

COMMENT

FINANCIAL POLLUTION: SYSTEMIC RISK AND MARKET STABILITY

MATTHEW BEVILLE*

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I. INTRODUCTION

This Comment analyzes systemic risk in the financial system and shows how current regulations provide insufficient protection for our capital markets. Though the mortgage crisis and subsequent liquidity crisis currently affecting Wall Street provide the context for this analysis, this Comment is neither meant as a full account of these events, nor a detailed exploration of our banking regulations. Rather, this Comment shows how the incentives created by our current regulatory regime lead to externalities that threaten the stability of the financial system.¹ By focusing on the incentives guiding financial actors, this Comment proposes a novel approach to financial regulation using mechanisms that have effectively internalized external costs in conceptually similar scenarios.

Current regulatory mechanisms aimed at producing financial stability, specifically the Basel II Capital Adequacy Framework, actually exaggerate crises by forcing firms to sell assets during liquidity shocks, compounding their tendencies to panic. These command and

* J.D. Candidate, May 2009, Florida State University College of Law; B.A., Florida State University. Special thanks to Professor Dino Falaschetti, Alyssa Lathrop, and Trevor Thompson.

1. This Comment roughly documents events that occurred through the summer of 2008; while the crisis has evolved considerably since then, my analysis of the financial actors' underlying incentives remains unchanged.

control regulations fail because they attempt to legislate around the problem instead of adequately addressing the inefficient incentives that influence firms and their managers. However, as this Comment discusses below, a market-based cap and trade system may resolve many of these issues by directing firms toward more socially optimal investment strategies.

This Comment begins with a short summary of systemic risk and follows with an analysis of the subprime crisis in Part II. Part III provides a brief background on economic regulation and shows how a tradable permit system can efficiently reduce systemic risk. Part IV concludes.

II. A BRIEF INTRODUCTION TO SYSTEMIC RISK

Systemic risk has been the subject of extensive economic commentary, but it has received little attention from legal scholars.² In part, this is due to the abstract nature of the problem. Systemic risk is “not always defined and remains somewhat nebulous,” making analyses difficult.³ Further, definitions across the literature are not entirely consistent.⁴ However, systemic risk can be generally defined as the risk that a negative shock to a firm or asset will result in losses or failure across the financial system.⁵

This risk is a result of the divergence between private and socially optimal investment strategies.⁶ Firms price only the internal costs and benefits of any particular transaction and not risks to the financial system.⁷ This produces a classic externality: firms imposing costs on third parties will not, without regulation, internalize the effects of their actions. Concretely, it is more profitable to take on more risk and leverage than is socially optimal.⁸

2. This Comment is one of the few to address the problem. The first was Professor Steven Schwarcz's *Systemic Risk*. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 247 (2008) [hereinafter Schwarcz, *Systemic Risk*] (noting that it is “the first major work of legal scholarship on systemic risk”).

3. John Kambhu et al., *Hedge Funds, Financial Intermediation, and Systemic Risk*, 13 FRBNY ECON. POL'Y REV. 1, 5 (2007).

4. Schwarcz, *Systemic Risk*, supra note 2, at 196-97.

5. See *id.*; Kambhu et al., supra note 3, at 5-6.

6. This divergence is commonly referred to as a prisoner's dilemma. The rational choice for each agent leads to collectively unfavorable consequences.

7. See *Systemic Risk: Examining Regulators' Ability to Respond to Threats to the Financial System: Hearing Before the H. Fin. Servs. Comm.*, 110th Cong. 49 (2007) [hereinafter *Systemic Risk Hearings*] (statement of Richard Bookstaber), available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_house_hearings&docid=f:39903.pdf (stating that firms do not price external risks); Kambhu et al., supra note 3, at 6 (observing that systemic risk is an externality); Schwarcz, *Systemic Risk*, supra note 2, at 206 (“Thus, market participants will not want to internalize those costs and will take an insufficient amount of care to prevent them.”).

8. See *infra* Part IV.B.4.

III. ANALYZING THE CREDIT CRISIS

Though intuitively appealing, the crisis is not the result of widespread mortgage fraud or predatory lending, as generally believed.⁹ While current foreclosure rates are record setting, national data has only been collected since 1979, and the previous record was set after the 2001 recession, which was hardly the Great Depression.¹⁰ Though attributed to failing subprime securities, the credit crunch was a result of misaligned incentives, which created externalities entirely unrelated to the housing market. Subprime defaults served only as a trigger event for an endogenous response that amplified losses across the market.

A. MBS Risk Modeling Understated Default Risk

The poor performance of subprime mortgages affected Wall Street through mortgage backed securities (MBS), which were sold and held by nearly all major financial institutions. MBS are created when lenders pool mortgages into a legally distinct subsidiary special purpose vehicle (SPV).¹¹ These loans are resold to a second SPV, often owned by an investment bank, which finances the purchase of these loans by selling bonds on the capital markets.¹² The proceeds from the sale are used to pay the first SPV for the loans, which are in turn used to pay the lender.¹³ These bonds are divided into prioritized

9. There are a number of articles mistakenly criticizing the subprime mortgage market as a market for lemons. See, e.g., Kurt Eggert, *Held up in Due Course: Predatory Lending, Securitization, and the Holder in Due Course Doctrine*, 35 CREIGHTON L. REV. 503 (2002); Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEX. L. REV. 1255 (2002); Kathleen C. Engel & Patricia A. McCoy, *Turning a Blind Eye: Wall Street Finance of Predatory Lending*, 75 FORDHAM L. REV. 2039 (2007) [hereinafter Engel & McCoy, *Blind Eye*]; Patricia A. McCoy, *A Behavioral Analysis of Predatory Lending*, 38 AKRON L. REV. 725 (2005); John A.E. Potow, *Private Liability for Reckless Consumer Lending*, 2007 U. ILL. L. REV. 405.

10. See U.S. GOV'T. ACCOUNTABILITY OFFICE, INFORMATION ON RECENT DEFAULT AND FORECLOSURE TRENDS FOR HOME MORTGAGES AND ASSOCIATED ECONOMIC AND MARKET DEVELOPMENTS 14 (2008) [hereinafter RECENT DEFAULT AND FORECLOSURE TRENDS], available at <http://www.gao.gov/new.items/d0878r.pdf>.

11. Christopher L. Peterson, *Predatory Structured Finance*, 28 CARDOZO L. REV. 2185, 2208-09 (2007); Thomas E. Plank, *Sense and Sensibility in Securitization: A Prudent Legal Structure and a Fanciful Critique*, 30 CARDOZO L. REV. 617, 621-22 (2008).

12. Peterson, *supra* note 11, at 2208-09; Steven L. Schwarcz, *The Alchemy of Asset Securitization*, 1 STAN. J.L. BUS. & FIN. 133, 135, 142 (1994) [hereinafter Schwarcz, *Alchemy*].

13. See generally Kathleen C. Engel & Patricia A. McCoy, *Predatory Lending: What Does Wall Street Have to Do with It?*, 15 HOUSING POL'Y DEBATE 715 (2004); Peterson, *supra* note 11. For a more detailed look at securitization, see COMM. ON BANKR. & CORP. REORGANIZATION, ASS'N OF THE BAR OF THE CITY OF NY, STRUCTURED FINANCING TECHNIQUES 6 (2005) (originally published in 50 BUS. LAW. 527 (1995)); STEVEN L. SCHWARCZ ET AL., SECURITIZATION, STRUCTURED FINANCE AND CAPITAL MARKETS 6-7 (2004); Steven L. Schwarcz, *Securitization Post-Enron*, 25 CARDOZO L. REV. 1539 (2004); Schwarcz, *Alchemy*, *supra* note 12.

tranches that allocate risk and returns among note holders.¹⁴ Because these offerings are so complex and the production of investment grade securities so critical,¹⁵ structured offerings are heavily influenced by ratings agencies' analysis of the underlying collateral.¹⁶

Though investment grade securities bear little risk, they comprise more than ninety percent of any particular deal. Conversely, subordinated tranches compose roughly ten percent of the average MBS structure but bear almost all the risk.¹⁷ Because tranching prioritizes payments, junior securities are leveraged against the mortgage pool, creating significant tail risk for these investors.¹⁸ If losses exceed the value of junior securities, they will be wiped out and the next junior class will be impacted, up to the senior class. Thus, small miscalculations with regard to losses can have disparate effects in subordinate tranches.¹⁹ The effect is that junior tranches "have the appearance of producing very high alphas (high returns for low risk)" by ignoring

14. See sources cited *supra* note 13. Senior tranches receive first priority to payments and are practically guaranteed. Subordinated tranches demand a higher rate of return and are paid only if there are sufficient funds. COMM. ON THE GLOBAL FIN. SYS., BANK FOR INT'L SETTLEMENTS, THE ROLE OF RATINGS IN STRUCTURED FINANCE: ISSUES AND IMPLICATIONS 4 (2005) [hereinafter *ROLE OF RATINGS IN STRUCTURED FINANCE*], available at <http://www.bis.org/publ/cgfs23.pdf> ("A key goal of the tranching process is to create at least one class of securities whose rating is higher than the average rating of the underlying collateral pool or to create rated securities from a pool of unrated assets. This is accomplished through the use of credit support (enhancement), such as prioritisation of payments to the different tranches."); Schwarcz, *Alchemy*, *supra* note 12, at 143 ("The interest rate on these subordinated securities would be higher than the interest rate on the non-subordinated (or senior) securities to compensate for the greater risk.").

15. Most MBS may only be sold to qualified investors, and many of the primary purchasers of structured finance products have ratings-based constraints limiting their investment options. *ROLE OF RATINGS IN STRUCTURED FINANCE*, *supra* note 14; Engel & McCoy, *Blind Eye*, *supra* note 9, at 2047; see also 17 C.F.R. § 230.144A (2008) (defining qualified investor).

16. See DEBASH CHATTERJEE ET AL., MOODY'S INVESTOR SERVICES, 2007 REVIEW AND 2008 OUTLOOK: HOME EQUITY ABS 2-3 (2008).

17. David Greenlaw et al., *Leveraged Losses: Lessons from the Mortgage Market Meltdown 17* (Feb. 29, 2008) (unpublished draft), available at <http://www.chicagogsb.edu/usmpf/docs/usmpf2008confdraft.pdf> (indicating that, in typical subprime securitization, securities are 80% AAA, 9.6% AA, 5% A, 3.5% BBB, and only 1.1% lower rated).

18. *ROLE OF RATINGS IN STRUCTURED FINANCE*, *supra* note 14, at 4. See generally Raghuram G. Rajan, *Has Finance Made the World Riskier?*, 12 EUR. FIN. MGMT. 499 (2006); Joseph R. Mason & Joshua Rosner, *Where Did the Risk Go? How Misapplied Bond Ratings Cause Mortgage Backed Securities and Collateralized Debt Obligation Market Disruptions* (May 14, 2007) (unpublished draft), available at <http://www.ssrn.com/abstract=1027475>. Tail risk is the term for positions or investments "that offer[] high returns most of the time but entail[] a hidden risk, albeit a small risk, of extraordinary losses or default." Linda Chatman Thomsen et al., *Hedge Funds: An Enforcement Perspective*, 39 RUTGERS L.J. 541, 575 n.201 (2008). The analogy is often made to disaster insurance: insurers demand high premiums to cover hurricane-prone property. As long as a disaster never occurs, these companies make considerable profit. However, in the rare event that a disastrous storm occurs, the costs of covering the damage can be devastating. Cf. Rajan, *supra*, at 516.

