Discussion of Frank Allen and Douglass Gale's *Systemic Risk and Regulation*

Gary Gorton began the general discussion by questioning whether the amount of risk transferred from banks to insurance companies is as large as some statistics imply. Although credit derivative contracts may transfer risk, many securitizations receive implicit support from sponsors. He also questioned whether capital requirements can be binding in the long run because banking business can move to nonbank financial institutions.

Martin Feldstein observed that economic capital considerations drive large-bank decision-making, not regulatory capital requirements.

Anthony Saunders noted that the behavior of insurance companies (and other nonbank institutions) in bad states of the world is important to understanding systemic risk. Defaults by nonbanks, in addition to disrupting nonbank markets, could affect bank solvency. *Peter Garber* noted that U.S. insurance companies are subject to capital regulations, which are complicated, and that in bad states of the world insurance companies may gamble for redemption just like banks. *Martin Feldstein* observed that the guarantee funds that protect U.S. policyholders may strengthen moral hazard incentives of weak insurers. Surviving insurance companies must make up the losses imposed by those that fail.

When discussion turned to the experience of European insurance companies, *Paul Kupiec* noted that their losses in recent years were mainly driven by losses on their equity investments, which are much larger as a proportion of assets than at U.S. insurance companies. *Philipp Hartmann* agreed that equity losses were the first and primary source of loss, but noted that losses on credit derivatives were a material second leg of the double-whammy they suffered.

Hayne Leland argued that credit derivatives might cause systemic problems for reasons other than those mentioned in Allen & Gale's paper. If dynamic hedging is used by protection sellers to hedge their credit derivative portfolios, increases in default rates may have knock-on effects in equity and bond markets, amplifying the price declines that are in any case likely to be associated with increased credit risk. *Peter Garber* agreed that such dynamic hedging is common in practice.

In the course of the discussion, several participants mentioned the common wisdom that a) many risk-transfer transactions by banks (securitizations, credit derivatives and others) are "capital arbitrage" (intended primarily to reduce regulatory capital requirements), and b) losses suffered by insurance companies on their investments in credit derivative contracts were due to insurance companies' lack of expertise in pricing credit risk. *Richard Cantor* noted that, at least in the U.S., it is not clear that credit protection sellers lost money on the whole in the long run. Although their portfolios may have suffered mark-to-market losses during 2001-2003, when credit spreads were high, over the longer term the premiums they earn may more than compensate for payouts. *Ken Abbott* commented that concerns about precision of credit risk pricing should be more general.

He does not have great confidence in the credit risk pricing models he has seen used in practice. Most of the risk-transfer transactions he has seen have economic motivations and are not capital arbitrage. *David Modest* observed that at the time of the conference, the cyclical pendulum appeared to have swung to an excess of supply by protection sellers, forcing spreads down to unreasonable levels.

Commenting on some of the assumptions of the Allen & Gale model, *Casper de Vries* wondered if results would be different if capital regulation was useful rather than having no role in enhancing welfare. The assumption that regulation is binding in equilibrium may not be necessary for it to affect the equilibrium, as it might affect the value of off-equilibrium-path alternatives even if not binding.

Nicholas Chan, Mila Getmansky, Shane M. Haas, and Andrew Lo's *Systemic Risk and Hedge Funds*

Gary Gorton opened the general discussion, suggesting that the hedge-fund index data used by Chan et al. may be problematic because the details of index construction may amount to a choice of trading strategy that does not match the strategies the funds follow.

