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Market-Based Mechanisms to Reduce Systemic Risk

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With the advent of the financial/economic crisis of 2008, financial entities, corporations, consumers, investors, and governments need to reduce debt, whether in the United States, Europe, Asia, or in emerging market countries. Asset values have fallen dramatically as risk premiums have increased, and the income-generating potential of assets has fallen. If asset values continue to fall, entities must continue to reduce leverage. With falls in asset values, debtors must issue equity, sell assets, or rely on external guarantees to provide cash to pay down or support debt and reduce risk. The cost of issuing equity, of selling assets, or relying on guarantees, however, becomes extreme at times of shock. Credit markets cease to function efficiently.

What regulations or new market-based mechanisms should we implement to reduce the potential impact or the import of systemic shocks going forward? To answer this question, I first

set the stage by discussing some of the key determinants of risk in the financial markets. I then propose ways in which market players and central banks, including the Federal Reserve, can help to reduce those risks.

CAPITAL STRUCTURE ISSUES: VOLATILITY, LEVERAGE, AND RISK

The risks to individual financial firms and the financial system are functions of a number of variables, including volatility and leverage. Understanding how these factors affect risk and vulnerability is the first step to designing appropriate market-based mechanisms to deal with them.

The Role of Volatility

In a perfect market, Franco Modigliani and Merton Miller proved over fifty years ago that the value of the firm is not enhanced by using more debt (see Modigliani and Miller 1958). Although the expected return on equity increases with more debt, the risk increases just enough to offset the value of increased expected returns. Financial entities that increase their expected return on equity by increasing leverage do not add value for their stockholders.

When volatility is low, increasing leverage to increase equity volatility to a target volatility level–and thereby enhance expected returns—comes at the cost of greater risk. And, many financial entities do target volatility to keep up with competitors that also increase leverage when volatility is low. Unfortunately, if future volatility turns out to be unexpectedly greater than forecast, adjustment costs to reduce risk in this new environment become extremely high. The deadweight costs in-

curred to sell assets, to raise cash, and to reduce leverage to reduce risk are extremely high.

Regulators should not allow financial entities to reduce their equity capital based on notions that economic volatility is lower and will remain so. More equity capital is good. And, central bankers and regulators should not encourage leverage by making statements to the effect that mini shocks should be ignored and "that the fundamentals of the economy are strong." Market participants believe that central bankers have information that they do not have and incorporate this information, whether signaled to them through interest rate changes or public statements. If central bankers attempt to dampen natural market volatility, the unintended consequences of these short-term actions will be to encourage leverage and other forms of risk taking. For example, "we will increase interest rates at a measured pace." The adjustment costs in the aftermath will be far greater.

By way of an analogy, for many years, firefighters put out every small fire in Yellowstone National Park and other areas of the western United States. The underbrush grew, setting the stage for multiple lightning strikes to cause fires to destroy much greater areas in the park than if fires initially had been left to burn of their own accord. Financial regulators do the same thing when they dampen volatility; they put out small fires but encourage risk-taking and thus increase the likelihood of a major conflagration. We don't know the level of volatility in the economy that balances the need for more risk taking to enhance returns (the underbrush grows) and the cost of adjustment at times of shock (lightning striking many parts of the park). But, low volatility is not necessarily the norm to avoid the consequences of shocks in the growth of the economy.

We need to trade off the benefits of "mini-shocks" causing natural market adjustments through price changes, unemployment, and business failures with the costs of dampening these effects and a possible follow-on "mega-shock." And, like Yellowstone National Park, the effects are non-linear. The costs of adjustment to a mega shock may be multiples of the summation of the costs of adjustment to mini-shocks. And, the costs of adjustment to mini-shocks most likely won't involve the central bank or the treasury.

Challenges in Reducing Leverage

Leverage is a reduced form measure of risk; that is, two firms with the same leverage ratio might have far different equity risks, because the risk of underlying assets supporting each firm's debt is different. However, leverage theory does not take into account that entities must act to reduce risk, and to act is costly. Leverage reduction does not happen on its own. As the value of assets supporting the debt falls, the risk of the equity increases if the entity does not take explicit actions to reduce risk. Under the form of contracting currently in place, to reduce risk is extremely expensive, because most financial entities are interconnected: latent risk factors affect them simultaneously, and many must reduce risk at the same time.