19. *ROLE OF RATINGS IN STRUCTURED FINANCE*, *supra* note 14, at 12.

the risk of rare, devastating events.²⁰ While an MBS bond will generally outperform comparably rated corporate bonds, in rare events the loss volatility significantly exceeds the risk posed by comparable investments, exposing investors to significant losses.²¹

As the housing market slowed, lenders attempted to maintain market share by originating higher loan-to-value ratio mortgages, often with adjustable rates.²² Many of these loans did not fully document the borrowers' income or assets. Though these loans carried increased risk of default, they are not the cause of the subprime crisis: as the terms of loans became riskier, lenders compensated by lending to increasingly creditworthy borrowers.²³ Lenders increased default only by creating a class of homeowners who were particularly sensitive to declining house price appreciation.²⁴

1. Mortgage Backed Securities Relied on Faulty Loan Assumptions

Subprime MBS tranches are structured according to ratings models, which evaluate the expected default rate of the mortgage pool.²⁵ Though obvious now, the models were produced from fundamentally incomplete data. Because subprime lending was cyclically untested, these models could not quantify the effects of depreciation on subprime borrowers.²⁶

Default can take two forms.²⁷ The first, ruthless default, is determined by a borrower's rational choice.²⁸ Rational borrowers de-

20. Rajan, *supra* note 18, at 516.

21. ROLE OF RATINGS IN STRUCTURED FINANCE, *supra* note 14, at 11-12 ("As a result, given that ratings are based on expected loss or probability of default, structured finance tranches can be significantly riskier than investments in bond portfolios with identical (weighted average) ratings.").

22. CHATTERJEE ET AL., *supra* note 16, at 2.

23. KEVIN KENDRA & GLENN COSTELLO, SUBPRIME MORTGAGE DISTRESS EFFECT ON CDOs 25 (2007), available at http://www.fitchratings.com/web_content/sectors/subprime/CDO_Exposure_to_Subprime_Mortgage_Markets_Web_Cast_w_RMBS_Slides.ppt.

24. See Krisopher Gerardi et al., *Subprime Outcomes: Risky Mortgages, Homeownership and Foreclosure* 3 (Fed. Reserve Bank of Boston, Working Paper No. 15, 2007), <http://www.bos.frb.org/economic/wp/wp2007/wp0715.pdf>.

25. See COMM. ON THE GLOBAL FIN. SYS., *supra* note 14, at 16-20; Mason & Rosner, *supra* note 18, at 8.

26. David Greenlaw et al., *supra* note 17, at 14 n.8 (citing FITCH RATINGS, RESIDENTIAL MORTGAGE SPECIAL REPORT: DRIVERS OF 2006 SUBPRIME VINTAGE PERFORMANCE (2007)).

27. Gerardi et al., *supra* note 24, at 8-9. Note that these two concepts are not strictly opposite; rational borrowers are unlikely to default if they are not also experiencing some cash flow problems. *Id.* at 3-4, 8-9 (noting that neither concept is completely theoretically satisfying).

28. Michelle A. Danis & Anthony Pennington-Cross, *The Delinquency of Subprime Mortgages*, 60 J. ECON. & BUS. 67, 71 (2008) ("[T]he main feature of a ruthless default is that it makes financial sense because the mortgage is substantially larger than the value of the property."). This is also referred to as the option model of default. Gerardi et al., *supra* note 24, at 8.

fault only if they have negative equity, as refinancing or selling is preferable to foreclosure.²⁹ Once the outstanding balance of the loan exceeds the home's value, it may be rational to default if opportunity cost of maintaining the loan exceeds the value of maintaining the loan.³⁰ The second, distressed default, occurs when a borrower, despite his or her best efforts, cannot maintain payments.³¹

It appears that "low subsequent house price appreciation" is the primary factor influencing the increased delinquency of 2006 and 2007 vintage subprime loans.³² Because models predict defaults from the loss history of similar loans,³³ ratings do not immediately reflect changes in underwriting standards.³⁴ When the market began to fall, borrowers' incentives fundamentally changed in a way that subprime borrowing had never experienced. This paradigm shift was simply

29. Danis & Pennington-Cross, *supra* note 28, at 68 ("A mortgage is put . . . when the mortgage outstanding is greater than the value of the property after accounting for costs such as transaction fees."); Gerardi, *supra* note 24, at 10 ("[N]egative equity is a necessary condition for default.").

30. For example, a borrower expecting to live in a home for many years may not be influenced at all, while investors would have greater incentives to default. See Todd J. Zywicki & Joseph D. Adamson, *The Law & Economics of Subprime Lending*, 80 U. COLO. L. REV. 1, 44 (2008) ("[U]nless a given homeowner intends to sell her home, short-term changes in property values are fundamentally irrelevant to these borrowers."); *id.* at 33 ("[Evidence] suggests that an increasing number of subprime loans in recent years may have been issued to investors and speculators, not to families. Because these properties were bought for the purpose of speculation, their owners might be especially likely to exercise the default option in response to declining residential real estate prices.").

31. *Id.* at 26, 50-51; see also Danis & Pennington-Cross, *supra* note 28, at 68 (noting that nonfinancial motivations, such as "losing a job, a severe illness, or the breakup of a household," can also lead to default).

32. Yuliya Demyanyk & Otto Van Hemert, *Understanding the Subprime Mortgage Crisis 2*, 32-33 (Dec. 5, 2008) (unpublished draft), available at <http://www.ssrn.com/abstract=1020396>; see also GLENN COSTELLO, FITCH RATINGS, UPDATE ON U.S. RMBS: PERFORMANCE, EXPECTATIONS, CRITERIA 11 (2008) (indicating that, of the loans that originated in 2006, twenty-three percent of borrowers with 636 FICO scores, second liens, and negative appreciation are delinquent, while approximately fifteen percent of borrowers with 607 FICO scores, negative appreciation but no second lien are delinquent); KENDRA & COSTELLO, *supra* note 23, at 25 (indicating that defaulted loans have a ten percent higher loan-to-value ratios than performing loans); RECENT DEFAULT AND FORECLOSURE TRENDS, *supra* note 10, at 33 (showing graph indicating close positive relationship between foreclosure rates and areas with sharpest drop off of home price appreciation).

33. Greenlaw et al., *supra* note 17, at 13-14 (explaining that the common model for estimating default "simply extrapolates the performance – defaults, loss severities, and total loss rates – of each 'vintage' (origination year) of subprime and other mortgage loans, based on its own history as well as the typical progression pattern through time").

34. See Mason & Rosner, *supra* note 18, at 38 (noting that "changes to origination standards may be manifested in adverse loan performance only after a substantial lag"); see also Zywicki & Adamson, *supra* note 30, at 50 (noting that default models were developed during a period of continuous appreciation and "may not be equally valid when applied to subprime borrowers or in a declining real estate market"); Greenlaw et al., *supra* note 17, at 14 ("[B]ecause the detailed mortgage performance data required to build these types of models are available only back to the mid-1990s, there are no observations on how defaults and losses on a particular vintage change through time when home prices start to fall.").

not captured by ratings models. Adjustable rate loans, though demonized, were not the cause of the fallout; the “overwhelming majority” of subprime loans entered foreclosure prior to the interest rate resetting.³⁵

The occurrence of these defaults was surprising only because of the limited history of subprime borrowing. Default models have been developed over a period of largely uninterrupted appreciation in housing prices.³⁶ Prior to 2006, subprime borrowers could easily refinance or sell instead of foreclosing, which produced unrealistic assumptions about subprime borrowing. However, after the market fell, many otherwise creditworthy borrowers had an *incentive* to default. This paradigm shift in borrower incentives would have been impossible to predict from historic performance data.

2. MBS Have Been Downgraded—Not Wiped Out

Because ratings models did not anticipate the regime shift in subprime performance, issuers undercollateralized subprime securities. When defaults exceeded expectations, cash flows were compromised, and mortgage pools could not meet their obligations to investors. However, the extent to which the actual worth of these securities was impacted still is not clear. The market value of subprime MBS has fallen because, once these assets depart from ratings agency predictions, it is nearly impossible to determine how to price them.

After the performance of subprime mortgage securities began to suffer, Moody's, a large ratings agency, revised its credit risk model and reviewed outstanding securities, resulting in significant downgrades.³⁷ However, these ratings revisions are primarily confined to securities issued after housing prices began to decline.³⁸ Practically

35. Zywicki & Adamson, *supra* note 30, at 28. Hybrid adjustable rate mortgages have been blamed for much of the current mortgage crisis. See, e.g., Sheila C. Bair, Op-Ed., *Fix Rates to Save Loans*, N.Y. TIMES, Oct. 19, 2007, at A25, available at http://www.nytimes.com/2007/10/19/opinion/19bair.html?_r=1&oref=slogin. These loans have artificially low interest rates for two to three years, which reset to a higher adjustable rate. RECENT DEFAULT AND FORECLOSURE TRENDS, *supra* note 10, at 16, 40; see also Demyanyk & Van Hemert, *supra* note 32, at 6. However, the worst performing loans were originated in 2006 and 2007. *Id.* at 2 (“The subprime mortgage crisis of 2007 was characterized by an unusually large fraction of subprime mortgages originated in 2006 and 2007 becoming delinquent or in foreclosure only months later.”). These loans began to reset only recently and mathematically could not have been the cause of the subprime crisis; interest rates on the 2006 vintage only began resetting in 2008, well after the mortgage market collapsed.

36. See Gerardi et al., *supra* note 24, at 35 (noting “the favorable economic environment that has largely characterized the existence of the subprime mortgage market from its emergence in 1993 up until the past few years”); Mason & Rosner, *supra* note 18, at 3.

37. PETER McNALLY, MOODY'S INVESTOR SERVICES, U.S. SUBPRIME RMBS 2005-2007 VINTAGE RATING ACTIONS UPDATE: JANUARY 2008, at 1 (2008).

38. See Mason & Rosner, *supra* note 18, at 6-7; see also Demyanyk & Van Hemert, *supra* note 32, at 2 (noting that subprime crisis disproportionately affected 2006-07 mortgages).

none of the 2005 vintage first-lien securities have been impacted.³⁹ For the 2006 vintage, however, downgrades have been more pronounced. Nearly half of 2006 first-lien securities, including over ninety percent of all assets below its highest rating of AAA, have been downgraded.⁴⁰ Downgrades for 2007 securities have not been as severe, with thirty-seven percent of first-lien and fifty-five percent of second-lien tranches being downgraded.⁴¹

Though downgrades are easily cataloged, actual losses are currently impossible to determine.⁴² Though both 2005 and 2006 each have delinquencies exceeding thirty percent of the outstanding balance, cumulative losses are still below two percent.⁴³ While delinquent mortgages are not meeting monthly obligations, we cannot determine how the final worth of these securities will be affected. For instance, if all delinquent properties foreclose, losses will be catastrophic. Conversely, losses will be mitigated if lenders modify the loans or if borrowers are able to refinance or become current. The problem is not that tranches have been wiped out, but that there is no way to determine how far they have diverged from model price.⁴⁴

This uncertainty is a primary cause of the current crisis. As MBS performance declined, investors had an incentive to move these assets off of their balance sheets before losses increased.⁴⁵ However, collective selling depressed both price and liquidity. Under the mark-to-market rule, firms had to revalue their balance sheets to reflect this new market price.⁴⁶ This created a negative feedback loop such that

39. McNALLY, *supra* note 37, at 2 (2008) (indicating that less than six percent of 2005 first-lien notes were downgraded). Second-lien securities have fared worse, *id.*, but the underlying collateral was much riskier and these securities were only a minimal part of the market. *See id.* at 5-8 (showing that second-lien securities accounted for less than ten percent of rated transactions in any given year).