Much of the general discussion focused on the intuition and utility of the portion of the paper that uses serial correlation in hedge fund returns as an indicator of systemic liquidity risk. [To be omitted later: To recap the intuition in the paper and the presentation as Carey understands it, the authors argue that conventional market-efficiency arguments imply little serial correlation in returns. Especially because hedge fund managers are sophisticated, they should change their positions to take advantage of the profit opportunities implied by serial correlation, which would tend to change prices in a manner that removes the serial correlation. Thus, the serial correlation that the authors find must arise from infrequent-trading and bid-ask bounce problems that affect time series of prices of illiquid instruments.] *Darrell Duffie* suggested that serial correlation may be different for positive and negative returns, and also may differ in high- and low-volatility environments even if the high-volatility periods are not characterized by the "phase-locking" that characterizes crises. *Philipp Hartmann* suggested that phase locking need not be pervasive because some funds should win and some should lose in any given price-movement scenario. *Andrew Lo* responded that exposure to a given set of prices may be limited to a subset of fund styles, and that liquidity problems could affect funds with a wide range of styles.

Peter Garber suggested a different mechanism by which the growth of hedge funds may affect systemic risk. In previous decades large dealer banks tended to be the main providers of liquidity in many markets, directly or indirectly, and they were able to collect rents from such liquidity provision. Hedge fund activity has been eroding such rents and thus liquidity from banks is less available in at least some markets. In a crisis, if hedge funds withdraw as liquidity providers, banks may no longer be prepared to step in.

Loriana Pelizzon and Stephen Schaeffer's *Pillar 1 vs. Pillar 2 Under Risk Management*

Charles Calomiris opened the general discussion with two observations: 1) Pillar 2 cannot be assumed to work, so market discipline is important as well, and 2) During times of stress (meaning reduced solvency), asset substitution by banks is toward risks that often are not socially productive (gambling for redemption), so both regulatory and market monitoring of banks is especially important in crisis situations.

Ross Levine suggested an additional motivation for the tradeoff between failure risk and productive investment that the authors emphasize. Especially outside the industrialized countries, stronger supervisory powers are often used by bank regulators to direct lending to politically favored constituencies, and such loans are often not economically productive.

Patricia Jackson defended the importance of Pillar 2, noting that even the relatively sophisticated formula's of the Basel II Pillar-1 regime are not likely to measure economic capital requirements well. Moreover, large dealer banks, which are quite important systemically, face a rapid-implosion risk if their credit ratings fall below single-A-minus because many counterparties may cease dealing with them. Prompt corrective actions triggered by changes in Pillar-1 regulatory capital adequacy almost surely would come too late in such cases. *Martin Feldstein* added that what amounted to Pillar 2 actions by U.S. bank supervisors seemed to work to prevent a systemic crisis in the late 1980s and early 1990s. *Richard Evans* noted that many managers of large banks have been concerned that Pillar 2 will be applied inconsistently across nations, but that the recent formation by regulators of a "college of supervisors" offers hope that inconsistencies may be modest. Such cooperation among supervisors may also reduce systemic risk by promoting good cooperation among supervisors internationally in a crisis.

To shed light on whether capital requirements are binding, *Martin Feldstein* asked for evidence that Basel I increased regulatory capital requirements. *Mark Carey* recalled that book-capital ratios of U.S. bank reached a trough in the late 1980s and increased substantially after implementation of Basel I, and that recent papers by Mark Flannery and Kasturi Rangan offer evidence that market-price-based measures of bank leverage also imply an increase since the 1980s. *Richard Evans* observed that large dealer banks strive to choose their leverage based on economic considerations, balancing the need for a buffer-stock of capital to support capturing rapidly-developing market opportunities with a desire to maximize shareholder value, which sometimes is best done by dividend payouts or share repurchases. However, Basel I requirements have been a constraint at times, and do seem to affect the decision-making of some banks.

Responding to the authors' remarks about the absence of clear discussions in regulatory documents of the market failure that capital requirements are meant to address, *Mark Carey* observed that such ambiguity arises because regulators have too many hypotheses about the nature of such market failures, not no hypotheses at all, and moreover that intuition suggests that the weight placed on different possible market failures is likely to

be different over time, across nations, and in the case of large and small banks. This, it is difficult for regulators to produce a concise treatment. But he agreed that research on the nature of such market failures could produce large benefits.

