbalances. But it is possible to counter this with anecdotal evidence of successful fund managers and proprietary traders who wish to receive constant feedback from the market. Even though they are investing long-term, they want to be constantly aware of the price at which risk positions can be unwound. They attempt to make money by having a few positions on which they are right and earn a large amount and avoiding having any positions on which they lose a large amount. The constant feedback of market prices at which positions can be exited provides both a means to assure that a limit is placed on the amount lost on any one position and a signal that markets are moving in ways they do not fully understand. In such circumstances, they seek to exit the market and wait until they can gain a better understanding before reentry.