Financial entities find that at times of shock, the cost to issue equity capital is extremely high. Most of the value of the capital raised is transferred to the benefit of debt holders at the expense of the equity holders. Debt holders are made better off when more equity is raised to support their claims. Therefore, equity holders are unable or unwilling to add to equity, for they recognize that to reduce risk through issuing equity destroys its value. The more equity that is raised, the lower the value of

existing equity. By issuing equity, equity holders reduce the value of their option to pay off the debt in the future (for example, see Black and Scholes 1973). This has been labeled the "debt trap."

Moreover, at times of shock, debt covenants preclude financial entities from issuing senior debt. Debt holders had contracted to retain their senior claims on assets. To change the form of debt contracts and reduce constraints at times of crisis is expensive. When central bankers support financial entities, debt holders are "bailed out." The financial entity has more assets to support their claims.

Financial entities profit by making markets in and holding inventories of less liquid assets, such as: (1) loans to corporations, investors, other financial entities, (2) mortgage contracts and mortgage structures, (3) guarantees such as lines of credit, stable-value products, and other financing arrangements, (4) derivative contracts including interest rate swaps and credit default swaps, and (5) other structured products, including so-called "Collateralized Debt Obligations" containing mixtures of subprime mortgages, student loans, and credit-card loans. The inventory holdings generally have a longer maturity period than the liabilities used to finance them. Financial entities earn a liquidity premium and a risk premium on their inventory holdings as long as they are able to hold and finance their inventory.

The liquidity premium, however, does not remain constant. With mini- and mega-shocks, the price of liquidity increases as financial entities no longer are willing to act as a principal to inventory these securities and, as a result, reduce their provision of liquidity. They no longer have confidence in their model values, how extreme prices might become because of market flows, their ability to transfer inventory risk, and for

how long they might need to hold onto their inventory before they are able to sell at a profit to earn a return on capital employed. As a result, they stop intermediating risk. They no longer perform the classical speculator function in markets.

At times of shock, other investors wish to sell risky assets and move to safer, more liquid securities such as government bonds. Financial entities follow other investors and attempt to sell assets to reduce risk. As they and other investors demand liquidity from the market, the price of liquidity increases. Time stops. Calendar time and decision time become disjointed. Increasing volatility forces market participants to make decisions extremely quickly, which is often impossible to do in times of shock. Time is needed for speculators to recalibrate or reformulate their models to restore their ability to intermediate.

At extremes, participants in the dealer markets are able to transact sporadically and at wide spreads. And, financial entities might be unable to refinance their short-term debt, causing additional liquidations. Potential investors do not know to what extent asset values are lower because of increases in the price of liquidity or because asset values have fallen. Therefore, a leveraged market-making business is inherently unstable. Banks might be the wrong providers of liquidity to markets. Simply put, leverage can only be reduced by selling assets to raise cash if market makers are making markets in the assets they need to sell and they no longer can continue to do so at times of shock and to make conditions worse, they borrow from each other with short-term financing to hold longer-maturity, relatively idiosyncratic assets.

Market-Based Solutions to Reduce Risks and Mitigate Adjustment Costs at Times of Shock

Market-based measures are needed to manage the risks and vulnerabilities discussed above and to make the financial system more reslient to shocks.

The Need to Move Risks to Markets

The solution to the market-making paradox—small returns most of the time, big losses occasionally at times of market shock (that might have to be borne by taxpayers through "bailouts")—is to move as much risk as possible to markets and away from financial entities. During this crisis, equity prices on exchanges fell by approximately fifty percent. These markets functioned extremely well, because these are not leveraged markets. Buyers and sellers were able to come together through market price discovery mechanisms. Government bond markets and interest rate swap markets functioned as expected. Nearly all other credit markets, whether leveraged dealer or over-the-counter markets, failed to function with any degree of efficiency.

This being said, the problem is to distinguish risks that can be migrated to markets from those that must be kept to make markets. Holding excess inventory to earn a liquidity premium, a premium that is magnified through leverage makes financial entities more exposed to shocks. With the costs of computers and telecommunications technology far lower today than 5 years ago, 10 years ago, etc., the cost to migrate risks to markets must be a fraction of what it once was.