40. *Id.* at 2-3. Similarly, over ninety percent of all second-lien securities have been downgraded. *Id.*

41. *Id.*

42. *See* David Reilly, *Wave of Write-Offs Rattles Market; Accounting Rules Blasted as Dow Falls; A \$600 Billion Toll?*, WALL ST. J., Mar. 1, 2008, at A1.

43. ANDREW J. GIUDICI & ERNESTINE WARNER, STANDARD & POOR'S, U.S. SUBPRIME RMBS PERFORMANCE UPDATE: JANUARY 2008 DISTRIBUTION DATE (2008), <http://www2.standardandpoors.com/portal/site/sp/en/us/page/article/4,5,5,1,1204262834087.html>.

44. *See, e.g.*, Bomi Lim, *Merrill May Fail to Sell Bad Loans to Korea Asset*, BLOOMBERG.COM, Sept. 4, 2008, <http://www.bloomberg.com/apps/news?pid=20601087&sid=a0QemFmcMrdA&dbk> (describing Merrill Lynch's difficulty selling troubled loans because of difficulties in pricing the assets).

45. *See* Schwarcz, *Systemic Risk*, *supra* note 2, at 214 ("Panics can trigger market failures . . . when doubt arising over a market's future liquidity triggers a stampede to sell first while the market is still liquid . . .").

46. *See* 26 U.S.C. § 475(a)(1) (2000) ("Any security which is inventory in the hands of the dealer shall be included in inventory at its fair market value."); FIN. ACCT. STANDARDS BD., FINANCIAL ACCOUNTING STANDARD 133-3 (2008), *available at* http://www.fasb.org/pdf/aop_FAS133.pdf (requiring all entities to account for derivatives and hedges at a "fair value"); *see also* 17 C.F.R. § 210.4-01(a)(1) (2008) (requiring financial statements to be prepared according to U.S. Generally Accepted Accounting Principles); *The Roles of the SEC*

the decision to sell by one firm imposes a negative price effect on the balance sheets of all other firms, creating an incentive to be the first to sell.⁴⁷ The result was a panic that made subprime MBS virtually illiquid, destroying what little market existed.⁴⁸ Once the market dried up, banks were “left oxymoronically trying to estimate what market prices would be if markets existed.”⁴⁹ This is a liquidity crisis; the market price is “disconnected” from the actual value of these securities.⁵⁰ Indeed, many investors are adamant that these securities are worth significantly more than what they are currently valued in the market.⁵¹

B. A Systemic Crisis

As the market for subprime mortgage securities fell apart, the firms’ reactions became disconnected from the housing market and the value of any particular asset. Collective purchasing and selling strategies created a tragedy of the commons, where competitive incentives led to perverse, inefficient results. The systemic risk is not that subprime securities are correlated to the housing market, but that firms priced only the internal costs and benefits of their investment strategies and not the risk imposed on the financial system.⁵²

and the FASB in Establishing GAAP: Hearing Before the H. Subcomm. on Capital Mkts., Ins., & Gov’t Sponsored Enters. of the Comm. on Fin. Servs., 107th Cong. 2 (2002), available at <http://financialservices.house.gov/media/pdf/051402rh.pdf> (testimony of Robert K. Herdman, Chief Accountant, U.S. Sec. & Exch. Comm’n) (noting that the SEC considers FASB statements definitive for determining GAAP).

The mark-to-market rule requires “companies to value many of the securities they hold at whatever price prevails in the market, no matter how sharply those prices swing.” Reilly, *supra* note 42. See generally Daniel Gross, *The Mark-to-Market Melee: Is an Obscure Accounting Rule to Blame for the Credit Market Meltdown?*, SLATE, Apr. 1, 2008, <http://www.slate.com/id/2187880>.

47. See Guillaume Plantin et al., *Marking-to-Market: Panacea or Pandora’s Box?*, 46 J. ACCT. RES. 435, 439 (2008) [hereinafter Plantin et al., *Panacea or Pandora’s Box?*]; Reilly, *supra* note 42.

48. See Plantin et al., *Panacea or Pandora’s Box?*, *supra* note 47, at 439 (“Anticipating this negative outcome, a short-horizon firm is tempted to preempt the fall in price by selling the asset itself. However, such preemptive action merely serves to amplify the price fall.”); Schwarcz, *Systemic Risk*, *supra* note 2, at 214-15.

49. Holman W. Jenkins, Jr., *Mark to Meltdown?*, WALL ST. J., Mar. 5, 2008, at A16, available at <http://online.wsj.com/article/SB120468045939012133.html>.

50. See Reilly, *supra* note 42 (“Many people would take the view that price and ultimately [sic] value have disconnected.” (quoting Neal Soss, Chief Economist, Credit Suisse)).

51. Jenkins, *supra* note 49 (predicting write-ups will “undo much of the damage once the ‘panic’ subsides”); Reilly, *supra* note 42.

52. See Schwarcz, *Systemic Risk*, *supra* note 2, at 206. See generally PRESIDENT’S WORKING GROUP ON FIN. MKTS., HEDGE FUNDS, LEVERAGE, AND THE LESSONS OF LONG-TERM CAPITAL MANAGEMENT (1999).

This creates an externality imposed by the unpriced costs of exploiting the financial system—a public good.⁵³

Subprime MBS are an attractive investment as lower rated tranches generally outperform similarly rated securities with the same average expected loss⁵⁴ and have the “appearance of producing very high . . . returns for low risk.”⁵⁵ However, rare losses to these assets can be substantial. For fund managers,⁵⁶ who are compensated and compete based on returns, the incentive is to “load up” on these assets to outperform rival firms.⁵⁷ However, competitors are forced to take similar risks, pushing firms toward increasingly inferior investment strategies.⁵⁸ This incentive reinforces suboptimal investment strategies in two ways. First, in the short term, firms that take excessive risk will outperform more conservative rivals; in order to maintain market share, these other firms must then increase leverage and exposure to illiquid markets to remain competitive.⁵⁹ Second, because the entire market is engaged in similar strategies, a large loss will affect everyone, reducing accountability for poor performance.⁶⁰ These firms are “well aware of the consequences of their moves into less liquid markets, as are their counterparties.”⁶¹ The problem is not a lack of disclosure or asymmetric information, but of individual incentives that must be aligned with the efficient collective outcome.⁶²

The same maximizing incentives to take risky positions also create incentives to be the first to sell if there is fear of an impending liquidity problem.⁶³ This rush to sell creates a fire sale, “inadvertently

53. See Frank Partnoy, *Why Markets Crash and What Law Can Do About It*, 61 U. PITT. L. REV. 741 (2000) (describing market stability as a public good); Schwarcz, *Systemic Risk*, *supra* note 2, at 207-08 (“[P]reservation of the financial system is socially desirable.”).

54. ROLE OF RATINGS IN STRUCTURED FINANCE, *supra* note 14, at 11-12.

55. Rajan, *supra* note 18, at 516.

56. Though hedge funds have been demonized, the incentives involved are common to most financial actors. See generally Rajan, *supra* note 18.

57. *Id.* at 516-17; see also Kambhu et al., *supra* note 3, at 9 (indicating that a hedge fund’s “opacity and incentive structure may increase the likelihood of such an event as managers turn toward high-risk strategies with substantial tail-risk”).

58. See Kambhu et al., *supra* note 3, at 13 (discussing concern that competition may create “pressures that weaken credit risk mitigation practices”); cf. James Brown et al., *Auditor Independence and Earnings Quality: Evidence for Market Discipline vs. Sarbanes-Oxley Proscriptions* 14-15 (Fla. State Univ. College of Law, Pub. Law Research Paper No. 259, 2008) (discussing governance spillovers in auditor independence context).

59. Kambhu et al., *supra* note 3, at 13 (stating competition may result in “inadequate risk controls such as lower initial margin levels, collateralization practices, or exposure limits”); Rajan, *supra* note 18, at 517 (discussing incentive to herd on risky investments).

60. Rajan, *supra* note 18, at 517.

61. Kambhu et al., *supra* note 3, at 8 box 2.

62. Brown et al., *supra* note 58, at 15 (“Indeed, even if markets enjoy complete information about a firm’s governance decisions, they will only price the internal costs and benefits of those decisions.”).

63. Schwarcz, *Systemic Risk*, *supra* note 2, at 214.

destroying the market's liquidity."⁶⁴ This effect is produced because firms' balance sheets are linked: one firm's decision to sell depresses the value of all like assets.⁶⁵ If a firm's balance sheet is sufficiently affected, a liquidity crisis can turn into a solvency crisis. The rational strategy is then to preemptively sell as soon as performance declines, avoiding mark-to-market losses. Collectively, every firm feels this incentive, amplifying the price fall.⁶⁶ Stated differently, herding on the upside of the market leads participants to herd on the downside as well, creating a system where actors buy high and sell low.⁶⁷

Problematically, the very regulations that were supposed to reduce system risk contributed to the crisis. The Basel Capital Accords are international banking regulations promulgated by the Bank for International Settlements.⁶⁸ The Basel Accords calculate minimum amounts that capital banks must maintain to prevent institutional failure and ensure financial stability. The United States is currently implementing Basel II⁶⁹ while phasing out its previous incarnation,

64. *Id.* at 214-15.

65. Plantin et al., *Panacea or Pandora's Box?*, *supra* note 47, at 439 ("A bad outcome for the asset depresses fundamental values somewhat, but the more pernicious effect comes from the negative externalities generated by other firms selling. When others sell, observed transaction prices are depressed more than is justified by the fundamentals, and exert a negative effect on all others, but especially on those who have chosen to hold on to the asset.")

66. *Id.* at 439-40.

67. Schwarcz, *Systemic Risk*, *supra* note 2, at 216-17. While Professor Schwarcz calls this behavior irrational, it is only collectively irrational; individually, such behavior is maximizing, producing a prisoner's dilemma. *Id.*; see also Rajan, *supra* note 18, at 516-18 (describing perverse incentives for fund managers); Hyun Song Shin, *Risk and Liquidity in a System Context* 4 (BIS Working Papers No. 212, 2006) [hereinafter Shin, *Risk and Liquidity*], available at <http://www.ssrn.com/abstract=898411>.

68. "The [Bank for International Settlements] is an international organisation which fosters cooperation among central banks and other agencies in pursuit of monetary and financial stability. Its banking services are provided exclusively to central banks and international organisations." Bank for International Settlements, <http://www.bis.org> (last visited Apr. 11, 2009).

69. See Risk-Based Capital Standards: Advanced Capital Adequacy Framework — Basel II, 72 Fed. Reg. 69,288, 69,288 (Dec. 7, 2007) (codified at 12 C.F.R. pt. 3, 12 C.F.R. pt. 208, 225, 12 C.F.R. pt. 325, 12 C.F.R. pt. 559, 560, 563, 567); BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT'L SETTLEMENTS, INTERNATIONAL CONVERGENCE OF CAPITAL MEASUREMENT AND CAPITAL STANDARDS (2006), available at <http://www.bis.org/publ/bcbs128.pdf>; Press Release, Bd. of Governors of the Fed. Reserve Sys., Board Approves Final Rules to Implement Basel II Risk-Based Capital Framework (Nov. 2, 2007) [hereinafter Implementing Basel], available at <http://www.federalreserve.gov/newsevents/press/bcreg/20071102a.htm>.

