

REGULATING FINANCIAL GUARANTORS

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To improve financial regulation, scholars have engaged in extensive research over the past decade to try to understand why systemically important financial firms engage in excessive risk-taking. None of that research fully explains, however, the unusually excessive risk-taking by financial guarantors such as bond insurers, protection sellers under credit-default-swap (CDS) derivatives, credit enhancers in securitization transactions, and even issuers of standby letters of credit. With tens of trillions of dollars of financial guarantees outstanding, the potential for failure is massive. This Article argues that financial guarantor risk-taking is influenced by a previously unrecognized cognitive bias, which it calls “abstraction bias.” Unlike banks and other financial firms that pay out capital—for example, by making a loan—at the outset of a project, financial guarantors do not actually transfer their property at the time they make a guarantee. As a result, they may view their risk-taking more abstractly, causing them to underestimate the risk (even after discounting for the fact that payment on a guarantee is a contingent obligation). The Article provides empirical evidence showing that abstraction bias is real and can influence even sophisticated financial guarantors. The Article also examines how understanding abstraction bias can improve the regulation of financial guarantor risk-taking.

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INTRODUCTION

Firms engage in risk-taking in order to make profits. Although risk-taking—especially if excessive—can cause externalities, the harm to third parties is usually either minimal, or outweighed from a societal perspective by the economic benefits of profitability, or required to be internalized through regulations and tort law.¹

When a systemically important financial firm (often referred to as a SIFI²) engages in excessive risk-taking, however, its failure can cause massive externalities if it triggers a systemic economic collapse.³ Traditional regulation and tort law are generally insufficient to limit or internalize those externalities.⁴ For example, although tort law imposes civil liability to remedy harm for unreasonable risk-taking,⁵ its effectiveness is limited to remedying foreseeable harm.⁶ But systemic harm is rarely foreseeable. A manager of a financial firm who, in the expectation of a bonus, sells highly-leveraged asset-backed securities to sophisticated investors could not reasonably foresee that she is contributing to a systemic economic collapse. Therefore, it is important to examine how to control excessive SIFI risk-taking.

Since the 2008–2009 financial crisis, scholars, regulators, and policy-makers have put forward various theories to explain, and try to control, that risk-taking.⁷ This Article argues that those theories do not fully explain the unusually excessive risks taken by financial firms as insurers of bonds and

¹ See Steven L. Schwarcz, *Misalignment: Corporate Risk-Taking and Public Duty*, 92 *NOTRE DAME L. REV.* 1, 2–3, 16–21 (2016) [hereinafter Schwarcz, *Misalignment*].

² Although SIFI is an acronym for a systemically important financial institution, those institutions are actually firms. Daniel Liberto, *Systemically Important Financial Institution (SIFI)*, *INVESTOPEDIA* (Nov. 21, 2019), <https://www.investopedia.com/terms/s/systemically-important-financial-institution-sifi.asp>.

³ Schwarcz, *Misalignment*, *supra* note 1, at 17.

⁴ See *id.* at 17–21.

⁵ See, e.g., Franklin A. Gevurtz, *The Role of Corporate Law in Preventing a Financial Crisis—Reflections on In re Citigroup Inc. Shareholder Derivative Litigation*, 23 *PAC. MC-GEORGE GLOBAL BUS. & DEV. L. J.* 113, 127–29 (observing that the concept of “[i]mposing liability to pay the damages resulting from unreasonable risks . . . is a pillar of tort law”); cf. RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 383 (6th ed. 2003) (observing that there are “two methods of public control—the common law system of privately enforced rights and the administrative system of direct public control”).

⁶ *RESTATEMENT (THIRD) OF TORTS* 3 (AM. LAW INST. 2013) (“To establish . . . negligence, it is not enough that there be a likelihood of harm; the likelihood must be foreseeable to the actor at the time of conduct.”).

⁷ See *infra* notes 58–59 and accompanying text.

other debt securities, as sellers of protection under derivatives known as credit-default swaps (CDS), as providers of credit enhancement in securitization transactions, as issuers of standby letters of credit, and otherwise as guarantors of financial obligations (collectively, “financial guarantors”).⁸ Despite their sophistication, financial guarantors tend to underprice risk relative to other financial firms.⁹ They also fail at a much higher rate than do other financial firms.¹⁰

We need to better understand financial guarantor risk-taking because of the immense size and impact of the financial guarantee industry.¹¹ For example, the “notional value of the CDS market” alone has been as high as \$57.8 trillion¹² and remains in the trillions.¹³ Monoline insurers had been insuring hundreds of billions of dollars of bonds,¹⁴ and the industry is poised for a revival with the potential to aid in the development of infrastructure projects worldwide,¹⁵ and a “renaissance” in municipal bond guarantees.¹⁶ The standby letter of credit market is likely in the trillions,¹⁷ with such instruments being “used in a huge range of transactions, such as lease agreements,

⁸ This Article later describes these forms of financial guarantees in more detail. *See infra* notes 39–4 and accompanying text. For some financial guarantors, such as monoline insurers, their sole business is providing financial guarantees. For other financial guarantors, such as banks that issue standby letters of credit, providing financial guarantees is only part of their business.