Yet, financial entities profit from making money on the bid-offer spreads and resist moving these securities to electronic exchanges, where spreads and liquidity premiums will come down. Financial entities enjoy earning the liquidity premium on holding inventory, the small steady returns, and, therefore, carry far more inventory than needed to manage their market-making activities (because of moral hazard and incentive issues within organizations). And, there are insufficient data to distinguish whether the inventory premium is a liquidity premium (a payment for providing liquidity) or a shock premium (making money most of the time and losing it all occasionally).

It is ironic that those screaming to eliminate mark-to-market accounting don't realize that doing so exacerbates the inventory problem because financial entities have the incentive to retain and add more illiquid assets on their books where losses can be hidden through the opacity of holding assets at original purchase price or for resale or marking assets by those models supplied by the desks that are suffering the losses in the first place.

The Problem with Fed Guarantees

One priority must be to reduce the adverse effects of central bank guarantees, which can induce market players to assume excessive risk.

Debt holders expect to be "bailed-out" at times of shock. Lower debt-to-equity ratios—more capital to support asset positions—lowers the value of the implicit guarantee for a given volatility of the returns on the underlying assets and reduces the expectation of the dead-weight costs of using the guarantees at times of shock. The Fed and other central banks will have to establish a risk monitoring system that anticipates

that financial entities confronted with the need for increased equity to support positions will attempt to increase risk to enhance the value of the guarantees.

Establishing a uniform global risk management system through the auspices of the Bank for International Settlements is not the correct approach. The agreed solution will take years to implement and will become a watered-down version of what is needed to manage risk. A case in point here is the value-at-risk framework (so-called "VaR") and the framework that allows banks to set their own risk management systems to determine their own equity capital requirements. The risk management system should require risk capital based on shocks and not on correlations such as a VaR calculation. Correlations are conditional means. Means are impossible to estimate accurately. At times of shock, we know that diversification breaks down because liquidity prices change together increasing the observed correlations.

Central bankers should require capital for each asset class based on shocks and ignore any correlations or offsets. This would increase equity capital requirements uniformly across financial entities. A uniform shock-based-capital system would mitigate the need for one financial entity to increase risk to earn a higher rate of return on equity to keep up with another competitor that had increased risk.

When shocks hit, the cost of central bank guarantees can be tremendous. For example, the amount of asset write-downs needed in the crisis of 2008 requires a gigantic recapitalization of financial entities around the world, somewhat in excess of $4 trillion. This is not politically feasible. The standard ways in which governments politically recapitalize the banking system entail:

(1) programs, each one seeming small, but in aggregate adding up to a large hidden cost as central banks buy illiquid assets from banks at above market prices claiming that markets will recover, or finance illiquid and risky positions at a lower than market rate of interest;
(2) quantitative easing programs to buy longer-dated bonds at short-term inflated prices from the banks;
(3) restricting competition through regulations such that customers pay higher fees and obtain less competitive services;
(4) unrealistic accounting assumptions to provide time for asset prices to recover hoping that lack of liquidity was the problem; and
(5) bailing out bond holders so they continue to finance bank activities.

These protracted methods are politically easier to implement than direct recapitalization but still have a cost. For example, the Bank of Japan took many years to recapitalize the banking system to rebuild profits through a zero interest-rate policy, excess reserve policy, and through quantitative easing.

The Importance of Stronger Derivatives Markets

Another key issue is to develop market-based mechanisms to strengthen the derivatives markets. When shocks occur, over-the-counter dealer markets do not function, because intermediaries reduce or eliminate inventory positions and act only as an agent. Many other investment pools, such as hedge funds, need to sell assets to reduce risk and leverage and to meet investor withdrawal requests. To facilitate transactions, markets need price signals. As stated, it is cost effective to quote bids

and offers on electronic exchanges. This will help to bring buyers and sellers together efficiently. Currently, last sales for small orders are posted on a system called TRACE. However, those prices may be far from current markets and prices available for large-scale transacting.

Financial entities resist moving price quotes for derivative products like CDS, ABS, RMBS, and CMBS to electronic exchanges because they benefit from the lack of transparency in non-shock times and in the short-term earn large market-making profits in shock periods as other entities reduce their risks. For example, the large profits in fixed-income trading reported by such banks as J.P. Morgan and Goldman Sachs during the first three months of 2009 resulted from fixed-income activities at the expense of clients who needed to reduce risk in a bilateral market.

The Fed's support of particular financial entities enabled them to charge large liquidation fees to the non-supported hedge funds, pension funds, and corporate clients. Consideration should be given to an analysis of the unintended consequences and costs of bailouts of particular financial entities. The net result might be to reduce competition in the markets, thereby increasing monopoly profits for some at the expense of other market participants.