The Federal Reserve, SEC, FDIC, Office of the Comptroller of Currency, and Office of Thrift Supervision all share regulatory and oversight responsibilities for Basel in the United States. These agencies have implemented the Accord on varying timelines. For instance, the SEC allows investment banks, defined as broker-dealers, to voluntarily use Basel II to compute net capital requirements. See *infra* note 71 and accompanying text.

Similarly, the Federal Reserve and Treasury have adopted a Final Rule requiring commercial banks and other institutions to adopt Basel II. This rule, however, has not been fully implemented. Since April 1, 2008, these institutions have been able to begin a mandatory parallel run of the Basel II capitalization requirements. Under the parallel run,

Basel I.⁷⁰ The primary difference between Basel I and II is the complexity of the calculations used to determine adequate capitalization. For instance, Basel I assesses the same capitalization requirements against all unsecured corporate bonds and residential mortgages, regardless of actual risk. Basel II calculates capital requirements on both the type of holding and the particular risks associated with that holding.⁷¹ For purposes of this Comment, Basel I and II create the same perverse incentives; Basel II merely provides a more nuanced calculation of net capital.

While commercial banks are still required to calculate minimum capital requirements under Basel I, the institutions most affected by the credit crisis have already moved to Basel II.⁷² The Securities and Exchange Commission allows investment banks to adopt Basel II's capitalization requirements under the Consolidated Supervised Entity program.⁷³ All of the largest investment banks, including Bear

each institution required to adopt Basel II must calculate net capital under both Basel I and II for one year prior to switching completely to Basel II requirements. *See* Press Release, Office of the Comptroller of the Currency, Comptroller Dugan Tells International Bankers that Basel II U.S. Implementation on a Prudent, Deliberate Path (Mar. 3, 2008), available at <http://www.occ.treas.gov/ftp/release/2008-26.htm>; *see also* U.S. DEP'T OF TREASURY & FED. RESERVE SYS., INTERAGENCY STATEMENT — U.S. IMPLEMENTATION OF BASEL II ADVANCED APPROACHES FRAMEWORK: QUALIFICATION PROCESS 4 (2008), available at <http://www.federalreserve.gov/boarddocs/srletters/2008/SR0804a1.pdf> (describing parallel run and implementation process).

70. 12 C.F.R. pt. 3 app. A (2008); 12 C.F.R. pt. 208, app. A (2008); 12 C.F.R. pt. 225 app. A (2008); 12 C.F.R. pt. 325 app. A (2008); 12 C.F.R. pt. 567 subpt. B (2008). *See generally* BASEL COMM. ON BANKING SUPERVISION, INTERNATIONAL CONVERGENCE OF CAPITAL MEASUREMENT AND CAPITAL STANDARDS (1998), available at <http://www.bis.org/publ/bcbasc111.pdf?noframes=1>.

71. *See* Randall S. Kroszner, Member of the Bd. of Governors, U.S. Fed. Reserve Sys., Remarks at the New York Banker Association Annual Washington Visit, Basel II Implementation in the United States (July 12, 2007), available at <http://www.federalreserve.gov/newsevents/speech/kroszner20070712a.htm>.

72. Alternative Net Capital Requirements for Broker-Dealers that Are Part of Consolidated Supervised Entities, 69 Fed. Reg. 34,428, 34,428 (June 21, 2004) (codified at 17 C.F.R. pts. 200, 240) [hereinafter Alternative Net Capital Requirements], available at <http://www.sec.gov/rules/final/34-49830.pdf> (establishing Basel II as alternative for investment banks). As a note to the reader, the CSE program was eliminated in September 2008 when all of the entities regulated under the program either collapsed or opted to be treated as Bank Holding Companies, which are regulated by the Federal Reserve. *See* Press Release, U.S. Sec. & Exch. Comm'n, Chairman Cox Announces End of Consolidated Supervised Entities Program (Sept. 26, 2008), <http://www.sec.gov/news/press/2008/2008-230.htm>; *see also* Stephen Labaton, *S.E.C. Concedes Oversight Flaws Fueled Collapse*, N.Y. TIMES, Sept. 26, 2008, at A1, available at <http://www.nytimes.com/2008/09/27/business/27sec.html>.

73. 17 C.F.R. § 240.15c3-1(a)(7) (2008) (permitting broker-dealers to adopt Basel II guidelines for establishing minimum capital); 17 C.F.R. § 240.15c3-1e (requiring that broker-dealers use alternate net capital requirements); 17 C.F.R. § 240.15c3-1g (providing conditions for broker-dealers to use the alternative Basel net capital requirements); *see also* Alternative Net Capital Requirements, *supra* note 72 (adopting final rule that includes the SEC's description of the alternative net capital program).

Stearns, Goldman Sachs, and J.P. Morgan, opted to use Basel II instead of the default rules for determining net capital requirements.⁷⁴

Both Basel Accords were designed to ensure financial stability by requiring banks and other financial institutions to maintain minimum capital requirements, mandating supervisory review of capital adequacy, and requiring disclosures to ensure market discipline.⁷⁵ Under Basel II, the capital cushion a bank must maintain is determined by its actual risk exposure.⁷⁶ However, capital constraints are determined against mark-to-market balance sheets,⁷⁷ forcing firms to write down the value of their holdings as the market price for subprime MBS fell. This reduced their total capital, forcing them to sell assets to maintain Basel capital requirements.⁷⁸ This forced liquidation further depressed market prices, requiring additional sales.⁷⁹ Once subprime MBS became sufficiently illiquid, firms were forced to sell otherwise unrelated assets in order to stay sufficiently capitalized, leading to problems in otherwise unrelated assets.⁸⁰ For in-

74. *Regulation of Investment Banks: Hearing Before the Subcomm. on Sec., Ins., & Inv. of the S. Comm. on Bank., Hous. & Urban Affairs*, 110th Cong. (2008) (statement of Erik Sirri, Dir., Div. of Trading and Mkts., Sec. & Exch. Comm'n).

75. BASEL COMM. ON BANKING SUPERVISION, *supra* note 69, at 2-3 (describing Basel's three pillar structure); Implementing Basel, *supra* note 69; *see also* Conrad Bahlke & Robert Lewin, *US Regulators Respond to Basel II*, INT'L FIN. L. REV., Dec. 2003, at 42, 43.

76. Schwarcz, *Systemic Risk*, *supra* note 2, at 224; Kroszner, *supra* note 71; *see also* 17 C.F.R. §§ 240.15c3-1e, 240.15c3-1g. However, regardless of exposure, the broker-dealer must maintain tentative net capital of at least \$1 billion and actual net capital of \$500 million. 17 C.F.R. § 240.15c3-1(a)(7)(i).

As an example of the detail required to compute net capital under Basel II, a firm's Value at Risk model (a method of measuring risk for particular holdings) must incorporate:

- (A) Risks arising from the non-linear price characteristics of derivatives and the sensitivity of the market value of those positions to changes in the volatility of the derivatives' underlying rates and prices;
- (B) Empirical correlations with and across risk factors or, alternatively, risk factors sufficient to cover all the market risk inherent in the positions in the proprietary or other trading accounts of the broker or dealer, including interest rate risk, equity price risk, foreign exchange risk, and commodity price risk;
- (C) Spread risk, where applicable, and segments of the yield curve sufficient to capture differences in volatility and imperfect correlation of rates along the yield curve for securities and derivatives that are sensitive to different interest rates; and
- (D) Specific risk for individual positions.

17 C.F.R. § 240.15c3-1e(d)(2)(iv).

77. *See* 26 U.S.C. § 475(a)(1) (2000); FIN. ACCT. STANDARDS BD., FINANCIAL ACCOUNTING STANDARD 133-3 (2008).

78. *See* Harald Benink et al., *On the Role of Regulatory Banking Capital*, 17 FIN. MKTS., INSTS. & INSTRUMENTS 85, 86 (2008) (discussing Basel II's perverse result that banks must sell falling assets to maintain capital requirements); *see also* Guillaume Plantin et al., *Marking to Market, Liquidity, and Financial Stability*, 23 MONETARY & ECON. STUDIES 133, 149 (2005) [hereinafter Plantin et al., *Liquidity, and Financial Stability*] (describing how marking to market will require asset sales to satisfy minimum capital requirements).

79. Schwarcz, *Systemic Risk*, *supra* note 2, at 213-14.

80. *See Systemic Risk Hearings*, *supra* note 7, at 48 (statement of Richard Bookstaber); George G. Kaufman, *Banking and Currency Crises and Systemic Risk: Lessons from*

stance, municipal bonds and auction-rate securities, traditionally cash equivalents, have both suffered liquidity problems unrelated to their fundamentals.⁸¹

While Basel II appears to reduce risk ex ante, it actually increases market instability during a crisis by requiring firms to maintain minimum collateral against market prices.⁸² The result is a negative price shock, which can create an endogenous feedback loop that creates linked cycles of write-downs and forced sales. While the Basel II framework has been criticized for its complexity and unintelligibility,⁸³ Basel is inadequate not because of its opacity, but because of its failure to address the underlying externality. Basel attempts to micromanage balance sheets but fails to force firms to internalize the costs of their trading strategies.

Though highly leveraged private equity firms, such as hedge funds, were forced to sell unrelated assets to meet margin or collateral calls when MBS collateral prices declined,⁸⁴ this effect was less important than the distress of critical intermediaries, such as investment banks or securities brokers. Hedge funds are private investment vehicles created to avoid the regulations facing other financial entities.⁸⁵ If investors understand the risks, there is nothing particularly problematic about high-risk strategies. Further, “[e]mpirical research supports focusing on the risk exposure of hedge fund counterparties.”⁸⁶ Because hedge funds are not publicly traded and generally not large enough to impact the larger economy, they were likely not a contributing factor to the systemic event we are now facing. Indeed, the failure of three Bear Stearns hedge funds in August 2007 did not cause an immediate disruption; the troubled investment bank did not collapse until nearly nine months later.⁸⁷

Recent Events, ECON. PERSPECTIVES, Third Q. 2000, at 9, 15, available at <http://www.chicagofed.org/publications/economicperspectives/2000/3qep2.pdf>.

81. See Dominic Elliot & Tom Fairless, *Hardest-to-Value Assets Escalate*, WALL ST. J. ONLINE, Apr. 15, 2008, <http://online.wsj.com/article/SB120820511277913811.html>; Michael A. Pollock, *Munis Likely to Face Weakness, Volatility; Supply, Demand Thrown Off-Kilter by Credit Turmoil*, WALL ST. J., Mar. 13, 2008, at C5.

82. See Rodrigo Cifuentes et al., *Liquidity Risk and Contagion* 32 (Bank of Eng., Working Paper No. 264, 2005), available at <http://www.ssrn.com/abstract=824166>.

83. See Nicholas Budd, *What Basel II Means for Specialized Lending*, 22 INT'L FIN. L. REV. 23, 23 (2003); Schwarcz, *Systemic Risk*, *supra* note 2, at 224.

84. See Kambhu et al., *supra* note 3, at 8 box 2.

85. Thomsen et al., *supra* note 18, at 543-44 (“[T]he term ‘hedge fund’ refers less to the hedging techniques that such funds have originally employed than it does to their present status as private and unregistered investment pools—so-called ‘alternative’ or ‘non-traditional’ investments.”).