Philippe Jorion's *Bank Trading Risk and Systemic Risk* and Jeremy Berkowitz and James O'Brien's *Bank Trading Revenues, VaR, and Market Risk*

A single general discussion of these two related papers was conducted. Part of the discussion centered on whether herding by banks, especially in crisis situations, is a material concern, and on how the authors' might better present evidence about it. In their responses, both *Jorion* and *O'Brien* agreed that the extent of herding is an interesting and important question but noted that it is largely beyond the scope of their papers, which are focused on whether the use of VaR measures is likely to cause herding. They interpreted the remarks as being consistent with their own conclusions that it does not. They agreed that their data and methods are not ideal for addressing the broader questions.

Andrew Lo suggested some additional measures would be informative. Noting that outliers matter more to systemic risk than average correlations, he suggested looking at averages of absolute value of returns. He also suggested a greater focus on the experience of individual banks, since a systemic event need involve a failure of only one or two major banks.

Richard Evans suggested that the VaR data used by both authors, while different in the details of sources and construction, may suffer from a lack of comparability across institutions. The assets that are included in the portfolios for which VaR measures are disclosed differ cross-sectionally and over time at a given financial institution. Profit-and-loss results are badly distorted, especially at a daily frequency, for a number of reasons, such as the impact of accounting reserves. Some institutions that appear in the samples are relatively small and the behavior of their VaR measures may be different and of less interest than at the major dealer banks. Overall, although he believes that better data would reveal higher correlations of VaR and returns than the authors find, use of VaR measures does not itself cause herding by the dealer banks.

Gary Gorton and Nicholas Souleles' *Special Purpose Vehicles and Securitization*

Charles Calomiris opened the general discussion by expressing a bit of skepticism that bankruptcy costs are the sole driver of the large-scale securitization that we see. An additional possibility is that adverse selection problems are mitigated by learning about asset quality that takes place when assets are transferred to a special purpose vehicle. Both rating agencies and at least some investors closely scrutinize disclosure about the nature of such assets, and such disclosures would not occur if the assets remained on the balance sheet of the sponsor.

Patricia Jackson suggested, and *Richard Evans* agreed, that segmentation of funding markets is an additional motivation for securitization. Because many tranches of securitizations are typically bought by nonbank investors, a commercial bank may be able to raise funds on better terms than it could in the interbank or commercial-paper markets, where investors' single-name exposure limits may begin to bind as scale increases. *Hayne Leland* suggested that a financial institution may be able to lever up more by securitizing with implicit support.

A spirited debate about the role of regulatory capital arbitrage in securitization was opened by *Martin Feldstein's* suggestion that it is material. *Michel Crouhy* agreed, noting that regulatory capital requirements are typically reduced by a securitization even though most or all risk is retained, and *Marc Saidenberg* suggested that banks have fought too hard recently to retain regulatory permissions for the contractual features that set up implicit support for regulatory-capital considerations to be immaterial. But *Richard Cantor* noted that securitization continues even though regulatory sanctions have recently increased in cases where support occurs, and *Charles Calomiris* noted that securitization is a common tool of unregulated institutions like finance companies. *Nicholas Souleles* closed the discussion by agreeing that regulatory capital considerations may have some role. Their paper is intended to focus on other considerations that also have a role in securitization decisions.

Gunter Franke and Jan Pieter Krahnen's *Default Risk Sharing Between Banks and Markets: The contributions of collateralized loan obligations*

The general discussion focused on technical suggestions for the authors. *Gary Gorton* suggested that synthetic CLOs should be removed from the sample, as they have no effect on leverage of the sponsor. *Til Schuermann* suggested that the authors focus on expected shortfall measures of loss in their modeling of individual securitizations. *Phillipe Jorion* and *Hashem Pesaran* expressed concern about cross-sectional dependence in the pooled sample of CLOs, suggesting that different methods may be needed in estimation of standard errors. *Mark Carey* suggested that unlevered rather than levered betas be used in the computations.