Moreover, if all CDS (and other derivative contracts) can be closed out at mid-market prices, market participants would be able to unwind contracts at times of shock without paying large bid-offer spreads. Once a CDS contract becomes a standardized instrument, future transactions should migrate to a clearing corporation of the variety discussed by Darrell Duffie in this volume (see also Duffie and Zhu 2009). This will not only provide contract information and exchange pricing but also enable reg-

ulators to monitor the trading activities of market participants using inside information to their advantage. A clearing corporation reduces the costs of liquidation of risks. It cannot handle, however, idiosyncratic, non-standardized contracts.

All dealers and market participants should be required to post initial margins on derivative contracts (e.g., AIG did not post initial margins on its guarantees (CDS contracts)). The Fed and other central banks should study the effects of margin, credit markets, liquidity provision, and their policies on the operation of markets. A clearing corporation is an institution that might help.

Alternatives to Fed Guarantees

We must take measures to reduce the value of government guarantees and the need for costly government intervention. As the preceding discussion has suggested, there are many routes to achieve this result:

(1) The Fed and other regulators could require more equity capital, reducing the probability of default and the call on a government guarantee.
(2) The Federal Reserve could use the credit default swap market or the differential between Libor rates and Federal Funds rates to estimate premiums that it would charge each period to provide guarantees.
(3) Banks could be required to leverage their operations through only using convertible debt. This convertible debt must be converted into a predetermined fraction of the equity of the financial entity on a systemic event, either declared by the central bank or by a fall in the market value of a bank index, or both. As a result, the

bank immediately has additional equity and does not need to sell assets to raise capital in illiquid markets at potentially "fire sale" prices. And, since bank debt holders are not bailed out by a central bank, this greatly reduces the "moral hazard" problem. Debt holders will be more cautious and more cognizant of the amount of on- and off-balance sheet bank leverage. Moreover, there is more certainty as to the terms of the actual bank debt contract in the event of a market shock wherein renegotiation of contracts is a further deadweight cost to the system. In this crisis some debt holders were "bailed out," others suffered losses. This solution reduces the value of government guarantees, eliminates the "debt trap" problem, and limits the risk of assets held in inventory. (See an independent cut at this in Squam Lake Working Group 2009.)

(4) The Fed could grant guarantees only on investments that are one-hundred percent backed by actual government debt. For example, money market funds should not offer stable-value products or banks should not offer floating-rate short-term preferred stock. Insurance companies should not offer annuities that provide a minimum return while at the same time investing investor proceeds in risky instruments that promise higher returns. Savings deposits at banks should be invested in government bonds if they are offered as stable-value products. Bank market-making activities should be funded in the credit markets with convertible debt as described above. The bank needs to separate itself into at least two banks, one a money market bank and, the other an investment bank.

(5) Contingent capital arrangements should be encouraged. Financial entities should pay other entities such as pension funds or insurance companies an annual fee for the right to draw capital to support their activities. If the cost of this contingent capital is too great, correctly so, financial entities will reduce their risk-taking activities. These contingent-capital contracts internalize the costs of providing risk products and reduce the need for central bank guarantees. The central banks might compete and offer contingent capital contracts at auction each year to determine a market-based price.

(6) Any form of bank guarantee must be disclosed to regulators and to the markets. Accountants should not obfuscate these guarantees, and their economic value should be included in the financial reporting process.

(7) Derivative contracts provide both risk transfer and leverage services. These contracts are used to hedge risks. There are some who argue that credit-default swaps should only be written on those firms in which the writer has an insurable interest. This same argument extends to futures contracts such as shorting the S&P 500 futures index or taking positions in government bond futures or option contracts on indices or bonds. I believe that instead of artificial limitations on risk transfer and hedging mechanisms, better risk management and margining systems are of lower cost and greater benefit to society than restricting innovation and use of derivative contracts.

(8) Andrew Lo has suggested that as in the case of the Federal Aviation Administration, after every financial crisis (or even a financial entity failure) a board of ex-

perts and market participants should examine the causes of the failure and what to learn from it (see Lo 2008). This knowledge will not only benefit regulators in making policy choices but also market participants such as senior bank management who must make strategic decisions for their organizations.