86. Schwarcz, *Systemic Risk*, *supra* note 2, at 223.

87. See *Timeline of a Crisis*, WALL ST. J. ONLINE, Mar. 17, 2008, <http://online.wsj.com/article/SB120576387418941803.html> (indicating that Bear Stearns liquidated three hedge funds on August 1, 2007, but did not fail until March 14, 2008). Similarly, the failure of Carlyle Capital Fund did not significantly affect the market. See *infra* text accompanying notes 98-100.

These market liquidity crises result in firm-specific liquidity problems. Institutional investors rely on “short-term financing through borrowing on a secured basis” to fund illiquid positions.⁸⁸ However, counterparties will either require additional collateral or simply refuse to lend against troubled assets in fear that they will be “stuck with assets that are dropping in market value in the event that borrowers can’t repay them.”⁸⁹ As market liquidity further decreases, firms become unwilling to lend on any terms out of fear for their own liquidity.⁹⁰

Without access to capital funding, margin calls force firms to sell “assets into a falling market,”⁹¹ which further decreases prices, “setting off a nasty spiral in which assets are unloaded into a declining market, placing even more downward pressure on values and leading more lenders to call in loans.”⁹² Fear of default leads to a functionally identical result in market liquidity: investors rush to close out positions, forcing the firm to default or liquidate its entire portfolio.⁹³ Given the complex interdependent counterparty relationships in capital markets, liquidating a major institution could lead to defaults in affected institutions or to additional panics.⁹⁴

The collapse of Bear Stearns shows the effects of liquidity concerns. Lenders refused to extend credit during a “crisis of confidence,” and Bear Stearns could not fund its positions or post additional collateral.⁹⁵ Its counterparties declared default and moved to

88. Press Release, Letter from Christopher Cox, Chairman, Sec. & Exch. Comm’n, to Dr. Nout Wellink, Chairman, Basel Comm. on Banking Supervision, Sound Practices for Managing Liquidity in Banking Organizations (Mar. 20, 2008), available at <http://www.sec.gov/news/press/2008/2008-48.htm>.

89. Serena Ng & Randall Smith, *Another Source of Quick Cash Dries up: Firms Rethink Reliance on Repo Financing as Conditions Tighten*, WALL ST. J., Mar. 17, 2008, at C1, available at <http://online.wsj.com/article/SB120571167285740199.html>.

90. Kaufman, *supra* note 80, at 15; Schwarcz, *Systemic Risk*, *supra* note 2, at 214-15.

91. See Kambhu et al., *supra* note 3, at 8 box 2.

92. Peter A. McKay, *Mounting Liquidation Fears Squeeze U.S. Stock Market*, WALL ST. J. ONLINE, Mar. 6, 2008, available at <http://online.wsj.com/article/SB120480186203616481.html>.

93. See Viral V. Acharya & Stephen Schaefer, *Liquidity Risk and Correlation Risk: Implications for Risk Management* 9-13 (Sept. 8, 2006) (unpublished draft), available at http://www.greta.it/credit/credit2006/talk/Tuesday_26/1_Acharya.pdf; see also Schwarcz, *Systemic Risk*, *supra* note 2, at 213-14.

94. Kaufman, *supra* note 80, at 14-15 (describing how systemic events may be transmitted via counterparty relationships); Schwarcz, *Systemic Risk*, *supra* note 2, at 213-15 (describing how chain of failures could occur).

95. Cox, *supra* note 88. The SEC has raised concerns that several firms short sold Bear Stearns stock and subsequently spread rumors about the firm’s solvency. In response, the SEC issued an emergency rule, which prohibited “‘naked’ short selling” of certain financial institutions, including Goldman Sachs and Lehman Brothers. Emergency Order Pursuant to Section 12(k)(2) of the Securities Exchange Act of 1934 Taking Temporary Action to Respond to Market Developments, Securities Exchange Act Release No. 58166, 73 Fed. Reg. 42,379 (July 15, 2008), available at <http://www.sec.gov/rules/other/2008/34-58166.pdf>; Securities Exchange Act Release No. 58190, 73 Fed. Reg. 42,837 (July 18,

seize collateral. However, “the firm had a capital cushion well above what is required to meet supervisory standards calculated using the Basel II standard.”⁹⁶ Bear Stearns was not insolvent; rather, counterparties rushed to close out positions in fear of impending insolvency.⁹⁷ Similarly, the Carlyle Capital Group collapsed not from insolvency, but from panicked counterparties.⁹⁸ Carlyle Capital was a highly leveraged hedge fund consisting exclusively of AAA GSE securities.⁹⁹ These securities are traditionally very safe and considered guaranteed by the government; liquidity concerns, however, depressed their market price. As Carlyle’s asset values declined, lenders requested more collateral. Due to its leveraged position, Carlyle could not obtain funding and failed to meet margin calls. Its lenders seized their collateral and began auctioning its assets; the firm announced it would liquidate.¹⁰⁰

Importantly, each firm’s behavior was individually rational. It was in a firm’s best interest to sell its subprime exposures at the top of the market. Similarly, Bear Stearns’ counterparties had clear incentives to be the first to close out their positions. The systemic problem is that firms have only the incentive to maximize their own welfare and, hence, price only the internal costs and benefits of any risk.¹⁰¹ However, this problem is not novel; it is an archetypical tragedy of the commons. The proper regulatory mechanism is simply one which forces firms to internalize the costs they impose on the market.

2008), available at <http://www.sec.gov/rules/other/2008/34-58190.pdf> (amending order); see also Press Release, Sec. & Exch. Comm’n, SEC Enhances Investor Protections Against Naked Short Selling (July 15, 2008), available at <http://www.sec.gov/news/press/2008/2008-143.htm>. The order expired on August 12, 2008. See Order Extending Emergency Order Taking Temporary Action to Respond to Market Developments, Securities Exchange Act Release No. 58248, 73 Fed. Reg. 45,257 (July 29, 2008), available at <http://www.sec.gov/rules/other/2008/34-58248.pdf> (extending effective date of emergency order). The S.E.C. later adopted a limited short-selling proscription that extends securities fraud liability to persons who deceive a purchaser about their ability or intention to deliver the security and then actually fail to deliver the security at settlement. “Naked” Short Selling Antifraud Rule, 73 Fed. Reg. 61,666 (Oct. 17, 2008) (codified at 17 C.F.R. pt. 240).

96. Cox, *supra* note 88.

97. *Id.* (“The market rumors about Bear Stearns [sic] liquidity problems became self-fulfilling.”).

98. See Carlyle’s Comeuppance: Debt Fund CCC Placed Bet on AAA Mortgage Bonds and a Load of Leverage, WALL ST. J., Mar. 7, 2008, at C12, available at <http://online.wsj.com/article/SB120486025559518793.html>; Peter Lattman, Carlyle Capital to Liquidate What Is Left, WALL ST. J., Mar. 17, 2008, at A12 [hereinafter Lattman, *Liquidate*], available at <http://online.wsj.com/article/SB120572975692141167.html>; Peter Lattman, Credit Crunch: Carlyle Capital Nears Collapse as Accord Can’t Be Reached, WALL ST. J., Mar. 13, 2008, at C2, available at <http://online.wsj.com/article/SB120537974320632835.html>.

99. See Peter Lattman & Randall Smith, Carlyle Capital Aims to Halt a Meltdown; Leveraged Vehicle Seeks ‘Stretchout’ on Loans; In a ‘Purgatory Age’, WALL ST. J., Mar. 8, 2008, at B1, available at <http://online.wsj.com/article/SB120487123309819271.html>.

100. Lattman, *Liquidate*, *supra* note 98.

101. Rajan, *supra* note 18, at 514-18, 523-24; Schwarcz, *Systemic Risk*, *supra* note 2, at 206; Brown et al., *supra* note 58, at 14-15.

IV. WHAT'S THE PROBLEM?

A. *The Economics of Regulation*

A legal regulatory regime presupposes a market failure. Absent transaction costs, default legal rules would be irrelevant; rational individuals would bargain to produce efficient outcomes.¹⁰² However, once market frictions are introduced, parties will bargain only if the bargaining produces value that exceeds the cost of transacting.¹⁰³ Regulation can improve the market outcome only if transaction costs are limiting otherwise mutually beneficial trades.¹⁰⁴ However, regulation is not costless, and the decision to impose liability or proscribe conduct will also impose costs elsewhere in the market.¹⁰⁵ Regulators must decide “whether the gain from preventing the harm is greater than the loss which would be suffered elsewhere as a result of stopping the action which produces the harm.”¹⁰⁶ Efficient regulations will assign liability (or proscribe conduct) to the party able to mitigate the harm at the least cost. Because we assume economic actors are rational,¹⁰⁷ individuals will price regulatory costs resulting in optimal abatement and social efficiency.

Sound regulatory policy attempts to minimize fraud and force firms to internalize external costs.¹⁰⁸ Market failures (or imperfections) include monopoly, underproduction of public goods, asymmetric information, and moral hazard.¹⁰⁹ Without an externality or informational asymmetry to improve upon, any regulation is going to be superfluous or, worse, prevent socially beneficial trades.

B. *Financial Pollution*

The subprime crisis is decidedly more complex than the conventional narrative implies. The problem is not that mortgages defaulted, but that firms' incentives led to overinvestment in these se-

102. See Schwarcz, *Systemic Risk*, *supra* note 2, at 205-06. See generally DAVID P. BARON, *BUSINESS AND ITS ENVIRONMENT* 323-61 (5th ed. 2006); R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).

103. Coase, *supra* note 102, at 16 (“[T]he costs of reaching the same result by altering and combining rights through the market may be so great that this optimal arrangement of rights, and the greater value of production which it would bring, may never be achieved.”).

104. *Id.*

105. Schwarcz, *Systemic Risk*, *supra* note 2, at 209-10 (“Because regulation can be costly, efficiency . . . demands that the costs of regulation do not exceed its benefits.”).

106. Coase, *supra* note 102, at 27.

107. See DINO FALASCHETTI & MICHAEL ORLANDO, *MONEY, FINANCIAL INTERMEDIATION, AND GOVERNANCE* (2008) (discussing economic assumption of rationality). For a defense of rational choice theory against behavioral economic critiques, see Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551 (1998).

108. Schwarcz, *Systemic Risk*, *supra* note 2, at 205-06.

109. BARON, *supra* note 102, at 332-38.

curities. Systemic risk arises because market participants price only the internal costs and benefits of any transaction, resulting in socially inefficient investment strategies. An efficient regulatory response must address this moral hazard and disincentivize inefficient governance and investment decisions.¹¹⁰

While commentators have identified this externality, they have failed to apply this insight to their regulatory proposals.¹¹¹ All of the hallmarks of systemic collapse—excessive risk, high leverage, and subsequent panic¹¹²—stem from the failure of firms to internalize the systemic costs of their actions. Addressing the symptoms of this externality with liquidity provisions, capital requirements, or leverage constraints will not align the incentives of firms with the socially beneficial outcome. The primary contribution of this Comment is to show a mechanism whereby regulators can reduce the incentives that lead to systemic risk instead of legislating around the problem.

Individually maximizing incentives will lead firms to take incrementally higher risk to outperform competitors. This results in a race to the risk-management bottom, as firms increase risk exposure and leverage to outperform their peers.¹¹³ However, “[t]he greater flow of funds into the riskier asset classes . . . further contributes to the compression of yield spreads, inducing migration yet further down the risk spectrum.”¹¹⁴ As firms attempt to increase returns, they are

110. See *Part 2: Current Trends in Economic Research on Systemic Risk*, FRBNY ECON. POL'Y REV. 17, 20 (2007).

111. Previous proposals focus on particular symptoms of this externality. See, e.g., BASEL COMM. ON BANKING SUPERVISION, *supra* note 69 (creating minimum capital requirements); PRESIDENT'S WORKING GROUP, *supra* note 52, at 31-32 (recommending increased disclosure and capital requirements); Schwarcz, *Systemic Risk*, *supra* note 2 (recommending liquidity provider of last resort).

