

**Financial Risk Management in a Volatile Global Environment**

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## **INTRODUCTION**

The virtual collapse of several Asian markets has triggered a series of aftershocks in the global financial markets. From the alleged contagion that spread the crisis to Russia and South America to the de facto collapse of Long-Term Capital Management (LTCM), the repercussions of these events have led to endless debate. Even as participants in the global marketplace continue to seek answers to basic questions, such as the cause of the events and their implications, the public sector and industry lobbyists have offered remedies.

In April 1999, the President's Working Group on Financial Markets issued a report that recommended a series of measures designed to constrain leverage in the U.S. portion of the financial system. (See Box 1.) Precipitated by the collapse of LTCM, the working group saw their recommendations as a needed response to the situation leading up to capital market vulnerability, regional crises and the financial collapse of some institutions.

The President's report was followed by an industry report from the Counterparty Risk Management Group, a consortium of twelve internationally active commercial and investment banks, which was issued in June 1999. (See Box 2.) The new document recommends ways to strengthen the management of market, counterparty, credit and liquidity risk without regulation and government interference.

To some, the government and industry responses to the crisis that began in Malaysia and ended in the offices of the Federal Reserve Bank of New York were seen as timely. To us, they seemed premature, because neither the causes nor the effects of the tumultuous recent financial market events were well understood.

To shed light on the circumstances surrounding the global crisis, and to discuss possible firm-level remedies, the Wharton Financial Institutions Center, in conjunction with the Oliver Wyman Institute, held its second Financial Engineering Roundtable on “The Measurement and Management of Global Financial Risks” last Spring in Philadelphia. The event brought together an array of distinguished academics, risk managers from the major trading houses, and financial consultants to discuss the significant issues surrounding the increased risk of today’s global marketplace. Several of the participants offered their analysis and perceptions on the events of the last year, and several others proposed new risk management tools motivated by those events. Here we offer an overview of both the issues surrounding the global financial crisis and the potential solutions offered to assure the stability of financial firms in the increasingly complex trading environment.

#### **HOW EXTREME WAS THE FINANCIAL CRISIS?**

Perhaps the appropriate place to begin a discussion of the financial crisis is to investigate the size of the events themselves. To most, the collapse of Asian security markets in the fourth quarter of 1997, and the subsequent decline of the EAFAs securities worldwide, were seen as extraordinary. There have been a large number of references in the press and/or political announcements to a “10-sigma event,” and the unusual nature of the financial fallout surrounding the 12-month crisis. However, a careful examination of the historical record indicates that much of these assertions are hyperbole. To be sure, the Asian markets collapsed by more than 40 percent in the fourth quarter of 1997, and the Latin American markets finally gave way by almost as much in early 1998. However, the well-known volatility of those markets must be kept in mind. A careful look at IFC data illustrates that the standard deviation of emerging market securities has been very high historically, so that the recent episode is more of a 2- or 3-sigma event than a 10-sigma event, unlikely, but not nearly so

remote a possibility as some evidently believed. In a world of ever-increasing securities prices and a secular decline in interest rates, the collapse may have been viewed with surprise, but it should not be viewed as statistically extraordinary.

Just as volatility was high, so too was correlation of the disturbances across emerging markets. But, as with volatility, the high correlation was not unprecedented. It is frequently observed that correlations across markets seem to increase dramatically in crises. The work by Andersen, Bollerslev, Diebold and Labys (1999) provides methods for precise measurement and the work of Folkerts-Landau and Garber (1999) shows that this has some nasty consequences. Nonetheless, the extent of the spillover, *was* startling. Understandably, this has produced a search for the cause or causes of the observed contagion. In short, it would be convenient to find a culprit, or class of individuals, responsible for the events of the last year and the spillover from market to market.

### **WHO CAUSED THE CRISIS?**

With this in mind, the *presumed* culprits of the Asian financial crisis were “the unscrupulous investors and currency traders whose hedge funds unleashed a speculative attack on regional currencies and national states.” In the heat of the moment, the speculators were branded “financial market manipulators” and visible members of this community, such as George Soros, were singled out and vilified. Because governments often seek scapegoats during periods of financial collapse, it is not surprising that they tried to make such attributions.

However, the data do not support the accusation. The historical record suggests that hedge funds were not dealing with pools of capital large enough to effectively disrupt an entire nation. In addition, the evaluation of available records suggests that this group had not taken strong positions in the crisis, as discussed in Brown, Goetzmann and Park (1998). Rather, small businessmen and the

local citizenry caused the crisis through significant and consistent withdrawals from the national currency. In the end, a lack of confidence led to currency flight.