Interconnectedness in Markets: The Aggregation Problem and a Possible Role for a Systemic Risk Regulator

A further set of challenges to markets and regulators surrounds the problem of interconnectedness. Each financial entity has its own myopic risk management system. It measures its risks and its needs for future adjustments based on its assumptions about the completeness of markets through its measurement and analysis of its ability to liquidate assets at times of stress. But this is an inexact science to say the least.

The problem arises when many financial entities attempt to liquidate assets concurrently to reduce risk and leverage. The information set is so vast that no financial entity knows what the simultaneous demands for liquidity might be among other financial entities in the system and what sequences will unfold. With losses, entities sell securities that are liquid and have not fallen in value. These sales, in turn, reduce their prices and liquidity there falls as well, causing the need for further sales and an increase in liquidity prices. Investors do not know whether the shock is a liquidity shock or a change in economic valuations. If the former, prices will mean-revert over time; if the latter, prices will not rebound. Obviously, a shock causes reassessment of future prospects.

Market participants must assess the future role of government as the financial crisis results in government replacing private initiatives. An example here is the Private/Public Investment Partnership (PPIP) program. Until market participants understand how "toxic" assets are to be liquidated, if at all, they will not enter the credit markets. Moreover, if the government reduces market transparency through elimination of market-based accounting measurement, the new opacity will slow down the evaluation process and inhibit market participants from making investment decisions necessary for economic recovery. Prices must find their economic levels. I am in favor of disclosure of mark-to-market valuations for investor information and to reduce opacity. Regulators, however, can decide bank capital requirements on any measure they deem appropriate.

A systemic risk regulator (Andrew Crockett and Michael Halloran use the term systemic stability regulator in their chapters in this volume) would benefit the financial system if that regulator is able to obtain information from each financial entity as to the risks they are measuring (such as sensitivities to factor risks or shock tests or scenario analysis), aggregates that information, and resends the aggregated risk information back to each of the financial entities. This aggregated information might warn a particular financial entity to reduce risk because the aggregated risk was greater than assumed. Other entities, however, might assume the opposite. Through a process of information sharing, the risk regulator could provide the risk signals that will allow the system as a whole to manage risks by taking account of the information contained in the actions and the risks of others. This aggregation process is extremely valuable to market participants.

A systemic risk regulator should lead the effort to revamp the

financial reporting system to bring more risk measures into the income statements and balance sheets of financial entities. For example, balance sheets are snapshots at a moment in time, and do not provide dynamics or risk measures or the value of guarantees, incentive compensation contracts, and off balance sheet assets and liabilities. Accounting systems need to be revamped to handle derivatives and to incorporate off-balance sheet risks in other than footnotes.

A systemic risk regulator, however, will have no ability to micro manage the financial system or a particular financial entity. That is too tough an assignment and one that will fail. In reality, the regulator would not be able to predict or to figure out the magnitude of a "bubble" in advance. Most likely the regulator would mislead the market in that, if doing nothing, the market concluded that it was appropriate to take on additional risks.

Conclusion: Issues of Innovation

Economic theory suggests that infrastructure to support financial innovation must follow that innovation. Otherwise, it would be too expensive to build all of the information links, legal rules and risk management controls, etc., in advance of new product introductions. Since successful innovations are hard to predict, infrastructure necessary to support innovation needs to lag the innovations themselves, which increases the probability that controls will be insufficient at times to prevent breakdowns in governance mechanisms. Failures, however, do not lead to the conclusion that re-regulation will succeed in stemming future failures. Or that society will be better off with fewer innovations and better off vetting innovations in advance of initiation. Although governments are able to regulate

organizational forms, they are unable to regulate the services provided by competing entities, many yet unborn.

The response to this dilemma is difficult. The senior management of banks must use simple common sense tests to judge whether controls are adequate and when more resources should be placed on infrastructure. Senior management or a senior management team should understand financial engineering. The time has long gone where the leadership of financial entities should reside in the hands of those who do not understand markets or the products and risks that their entities offer to the markets. Board members of financial entities should understand risk reports, financial results, and be able to demand and understand clear explanations of the risks.

We must realize that shocks are a necessary part of growth and innovation. Financial entities are always striving to innovate to provide more efficient mechanisms to facilitate transacting, to finance larger-scale investments, to save for the future, to transfer and share risks, to provide pricing signals, and to reduce information asymmetries. We must foster innovation and attempt to internalize the costs of innovation within the financial system.

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