112. See Rajan, *supra* note 18, at 501-02, 517-18 (describing how periods of low interest rates lead firms to increase leverage and risk, which can lead to the realization of tail risk); Schwarcz, *Systemic Risk*, *supra* note 2, at 214-15 (describing how panic can initiate systemic crisis); Tobias Adrian & Hyun Song Shin, *Liquidity and Leverage*, 10-12, 31-32 (Sept. 2007), available at <http://www.newyorkfed.org/research/economists/adrian/LiquidityLeverage25Sep2007.pdf> (describing how economic booms lead firms to increase leverage and risk, which must be corrected by liquidating assets during a downturn).

113. Rajan, *supra* note 18, at 501; Brown et al., *supra* note 58, at 14-15.

114. Plantin et al., *Liquidity, and Financial Stability*, *supra* note 78, at 134; see also Shin, *Risk and Liquidity*, *supra* note 67, at 32 (discussing how, as mark to market prices increase equity, bank managers have incentives to increase leverage). This is apparently what preceded the failure of Long Term Capital Management (LTCM). After the success of LTCM's convergence strategies, “players with similar trading strategies crowded into the market, the spreads narrowed on the favored convergence trades, eroding the profit margin for all the players.” See Jon Danielsson & Hyun Song Shin, *Endogenous Risk* 14 (Sept. 21, 2002) (unpublished manuscript), available at <http://hyunsongshin.org/www/risk1.pdf>. This forced LTCM into riskier markets to increase returns. When the market reversed, the fund collapsed. *Id.* at 14-15. See generally PRESIDENT'S WORKING GROUP, *supra* note 52; Thomsen et al., *supra* note 18, at 545-47.

forced to invest in increasingly riskier assets. Problematically, it is less profitable to engage in socially optimal investment strategies.¹¹⁵

As investment strategies force firms into higher risk and less liquid markets, firms will sell “at a much higher price” out of “apprehens[ion] about the effect of other traders bailing out.”¹¹⁶ Inefficient investment strategies create socially inefficient selling strategies: as risk appetite increases on the upside of the market, loss aversion increases on the downside, increasing the market susceptibility to panic.¹¹⁷ The externalities are the same: an efficient regulatory response need not require firms to irrationally hold falling assets; by realigning incentives on the buy side, the incentive to panic will be efficiently regulated on the downside as well.

1. *A Model of Systemic Risk*

Procyclical trends increase systemic risk. That is, systemic susceptibility increases on the upside of the financial cycle. For example, the subprime crisis, the tech bubble, the 1987 stock market crash, and the Great Depression all followed periods of strong growth.¹¹⁸ Interest rates tend to fall during periods of strong economic growth. As interest rates fall, competitive pressures forcing managers to increase risk are compounded because low risk investments will not provide sufficient returns.¹¹⁹ Firms must seek out exceedingly risky positions to meet minimum returns; managers face similar pressures to ensure that they do not underperform their peers.¹²⁰ As interest

115. *Part 2: Current Trends in Economic Research on Systemic Risk*, *supra* note 110, at 20 (“If it is costly to hold liquid assets in order to be a buyer and to provide liquidity in a market crash, why *would* anyone choose to do it?”).

116. Stephen Morris & Hyun Song Shin, *Liquidity Black Holes* 19-20 (Cowles Foundation, Yale University, Discussion Paper No. 1434, 2003), available at <http://www.ssrn.com/abstract=446600>; see also Plantin et al., *Panacea or Pandora’s Box?*, *supra* note 47, at 439-40 (“As the liquidity of the asset dries up, marking-to-market becomes significantly more inefficient than the historical cost regime because strategic concerns overwhelm fundamental analysis.”).

117. Shin, *Risk and Liquidity*, *supra* note 67, at 5 (describing how external effects are transferred “on the way up” and “on the way down”); see also Adrian & Shin, *supra* note 112, at 32 (describing how incentives to increase leverage during economic booms sow the “seeds of the subsequent downturn”).

118. Eugene N. White, *Bubbles and Busts: The 1990s in the Mirror of the 1920s*, at 5, 7 (Nat’l Bureau of Econ. Research, Working Paper No. 12138, 2006), available at <http://www.nber.org/papers/w12138.pdf>; see also Rajan, *supra* note 18, at 501-02 (“An environment of low interest rates following a period of high rates is particularly problematic, for not only does the incentive of some participants to ‘search for yield’ go up, but also asset prices are given the initial impetus, which can lead to an upward spiral, creating the conditions for a sharp and messy realignment.”).

119. Rajan, *supra* note 18, at 518 (“When risk free returns are high, compensation is high even if the fund takes on little risk, while when risk free returns are low the fund may not even exceed the minimum return if it takes little risk.”); see also Plantin et al., *Liquidity, and Financial Stability*, *supra* note 78, at 134 (discussing how low interest rates and compressed yield spreads force firms to take on risky investment strategies).

120. Rajan, *supra* note 18, at 514-19; see also Kambhu et al., *supra* note 3, at 10-11, 13.

rates fall, investors become increasingly confident in market stability and feel more confident taking on more tail risk.¹²¹ However, these assets produce precisely the type of risk that typifies a liquidity crisis: rare but devastating losses that cause traders to bail out of positions at higher loss levels than is socially optimal.

Further, a firm's mark-to-market balance sheets expand during periods of strong growth. Firms must then increase borrowing to maintain minimum leverage ratios.¹²² As with risk appetite, "leverage is pro-cyclical."¹²³ Adrian and Shin hypothesize that, as balance sheets expand and borrowing increases, firms "increas[e] trading positions through the chasing of yield."¹²⁴ This increased leverage is "intimately tied to the short-term incentives facing the [firms'] management."¹²⁵ Increasing leverage and chasing yield are two aspects of the same returns-driven race to the bottom.

Importantly, this is precisely the set of preconditions for a systemic event outlined above. If there is a market event, the systemic threat is highest at this point. Further, negative mark-to-market-price shocks will result in instantaneously higher leverage. As with Carlyle Capital, counterparties demand more collateral, but the firm will be unable to borrow to meet margin calls as its leverage is maxed out. If, because of liquidity concerns, the firm is unable to sell its assets for a fair price, it will default, resulting in liquidation by its counterparties.

Command and control regulations, such as the Basel Accords, actually increase financial instability during a market shock.¹²⁶ Under Basel II's Internal Ratings Based (IRB) approach, firms must maintain minimum capital requirements with respect to individual risk exposures.¹²⁷ The capitalization requirements are determined by a

121. Rajan, *supra* note 18, at 518 (finding "[s]imple proxies such as the VIX index for the risk aversion of financial markets in the USA do seem to be positively correlated with the level of short-term interest rates"). The VIX is the "weighted average of the implied volatility in the S&P500 index options." See Adrian & Shin, *supra* note 112, at 27. Colloquially, the VIX measures how much traders expect the market to fluctuate and, consequently, how confident they are in risky positions. *Id.*

122. See Adrian & Shin, *supra* note 112, at 8-9; Greenlaw et al., *supra* note 17, at 25-32; Shin, *Risk and Liquidity*, *supra* note 67.

123. Adrian & Shin, *supra* note 112, at 8; Greenlaw et al., *supra* note 17, at 26, 29-30.

124. Adrian & Shin, *supra* note 112, at 30.

125. Shin, *Risk & Liquidity*, *supra* note 67, at 32.

126. See Benink et al., *supra* note 78; Plantin et al., *Liquidity, and Financial Stability*, *supra* note 78, at 149; Cifuentes et al., *supra* note 82, at 32.

127. See BASEL COMM. ON BANKING SUPERVISION, *supra* note 69, at 52-119; see also 17 C.F.R. § 240.15c3-1e (2008); Risk-Based Capital Standards: Advanced Capital Adequacy Framework — Basel II, 72 Fed. Reg. 69,288 (Dec. 7, 2007) (codified at 12 C.F.R. pt. 3; 12 C.F.R. pt. 208, 225, 12 C.F.R. pt. 325; 12 C.F.R. pt. 559, 560, 563, 567). The Basel Committee permits banks to adopt either the advanced IRB approach or a standardized approach, which is similar to the original Basel requirements. See BASEL COMM. ON BANKING SUPERVISION, *supra* note 69, at 19. However, the United States is requiring its large or in-

firm's credit risk, operational risk, and market risk.¹²⁸ Capitalization levels are dependent on not only the probability of default and loss given default of each holding, but also on the form that each holding takes: for example, there are different functions for determining the minimum capital required for corporate debt, derivatives, and real estate exposures.¹²⁹ Basel also requires firms to account for their off-balance sheet holdings.¹³⁰ The Basel calculations are complex, and some have called them incomprehensible.¹³¹ However, the problem is not their complexity, but their failure to address the underlying moral hazard.

While Basel may appear to limit risk taking *ex ante*, it produces perverse incentives in the event of an asset shock. Once the price of an asset is reduced, firms have the incentive to move it off of their balance sheets to maintain minimum capital levels; as firms sell more assets, however, the market price is depressed, creating a negative feedback loop "that far outweighs the initial shock."¹³² Basel's micromanaged approach legislates around the problem without addressing misaligned incentives. Firm-specific capital requirements do not find the least cost mitigator; Basel simply requires firms to manipulate balance sheets to maintain adequate collateralization. The effect is that, while firms must maintain capitalization, every firm still has the incentive to maximize returns by entering into increasingly risky transactions. The systemic externality is simply not addressed.

An efficient regulation must address the fact that socially efficient investment strategies are not individually maximizing. Firms' incentives must be aligned with society's, or else regulation is necessarily going to legislate around the issue.

ternationally active banks to comply with the IRB approach. Risk-Based Capital Standards: Advanced Capital Adequacy Framework — Basel II, 72 Fed. Reg. at 69,289-90.

128. BASEL COMM. ON BANKING SUPERVISION, *supra* note 69.

129. *Id.* at 52, 63-86.

130. *Id.*; *see, e.g.*, 17 C.F.R. § 240.15c3-1g(a)(3) (2008) ("The ultimate holding company shall compute an allowance for credit risk for certain assets on the consolidated balance sheet and certain off-balance sheet items, including loans and loan commitments, exposures due to derivatives contracts, structured financial products, and other extensions of credit, and credit substitutes . . .").

131. Schwarcz, *Systemic Risk*, *supra* note 2, at 224 (quoting Susan Schmidt Bies, Governor, Bd. of Governors, U.S. Fed. Reserve Sys., Basel II Developments in the United States, Remarks Before the Institute of International Bankers (Sept. 26, 2005)).

132. Plantin et al., *Liquidity, and Financial Stability*, *supra* note 78, at 151; *see also* Morris & Shin, *supra* note 116, at 2-3 ("[S]elling pressure[s] sets of further downward pressure on asset prices, which induces a further round of selling, and so on."); Plantin et al., *Panacea or Pandora's Box?*, *supra* note 47, at 439 ("[M]arking-to-market tends to amplify the movements in asset prices relative to their fundamental values in bad states of the world."); Shin, *Risk and Liquidity*, *supra* note 67, at 23 (describing how solvency constraints can induce endogenous liquidity crises).