Evan Gatev, Til Schuermann and Philip Strahan's *How Do Banks Manage Liquidity Risk: Evidence from the Equity and Deposit Markets in the Fall of 1998*

The general discussion opened with a number of what turned out to be questions of clarification. Discussion then turned to intuition about exactly how liquidity flows are embodied during a crisis and whether bank transaction deposits capture them. *Martin Feldstein* asked whether the price of liquidity changes, that is, whether flows represent and shift in supply or demand. *Richard Evans* remarked that prices do not change and gave examples of his experience during the LTCM crisis and around September 11, 2001. In both cases, institutions he worked for and other major dealer banks were flooded with liquid liabilities, and the systemic problem for commercial and central banks was to rapidly recycle such liquidity to where it was needed. *Ken Abbott* observed that the recent appearance of contingent put options and market-disruption put options may compel dealer banks that write such options to make substantial payouts during crisis periods, and thus inflows of liquidity would be helpful. *Peter Garber* observed that many wholesale depositors likely would turn to repos as a safe-haven asset during crises rather than deposits, if only because of the ease with which repos can be arranged. *Til Schuermann* noted that large CD volumes increased sharply at the time of the LTCM crisis, but only at the shortest maturities.

The remainder of the discussion embodied a number of suggestions for the authors flowing from skepticism that refinancing of commercial paper is the whole story, as well as technical concerns. *Casper de Vries* suggested excluding the banks that had financed LTCM in order to limit concerns about simultaneity bias. *Eric Rosengren* suggested close attention to the experience of banks that specialize in transaction processing, noting that many banks in the authors' sample are small and are unlikely to serve commercial paper issuers. *Hashem Pesaran* suggested including trailing volatility in regressions, and *David Modest* suggested using measures of excess volatility, that is, individual equity volatility net of the change in market-wide volatility.

Thorsten Beck, Asli Demurguc-Kunt, and Ross Levine's _Bank Concentration and Stability: Impact and Mechanics_

Much of the general discussion was focused on alternative stories. _Philipp Hartmann_ suggested an alternative to a market-power story: Concentration increases the chance that a material portion of a nation's banking sector will be treated as too-big-to-fail, and given the definition of the crisis measure, this will reduce the measured likelihood of a crisis. _Jan Krahnen_ wondered whether measured concentration may be a proxy for country size and about other measurement error, noting that the German banking system is functionally highly concentrated even though it would not be measured as such by the authors. _Patricia Jackson_ observed that United Kingdom experience has taught that, at the individual bank level, concentration in the sense of a bank being locked into a single funding source, into lending to a single industry, or into operating in a small geographic area is a major factor in bank failure.

Hashim Pesaran and _Darrell Duffie_ expressed concern about the use of a logit model in a setting where dynamic relationships within the sample may be material. Duffie suggested use of a Cox proportional hazard model for the probability of moving into a crisis as a way of dealing with such concerns. He also suggested examining the probability of moving out of a crisis.

Philipp Hartmann, Stefan Straetmans and Casper de Vries' *Banking System Stability: A Cross-Atlantic Perspective*

René Stulz opened the general discussion by asking whether what the authors measure as contagion simply reflects an increase in volatility of a factor that affects the equity returns of all banks. Hartmann noted that results of some preliminary robustness checks employing GARCH models imply that this is not the whole story, but even if it is, the vulnerability of the banking system to extreme shocks is of interest. *Jan Krahnen* asked about the experience of healthy versus unhealthy banks, and Hartmann replied that extreme moves appear to be larger for the latter.

Eric Rosengren suggested segmenting the sample by market-makers versus other banks, rather than using geography, as the relative vulnerability of the major dealer banks is of considerable interest. *Hashem Pesaran* suggested systematic pairwise comparison of banks in the sample to see if most of the average results are coming from a few banks.

In response to a query about practitioner use of extreme value theory, *Ken Abbott* noted that although the methods used by risk managers generally have to be understandable by non-specialists, and EVT does not yet meet than standard, he intends to train his staff to understand EVT.