Indeed, confidence was not warranted. In the aftermath, the state of the financial sectors in Thailand, Indonesia, and Malaysia (not to mention Russia or Mexico) clearly indicated that these financial systems were on the verge of collapse. Rational locals left at a propitious time.

### **THE MARKET'S RESPONSE TO THE CRISIS**

Causes notwithstanding, the crisis produced significant problems in the world financial markets. To casual observers, the problems seemed to roll from one country to the next, with neither rhyme nor reason. Even seasoned participants found the wave of contraction both surprising and troubling. Contagion has always been an area of central concern, and its manifestation in the recent events is perhaps the most troublesome part of the Asian crisis and its aftermath.

Little is known, however, about the causes of contagion. Dismissing cults of personality and the villainization of global trading houses, few satisfactory explanations have been offered. The pet explanations of the World Bank and IMF are poor macroeconomic policy, political corruption, and errant central banking. In Kumar, Moorthy and Perraudin (1999), these factors are shown to be relevant, indeed important determinants of currency crises. But, these factors alone do not explain the cross-country and cross-market correlation central to a contagious financial crisis.

Looking into this issue, both Kumar, Moorthy and Perraudin (1999) and Glick and Rose (1999) offer evidence that contagion can be explained at least in part by international trade linkages. In essence, the global real goods market spreads the crisis from country to country, with more rapid responses occurring between countries with strong trade linkages. Their evidence for this method of transmission covers multiple crises and proves to be surprisingly robust. This channel seems

particularly relevant for the Asian events, but it seems a strained explanation for the wave of crises beyond that region. Folkerts-Landau and Garber's contribution offers insight into these events, viewing Russia's action as a watershed event. They connect the Asian Tigers, Russia, and many of the Latin American economies even though trade links specifically were not especially strong. In the end, however, it remains unclear exactly *how* crises spread, *where* they spread, and *with what speed*.

In any event, it seems reasonable to believe that the international linkages, both political and economic, among markets accelerate both the severity of crises and the speed of contagion. Beyond this, over the last decade, we have seen that global traders follow similar trading strategies, observe similar market signals, and often withdraw simultaneously from a troubled market. In such cases, liquidity quickly disappears and risk premia jump, a point of considerable concern to market participants.

One aspect of the recent crisis, however, is comparatively new: the gaming that developed across trading houses. If LTCM's stories are to be believed (see Edwards, 1999), knowledgeable counterparties were able to exploit information on LTCM's positions to increase the cost of LTCM's being on the wrong side of the market. Doing so may have increased both volatility and interdependence, producing a substantial increase in market risk. In our view, understanding the longer-run implications of such gaming is crucially important for both industry participants and regulators (not to mention academics).

## **WHAT'S A FIRM TO DO?**

In the face of the new reality, firms in the global financial marketplace have been scrambling, once again searching for appropriate tools and managerial approaches to guide their organizations. This is occurring against a backdrop of risk managers spending the last decade increasing their focus

on firm-level risk management systems, spending tens of millions of dollars on trading systems, real-time position reporting, and VaR risk management systems. Some have suggested that the financial service industry's heavy investment in risk management during the last decade has yielded little. We disagree strongly. The Asian crisis and its aftermath should reinforce the need for adequate risk management, not bring them into question. If anything, the recent experiences have highlighted the need for such systems and should redouble risk managers' commitment to proper implementation.

As indicated elsewhere (Oldfield and Santomero, 1997), adequate risk management systems require substantial firm-level commitment. Risk exposures must be identified, measured and managed. To do so, risk managers must have the ability to understand global positions and the exposures inherent in them. This requires sophisticated computer systems linking global positions and updating exposures. The latter requires not only the knowledge of real-time exposures, but also changes in the underlying volatility and correlation exhibited in current market data.

Yet, risk management, no matter how sophisticated, does not eliminate risk. Rather, it dimensions and monitors it, in light of current circumstances. One clear lesson from the turbulent times of the recent crisis is the need for frequent updating of underlying risk measurements and appropriate portfolio re-balancing to manage risk. In this context, it is worthwhile to examine the lessons that can be learned from the Asian crisis and its aftermath.