2. *The Insufficiency of a Liquidity Provider*

Many scholars have recommended creating a formal liquidity provider (lender) of last resort.¹³³ A private or government-sponsored entity that provides liquidity during a crisis may avoid liquidity spillover by allowing firms to unwind troubled positions, avoiding systemic failure.¹³⁴ However, a liquidity provider is necessarily an ex post remedy and does not address the underlying externality.

While Professor Schwarcz recognizes that a liquidity provider may foster a sense of safety that encourages risk taking, he argues that refusing to spell out in advance whether the liquidity provider will assist in any given downturn will create enough constructive ambiguity¹³⁵ to minimize moral hazard. Assuming arguendo that he is correct, this approach will necessarily *not* reduce systemic risk, but will merely avoid systemic failure. A liquidity provider alone is, therefore, not an optimal regulatory response.

Further, though a liquidity provider of last resort serves socially beneficial ends, the Federal Reserve is acting in that capacity already. The Federal Reserve recently created a short term lending facility for AAA securities as collateral to provide liquidity to troubled firms.¹³⁶ Further, in fear of institutional failure, the Federal Reserve guaranteed Bear Stearns' liabilities in conjunction with J.P. Morgan's private sector acquisition.¹³⁷ Though the Federal Reserve's authority to enter into these transactions is unclear,¹³⁸ such jurisdic-

133. See Schwarcz, *Systemic Risk*, *supra* note 2, at 225-30, 241-49.

134. *Id.*

135. *Id.* at 226; see also Partnoy, *supra* note 53, at 785.

136. Press Release, Bd. of Governors of the Fed. Reserve Sys. (Mar. 11, 2008), <http://www.federalreserve.gov/newsevents/press/monetary/20080311a.htm> [hereinafter Board of Governors Press Release].

137. Press Release, Bd. of Governors of the Fed. Reserve Sys. (Mar. 14, 2008), <http://www.federalreserve.gov/newsevents/press/monetary/20080314a.htm>; see also Neil Irwin & David Cho, *Fed Takes Broad Action to Avert Financial Crisis: Central Bank Backs Sale of Bear Stearns, Cuts Key Interest Rate, Extends New Credit*, WASH. POST, Mar. 17, 2008, at A01, available at <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/16/AR2008031601672.html>.

138. The Federal Reserve may open its discount window and lend to any firm in "unusual and exigent circumstances" and has been traditionally thought of as a lender of last resort. 12 U.S.C. § 343 (2006); *Actions by the Federal Reserve Bank of New York in Response to Liquidity Pressures in Financial Markets: Hearing Before the S. Comm. on Banking, Hous., & Urban Affairs*, 110th Cong. 12-13, 16 (2008) [hereinafter *Actions by the Federal Reserve Hearings*], available at http://banking.senate.gov/public/_files/OpgStmtGeithner4308Testimony.pdf (statement of Timothy F. Geithner, Pres. & CEO, Federal Reserve Bank of New York) (noting that Federal Reserve is a lender of last resort but that exercising such authority is an "extraordinary step"). However, it is unclear how far this authority actually extends. Schwarcz, *Systemic Risk*, *supra* note 2, at 230 & n.232 (noting that the Federal Reserve's ability to act as a lender of last resort "is ambiguous under existing law" and that it likely lacks the authority to purchase securities outright). For instance, the Federal Reserve is restricted in its ability to acquire equity interests in firms, but it may freely purchase Treasury Bills. *Actions by the Federal Reserve Hearings*, *supra*, at 13 (statement of Timothy F. Geithner, Pres. & CEO, Federal Reserve Bank of New

tional doubt is likely the highest form of constructive ambiguity. Additionally, when profitable, the private sector has bailed out troubled firms. Citadel Investment Group bailed Amaranth and Sowood, two troubled hedge funds, when collapse was imminent.¹³⁹ Similarly, as the credit crisis unfolded, the Carlyle Group quickly formed a fund to “do everything from investing in publicly traded bonds and bank loans to purchasing ailing companies outright.”¹⁴⁰

Finally, a responsible liquidity provider can lend only against assets which are truly illiquid and not actually worthless. For instance, the Federal Reserve loaned not against subprime MBS, but only against assets which were practically guaranteed.¹⁴¹ No one has come forward to lend against assets which may be truly impaired, such as subordinated tranches or second-lien securities.¹⁴² A liquidity provider will be unable to lend against assets which are complex enough to make determining the worth cost prohibitive.

3. *Increased Disclosure Would Be Ineffective*

Systemic risk is a result of incentives which induce excessive risk taking, even in the presence of full disclosure; therefore, despite its prevalence in other financial regulation, additional disclosure will be ineffective.¹⁴³ The problem is not that firms do not realize the risks they are undertaking, but that maximizing investment strategies requires them to take those risks.¹⁴⁴ Firms have no incentive to reduce

York) (“We did not have the authority to acquire an equity interest in either Bear or JPMorgan Chase . . .”); Jon Hilsenrath & Liz Rappaport, *Fed Weighs Idea of Buying Treasuries as Focus Shifts*, WALL ST. J., Jan. 29, 2009, at A4 (noting that the Federal Reserve “has clear legal authority to buy government debt”). However, regulators appear free to liberally construe the power granted by section 343. The Federal Reserve’s loan to AIG is technically a secured loan, but it is often characterized as an equity purchase. See Matthew Karnitschnig et al., *U.S. to Take Over AIG in \$85 Billion Bailout; Central Banks Inject Cash as Credit Dries up*, WALL ST. J., Sept. 17, 2008, at A1 (noting that the AIG transaction is a secured loan but that it effectively transfers a majority interest to the government).

139. *Systemic Risk Hearings*, *supra* note 7, at 51 (statement of Richard Bookstaber); Jenny Anderson, *Hedge Fund Forced to Sell Its Portfolio*, N.Y. TIMES ONLINE, July 31, 2007, http://www.nytimes.com/2007/07/31/business/31hedge.html?_r=1&oref=slogin.

140. Peter Lattman, *Carlyle Fund to Target Distressed Assets; New Vehicle Enters a Crowded Field; Much Less Leverage*, WALL ST. J., Apr. 7, 2008, at C3, available at <http://online.wsj.com/article/SB120753238767993945.html>.

141. See Board of Governors Press Release, *supra* note 136.

142. As late as February 2009, it was impossible to properly value securitized mortgage assets because the market had been almost completely frozen for over six months. See Robert C. Pozen, Op-Ed., *How to Value Toxic Bank Assets*, WALL ST. J., Feb. 3, 2009, at A13, available at <http://online.wsj.com/article/SB120753238767993945.html>.

143. Schwarcz, *Systemic Risk*, *supra* note 2, at 218 (“[I]ndividual market participants who fully understand that risk will be motivated to protect themselves but not the system as a whole.”); see also Brown et al., *supra* note 58, at 15 (“Indeed, even if markets enjoy complete information about a firm’s governance decisions, they will only price the internal costs and benefits of those decisions.”).

144. See Rajan, *supra* note 18, at 514-19.

returns to make the financial system marginally more stable for other firms engaging in risky investment strategies.

Further, firms are provided the balance sheets of their counterparties. The problem is not that firms are unaware of systemic risk, but that it is individually less profitable to factor the cost to the system into a firm's decisionmaking calculus. Accordingly, increased disclosure should not be expected to result in firm-level changes that would diminish systemic risk.¹⁴⁵

4. *Internalizing Costs to the System*

An optimal solution to systemic risk must reduce the impediments to firms engaging in mutually and socially beneficial risk management. This is precisely the same externality produced by environmental pollutants. Each firm imposes costs on the environment because it prices only the costs and benefits of production internally, resulting in socially detrimental pollution levels.¹⁴⁶ Absent transaction costs, firms could bargain with each other to produce the efficient levels of pollution. However, "[t]he costs would be exorbitant if all these individuals attempted to reach an agreement,"¹⁴⁷ and the cost of pollution controls would reduce the firm's profitability. The result is that without regulation, a socially detrimental amount of pollution is produced.

From a regulatory perspective, excess systemic risk and excess pollution are the same problem. The solution lies in forcing firms to internalize the effects of their decisions, reducing the harm to the socially optimal level. Tradable permit systems have proven effective at reducing pollution to socially beneficial levels, forcing firms to internalize the cost of their emissions.¹⁴⁸ Such a system may provide an efficient way to limit systemic risk while allowing private ordering to efficiently allocate risk to the firms best able to manage it.¹⁴⁹ Though this proposal will face significant obstacles in implementation, the underlying incentive structure is efficient.

A tradable permit system¹⁵⁰ sets the total market allowance of the regulated good to a socially efficient level; however, because the permits can be traded, firms can allocate use to the most productive

145. Disclosure in other ways (i.e., more information) may lead to new avenues of regulation, but disclosure itself will not serve as effective regulation.

146. BARON, *supra* note 102, at 363-92 ("[S]ocial efficiency requires that the polluter and those affected by the pollution externality take into account both the harm and the costs of abatement.").

147. *Id.* at 367.

148. See generally KARAN CAPOOR & PHILIPPE AMBROSI, THE WORLD BANK, STATE AND TRENDS OF THE CARBON MARKET (2007) [hereinafter CARBON MARKET] (providing general discussion of carbon trading markets).

149. BARON, *supra* note 102, at 367-68.

150. "Tradable permit" and "cap and trade" are synonymous.

user.¹⁵¹ This type of system is optimal because activity is limited to the efficient level, but firms are able to trade allowances to meet “compliance requirements at the lowest possible cost.”¹⁵² Social efficiency results because firms can bargain over the ability to engage in the regulated activity over the efficient level. Effectively, firms are forced to internalize the cost of the harm because the individually maximizing strategy prices the cost of permitting to continue engaging in the activity. The firm best able to abate will reduce its activity and sell its unused permits for any price higher than the profit it would gain from incrementally increasing its usage of the regulated good. As a corollary, a firm that cannot abate for the least cost will purchase permits for any price below the profit it would lose from abating the activity.

The socially efficient outcome will result whether the permits are allocated for no charge or auctioned to the highest bidder at the outset.¹⁵³ For example, if a firm is allocated permits, it can abate the activity and sell to a nonabating competitor for any price between its cost of abatement and its competitor; if the permits are auctioned initially, the nonabating firm will purchase for any price below the cost of abating. Initial allocation does affect the distribution of wealth, but, in either scenario, both firms price the cost to the system, and the regulated activity is abated by the firm that can do so at the least cost.¹⁵⁴

By limiting the total pollution allowed each year, firms have the incentive to efficiently reduce the emissions and profit of their margin of abatement efficiency by selling permits to other firms. In effect, a tradable permit system realigns firms’ profit maximizing incentives with the socially efficient level of pollution. Because each firm can make an arbitrage profit by reducing its cost of abatement, firms have prosocial incentives. For example, allowances under the Clean Air Act reduced sulfur dioxide emissions from coal plants by forty-five percent and at half the cost of comparable command-and-control regulation.¹⁵⁵ The EPA implemented a similar system, which reduced nitrogen oxide emissions by over sixty percent from peak levels.¹⁵⁶

151. BARON, *supra* note 102, at 367-68 (discussing tradable permit mechanisms for pollutants); CARBON MARKET, *supra* note 148, at 11 (discussing allowance-based tradable permit markets).

152. BARON, *supra* note 102, at 367-68.

153. *Id.* at 367 (“With any of these allocations, social efficiency can be achieved provided the permits can be traded”). See generally Coase, *supra* note 102.