Torben Andersen, Tim Bollerslev, Peter Christoffersen and Francis Diebold's
Practical Volatility and Correlation Modeling for Financial Market Risk Management

Ken Abbott opened the general discussion by suggesting that the methods suggested by the authors may be more applicable to modeling of credit risk, where correlation skew is a concern and copula methods are coming into favor, than in traditional market-risk applications. In his experience, historical simulation methods work well in practice and are relatively easy for bank staff and management to understand. The dynamic issues raised by the authors, which are particularly dramatic in cases like the 1987 crash, are handled in practice by stress-test exercises, which are done along with VaR modeling.

Patricia Jackson observed that the use to which a VaR model is put is a key consideration in its design. Where the purpose is estimating the capital required by the financial institution, including dynamic volatility is undesirable because volatility falls during safe periods and thus implied capital requirements fall. The change to the high volatility characteristic of periods of stress may occur quickly, leaving the institution with little time to increase its capital. Historical simulation methods are less subject to this problem. However, the methods suggested by the authors may be preferable for other uses.

On the other hand, *Jim O'Brien* noted that although historical simulation may tend to give the "correct" number of violations of a VaR quantile, they tend to be bunched in time, which appears to be a sign of worrisome historical dependence.

In discussion of technical considerations, *Philipp Hartmann* noted that some of the methods suggested by the authors implicitly use linear measures in the tails of the return distribution, but tail events tend to occur during crisis periods and may require a more complex specification. He also noted that the robustness of the Login-Solnik result concerning right-tail versus left-tail behavior has been called into question by some more recent work. *Hayne Leland* noted that bid-ask bounce and infrequent-trading problems can be an issue in the high-frequency data that the authors suggest be used for volatility estimation, and *Hashen Pesaran* noted that such data also are often rather dirty. *Peter Christoffersen* agreed that such problems exist but suggested that they might be relatively easy to overcome for instruments traded in very liquid markets.

M. Hashem Pesaran, Til Schuermann and Bjorn-Jakob Treutler's *The Role of Industry, Geography and Firm Heterogeneity in Credit Risk Diversification*

Darrell Duffie liked the idea of examining the impact of changes in model assumptions on tail behavior, having previously observed that our understanding of tails of credit loss distributions is too limited. He suggested that the model might be used to examine the impact of correlated measurement error: If errors in estimation of individual-firm solvency or asset volatility are correlated, actual tails will be much fatter than the tails measured by currently popular portfolio credit risk models.

Much of the discussion revolved around technical issues. There was considerable discussion of the authors' methods of estimating rating transition matrices, with *Til Schuermann* responding that their modifications of Lando's method addresses the concerns. *Torben Andersen* suggested that recent upgrades and downgrades are informative and might be incorporated into estimation, and *Til Schuermann* agreed.

Patrick de Fontnouvelle, John Jordan and Eric Rosengren's *Implications of Alternative Operational Risk Modeling Techniques*

Part of the discussion revolved around the paucity of observations in the tails of loss distributions both currently and going forward. *Eric Rosengren* noted that the tail is more populated for some banks than others and that such variation may be a source of the variation in estimated tail-index values that the authors observe. He also noted that under Basel II's advanced measurement approach, banks are not limited to using of internal data, but also may use external data and scenario analysis. *Patricia Jackson* wondered whether Basel II's loss-size cutoff for data collection might be raised to reduce costs, but *Ken Abbott* observed that, in his experience, small losses may be indicative of process problems that might results in very large losses under other circumstances. Thus, there should be a role for judgment in internal reporting of small losses.

Darrell Duffie suggested that the authors might take a Bayesian approach to dealing with a potential censorship problem in their data: Losses are capped at the level of a firm's capital, because only surviving firms contribute observations to operational risk loss databases. *Casper de Vries* suggested that the authors could use bootstrap methods in determining the optimal number of observations to use in tail estimation, that they use the empirical distribution in estimating losses occurring in the body of the distribution rather than the lognormal, and that variation in constant terms mail account for the variation in tail-index estimates that they observe.