## **LESSONS FROM THE CRISIS**

With the above background, what can one extract from the recent experiences? While it is tempting to react to the grandstanding of politicians and the pontification of journalists, it appears that the lessons from the Asian crisis are much more mundane. The experiences of the Asian collapse, the Korean contract problems, the Russian default, the Latin American asset revaluation, and the fallout

around LTCM and others, all suggest that the key to survival in the global trading environment is appropriate implementation of well-known risk management solutions. The recently deceased Herb Stein has been quoted as suggesting that, “traditional remedies are called traditional because they have been traditionally recommended, not because they have been traditionally followed.” Risk managers should take this perspective to heart. The solutions that are key to surviving the next financial crisis lie in appropriate application and enhancement of current risk management techniques. The keys to survival are (1) appropriate implementation of standard administrative processes, (2) accurate risk management control systems, and (3) constant assessment of and reaction to current risk exposure.

The first of these remedies is usually taken for granted by traders and administrators, yet as Tom Russo so clearly articulated at the conference, taking it for granted can produce disaster: there is no substitute for signed contracts and clear contractual obligations. In addition, the enforceability of certain complex derivative contracts must be well established in both local and international law. See Russo and Vinciguerra (1999). In this respect, the ongoing work of IASCO is an important part of establishing an infrastructure of standardization and enforceability, without which global trading could not exist.

The second remedy requires that risk systems be constantly updated. While most large trading houses have invested heavily in the well-known trading risk systems, available from industry vendors, the events of the last year have illustrated the old IT adage, “Garbage in, garbage out.” Although few trading houses put garbage in, many were insufficiently vigilant in their data analysis and insufficiently knowledgeable about the limitations of the trading risk systems employed. Risk dimensions, such as VaR, are only as useful as the assumptions underlying their estimation. The recent experience has

taught us the limitations of such numbers. For some time, we have recognized temporal instability of volatility and cross-correlations as relevant in principle, and now we recognize them as relevant in practice. We have learned also that our list of problems with the risk management status quo includes failure to account for vanishing liquidity in times of crisis, and gamesmanship between trading partners. Recent work has begun to incorporate such effects, as in Bangia, Diebold, Schuermann and Stroughair (1999), who explore “exogenous” liquidity risk due to fluctuations in the bid/ask spread, and Almgren and Chriss (1999), who explore “endogenous” liquidity risk due to large trades moving the market.

The third remedy requires real-time comparison of risk system predictions against incoming data, and backtesting them against earlier data, in an effort to detect changes in the market environment or impending high-impact market events. It is always wise, however, to remember that our risk models are just that: models. As such, they are abstract simplifications of a much more complex reality, and they will likely always fail to inform us fully of the risk inherent in trading positions.

## **WHAT NEXT?**

Recent events in the global capital markets have brought new attention to the risks of financial trading. However, we have seen that the events of the last few years were not *that* unusual. This reality suggests an added level of responsibility must be borne by risk managers in the financial industry. Losses, systems breakdowns and bankruptcies cannot, and should not, be excused as results of an extraordinary event. This suggests that to the extent that these losses were an unpleasant surprise, risk management systems within the industry require additional investment and improvement. In short, if risk systems failed, they must be improved.

Finally, if risk managers need continuously to improve their assessment of risk, so too do senior executives need to improve their assessment of risk tolerance. In the recent episode, senior management may have been made complacent by the long-running boom in the global marketplace. With trading risk contributing an increasing share of bank profits, they may have both underestimated risk *and* overestimated their willingness to bear the consequences.

The failure to address these two issues would be a mistake. It will lead the industry to a continuation of surprises in reported trading results and could lead to loss of confidence in the system itself. Concerns over the latter could cause pundits to call for regulatory change, added disclosure, or at the very least, greater oversight.

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## **Box 1**

### **The President's Working Group on Financial Markets Recommendations.**

- More frequent and meaningful information on hedge funds should be made public
- Public companies, including financial institutions, should publicly disclose additional information about their material financial exposures to significantly leveraged institutions, including hedge funds.
- Financial institutions should enhance their practices for contemporary risk management
- Regulators should encourage improvements in the risk management systems of regulated entities
- Regulators should promote the development of more risk-sensitive but prudent approaches to capital adequacy.
- Regulators need expanded risk assessment authority for the unregulated affiliates of broker-dealers and futures commission merchants
- The Congress should enact the provisions proposed by the President's Working Group to support financial contract netting.
- Regulators should consider stronger incentives to encourage offshore financial centers to comply with international standards

## **Box 2**

### **The Counterparty Risk Management Group "Best Practices" Recommendations.**

- Enhanced information sharing between counterparties.
- An analytical framework for evaluating the effects of leverage on market liquidity and credit risk
- Improved credit risk estimation techniques
- Stronger internal limit setting, collateral margin, and other credit risk management practices
- Improved internal risk transparency for senior managements and regulators
- Stronger and harmonized market conventions for close-outs and other key credit documentation practices