154. See BARON, *supra* note 102, at 367-68.

155. *Id.*; see also Sulfur Dioxide Allowance System, 40 C.F.R. § 73 (2008).

156. BARON, *supra* note 102, at 367-68; see also Acid Rain Nitrogen Oxides Emission Reduction Program, 40 C.F.R. § 76 (2008).

Though the incentives are similar, systemic risk does not perfectly map onto environmental regulation. The most problematic aspect is the dimension of regulation. For pollution, a regulator can easily determine what is to be regulated; for systemic risk, the activity that must be abated is less clear. In some aspects, however, systemic risk regulation is less difficult to implement. Implementing financial regulation is not saddled with the costs of construction or installation that may hamper pollution controls. Further, financial regulation should be easier to monitor. Once the relevant dimension is determined, monitoring could easily be automated provided that firms disclose accurate information. Finally, because financial regulation is virtual, the efficient level of risk can be modified without cost, similar to interest rates, if initial estimates are incorrect or innovation shifts the efficient level of risk.

The primary impediment to implementing such a system is quantifying the efficient level of risk. While resolving this issue is far beyond the scope of this Comment, the computations are clearly not impossible. Both Basel I and II presume that regulators can determine efficient levels of risk for large financial firms. If we accept that Basel can quantify risk to acceptable degrees of error, we need only modify the way that capitalization ratios are allocated in order to create tradable risk credits.

By reframing the problem, regulators can sensibly ask who can mitigate systemic risk for the least cost. By identifying the problem, we can ask which party in the externality can reduce risk at the lowest cost to society. In a frictionless market, we would expect to see market participants bargaining to reduce risk. However, the transaction costs of such a bargain are clearly prohibitive. Systemic risk must be addressed at the firm level by forcing market participants to bear the cost of their investment strategies.

5. A New Capital Adequacy

The correct dimension to regulate must be one that accurately internalizes the systemic cost of any decision. However, systemic risk is produced along a number of dimensions, such as leverage, liquidity, and size. Regulating any one of these dimensions would be insufficient to limit systemic risk. A large, leveraged firm pursuing low risk investments will present little systemic risk. Similarly, a large firm with low leverage will not threaten the system no matter how risky its positions are. Finally, firms with sufficiently small holdings will not present systemic risks no matter how risky or leveraged they are.

However, modifying Basel II's advanced capital adequacy framework will adequately capture all of the relevant dimensions. Instead of using the Basel II requirements to set firm-specific leverage and

capital levels, regulators could use the Basel formulas to determine firm-specific indices which could be bought and sold in increments. As noted above, the existence of the Basel Accords presumes that the calculations are not impossible or excessively arbitrary. By setting the total systemic risk at the socially efficient level, firms could bargain to increase their individual index, either through total size, leverage, or risk exposure. Basel II requirements are cognizant of the size of the firm and minimum capitalization requirements and also control for leverage.¹⁵⁷ Further, the IRB approach requires firms to impose liquidity haircuts on illiquid assets.¹⁵⁸ Basel II measures the right dimensions; it simply does not implement them in a way that changes firms' inefficient incentives. Fundamentally, Basel ignores the externality underlying systemic events: it does not force firms to internalize the systemic costs of their decisions. The result is that each firm still has the incentive to take as much risk as its capital constraints will allow.

If we accept that the IRB index can serve as a rough proxy for systemic risk, we need only allow firms to bargain for the right to exceed individual risk levels. The Federal Reserve can determine, based on the combined size of the largest institutions' balance sheets, a capitalization rate sufficient to ensure financial stability for the entire market. Firms can then trade credits to determine how that capitalization is allocated.¹⁵⁹ Exactly how this index would be determined is outside the scope of this Comment; the basic dimensions, however, are already present under the Basel framework. Firms that are best able to reduce risk will be able to do so and profit from selling their unused risk. The socially efficient strategy and the individually maximizing strategies will be aligned.

If the Basel formulas can be adopted so that the level of capitalization reflects the total balance sheets of all regulated firms, firms may then trade the right to engage in investment strategies that would exceed their capital constraints. Firms can increase returns by either buying risk credits or reducing illiquid positions, allowing leverage to fall against increasing balance sheets and selling credits. Here, the risk-preferring firm can continue high-risk investment strategies, but in doing so, it must price the costs to the system. The

157. Implementing Basel, *supra* note 69 (discussing how U.S. implementation of Basel II retains the leverage ratio found in Basel I).

158. BASEL COMM. ON BANKING SUPERVISION, *supra* note 69, at 31-36 (providing formula for determining liquidity discounts); *see, e.g.*, 17 C.F.R. § 240.15c3-1e(b)(3) (2008) (requiring liquidity to be taken into account when evaluating the market risk for any particular holding).

159. For instance, the E.P.A establishes accounts for all regulated firms to "account and allocate" allowance credits. *See* 40 C.F.R. § 73.31. These accounts are then used to transfer credits between firms. *See* 40 C.F.R. §73.50.

increased cost of pursuing high-yield investments will provide a disincentive to pursuing inefficient trading strategies.

Risk-averse firms have the incentive to pursue less risky strategies but remain competitive by selling unused risk credits. These firms will become less leveraged and less exposed to high-risk markets, reducing the total systemic risk. As there are fewer firms pursuing the same high-risk investment, spreads will not narrow as quickly. Firms will have less incentive to travel down the risk continuum, and the total risk exposure should decline, even without the internalization provided by limiting borrowing.

The result will be a bifurcation of the market into risk-taking firms and risk-avoiding firms. Risk-taking firms can still pursue high-yield investments, but in the event of a market shock, risk-avoiding firms will have liquid balance sheets and the ability to engage in for-profit bailouts. By realigning incentives, the market can effectively regulate itself during liquidity panics.

The implementation of a cap and trade will raise some difficulties. First, the proper scope of the regulations must be determined. Should all institutions be covered or only those with balance sheets above a certain threshold? Similarly, should hedge funds be regulated or only publicly traded funds? Though hedge funds have been criticized,¹⁶⁰ they do not generally pose significant systemic threats. While hedge funds do not publicly disclose their trading strategies, counterparties are given disclosures that are detailed enough to inform their lending decisions.¹⁶¹ Long Term Capital Management's¹⁶² failure was not devastating because of its "status as a hedge fund but [because of] the sheer size of its exposure to other institutions."¹⁶³ A prudent regulation would likewise exempt all funds below a certain size, regardless of their legal structure.¹⁶⁴

160. See Jenny Strasburg, *Legislators Seek Hedge-Fund Disclosure*, WALL ST. J., Feb. 2, 2009, at C2, available at <http://sec.online.wsj.com/article/SB123353873110737937.html> (noting several senators have proposed legislation mandating hedge fund registration to "to help prevent market catastrophes and investor fraud"); see also Hedge Fund Transparency Act, S. 344, 111th Cong. (2009); 155 CONG. REC. S1059 (daily ed. Jan. 29, 2009) (statement of Sen. Levin).

161. Schwarcz, *Systemic Risk*, *supra* note 2, at 218 ("[C]ounterparties already demand, and usually receive, disclosure to the extent it helps them assess the merits of their investments, qua investments.").

162. See *supra* note 114 for a brief discussion of LCTM's failure.

163. Schwarcz, *Systemic Risk*, *supra* note 2, at 203.

164. See generally Tamar Frankel, *Private Investment Funds: Hedge Funds' Regulation by Size*, 39 RUTGERS L.J. 657 (2008) (arguing the size of hedge funds should be regulated by restricting the ability of banks and financial intermediaries to contribute capital to private investment firms).

Further, it is important to note that the ideal level of systemic risk is not zero.¹⁶⁵ The ideal level of systemic risk is the level at which additional reduction of risk would not offset the possible lost financial gains. While quantifying systemic risk will be empirically and mathematically difficult, regulators are not beginning from a blank slate. The Basel Accords are premised on the ability to quantify the ideal rate of capitalization to ensure financial stability. Further, several academics have attempted to model or quantify systemic risk.¹⁶⁶ If we can sensibly talk about quantifying the risk of terrorist attack,¹⁶⁷ producing a workable estimate of systemic risk is well within our capabilities. Insurance companies routinely quantify the risk of rare events, such as hurricanes, floods, or the chance someone will hit a hole-in-one during a golf tournament. While exactly determining an ideal level of risk is unlikely, producing a liberal estimate is possible. As regulators evaluate the effectiveness of the proposal, the allowed level of risk can be revised with little cost.

Finally, an enacted system would have to determine how to allocate these credits. Traditionally, tradable permits can either be purchased from the government or allocated for no cost and then traded among firms. While either method is efficient, allocating the credits at no cost to firms will likely increase support for this proposal from the financial sector.

This Comment's main contribution offers a different way to frame the systemic risk problem and a novel way to resolve the issue. Determining the efficient level of systemic exposure will be difficult but not insurmountable. Certainly, a regulator can create exemptions for startup firms, firms with balance sheets below a certain level, or not-for-profit companies. By encouraging firms to internalize the systemic consequences of their actions, the level of systemic risk can be reduced ex ante, improving the stability of the financial system.

165. See Ben S. Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys., Address at the Federal Reserve Bank of Atlanta's 2006 Financial Markets Conference: Hedge Funds and Systemic Risk (May 16, 2006), <http://www.federalreserve.gov/newsevents/speech/bernanke20060516a.htm> (stating that the cost of eliminating systemic risk would stifle productivity); see also Schwarz, *supra* note 2, at 23-24 ("Because regulation can be costly, efficiency also demands that the costs of regulation do not exceed its benefits.").

166. See Sanjiv Ranjan Das & Raman Uppal, *Systemic Risk and International Portfolio Choice*, 59 J. FIN. 2809, 2817-31 (2004) (attempting to model systemic risk and determine optimal portfolio choice); Craig H. Furfine, *Interbank Exposures: Quantifying the Risk of Contagion*, 35 J. MONEY, CREDIT & BANKING 111, 120-25 (2003) (quantifying risk of contagious bank failures using interbank loan data). See generally Richard A. Posner, *Efficient Responses to Catastrophic Risk*, 6 CHI. J. INT'L L. 511 (2006) (discussing pricing of catastrophe events).

167. See generally HENRY H. WILLIS ET AL., RAND CORP., ESTIMATING TERRORISM RISK (2005), available at http://rand.org/pubs/monographs/2005/RAND_MG388.pdf.

V. CONCLUSION

As shown by this Comment, the subprime mortgage crisis is the result of an unprecedented regime shift in subprime performance combined with inefficient incentives in the financial system. While increased defaults are troubling, they are not the result of any real market failure. The market appears to have corrected its pricing errors, and there is no reason to believe that market discipline is insufficient.

Systemic risk, however, must be addressed by regulators. As the subprime crisis has illustrated, systemic failures are more than an academic concern. Traditional approaches to financial regulation appear inadequate; the problem is not that particular financial instruments or debt levels are inherently too risky, but that competitive incentives in the market lead to inefficient outcomes. Innovation is necessary and should be encouraged, but regulators must align the firms' private maximizing incentives with efficient social outcomes. Otherwise, regulators risk proscribing beneficial financial innovations or falling a step behind the next systemic threat.

This Comment has proposed a new framework with which to analyze the problem that may prove helpful in stabilizing the financial system. While further research is necessary, a tradable permit system appears to realign incentives for firm managers. A robust market in tradable-risk credits could create a system where firms' maximizing incentives are efficient, instead of producing a tragedy of the commons that overexploits limited financial resources.