⁹ *See infra* notes 54 & 67–86 and accompanying text.

¹⁰ *See infra* notes 44–51 and accompanying text.

¹¹ *Cf.* Oscar Bernal et al., *Assessing the Contribution of Banks, Insurance, and Other Financial Services to Systemic Risk*, 47 *J. Banking & Fin.* 270, 271 (2014) (finding that the insurance industry in the United States—“characterized by an increased engagement in non-traditional activities such as credit default swaps”—displayed the largest contribution to systemic risk during the 2004–2012 period, as compared to the banking and other financial services industries).

¹² Houman B. Shadab, *Guilty by Association? Regulating Credit Default Swaps*, 4 *ENTREPRENEURIAL BUS. L. J.* 407, 433 (2010) (citing *BANK FOR INT’L SETTLEMENTS, OTC DERIVATIVES MARKET ACTIVITY IN THE SECOND HALF OF 2008* 7 (2009)). Shadab mentions that the notional value of the CDS market fell to \$41.87 trillion as of year-end 2008. *Id.*

¹³ Nina Boyarchenko, Anna M. Costello, & Or Shachar, *The Long and Short of It: The Post-Crisis Corporate CDS Market*, Federal Reserve Bank of New York, 26(3) *ECON. POL’Y REV.* 1, 1 (2020) (reporting “\$8 trillion notional value [of CDS] outstanding as of June 2018”); Iñaki Aldasoro & Torsten Ehlers, *The Credit Default Swap Market: What a Difference a Decade Makes*, 2 *BIS QUARTERLY REV.* 1, 2 (2018).

¹⁴ *Cf.* Moody’s, *Credit Opinion: Financial Guaranty Insurance Company* 1 (Jan. 30, 2009) (reporting that monoline insurer FGIC alone was insuring principal payments of \$73.1 billion in 2006).

¹⁵ *See, e.g., Monoline Revival Could Aid Infrastructure*, *FINANCIAL TIMES*, July 22, 2012, <https://www.ft.com/content/9790c5c2-d27b-11e1-8700-00144feabd0>; *cf.* MOODY’S INVESTORS SERVICE, *FINANCIAL GUARANTORS RATING METHODOLOGY* (May 29, 2018), at 6 (“We consider the size of the industry . . . to be an indicator of the acceptance of financial guaranty insurance.”).

¹⁶ *See, e.g., Heather Gillers, Bond Insurance Returns to the Muni Market in a Big Way*, *WALL ST. J.* (Oct. 22, 2020), https://www.wsj.com/articles/bond-insurance-returns-to-the-muni-market-in-a-big-way-11603359014?mod=itp_wsj&mod=amp;mod=DJemITP_h (reporting that the “municipal-bond insurance industry is having a renaissance”).

¹⁷ In 2017, Citigroup alone had over \$93 billion in standby letter of credit exposure. CITIGROUP INC., *BASEL III ADVANCED APPROACHES DISCLOSURES FOR THE QUARTERLY PERIOD ENDED JUNE 30, 2017*, at 12.

stock purchases, financial security, commercial paper, trade investments and many other such contracts.”¹⁸ There always will be a need for financial guarantors; institutional investors such as insurance companies and pension funds often are required to invest a large portion of their assets in AAA-rated securities.¹⁹ Because most securities have lower ratings, these investors need financial guarantors to enhance the credit to AAA levels.²⁰ Furthermore, the potential impact of the financial guarantee industry is greatly multiplied by the possible systemic consequences not only of a guarantor’s default, but also of its rating downgrade, on its counterparties.²¹

This Article hypothesizes that financial guarantor risk-taking is influenced by a previously unrecognized cognitive bias²² in perceiving risk, which it calls “abstraction bias.” The business of financial guarantors focuses on committing to pay out capital only if certain future contingencies occur—such contingent pay-out commitments are hereinafter referred to as “financial guarantees.” In contrast, the business of virtually all other financial firms focuses on paying out capital at the outset of a project, such as a bank that makes loans or a financial firm that makes investments. Because financial guarantors do not actually transfer their property at the time they make a guarantee, they may view their risk-taking more abstractly (the abstraction bias), causing them to underestimate the risk even after discounting for the fact that payment on a guarantee is a contingent obligation.²³

Recognizing abstraction bias as a cause of guarantor failure can inform financial regulation. It can help, for example, to refocus regulation away from facile solutions—such as the Dodd-Frank Act’s requiring securitizer risk-retention, or “skin in the game,” while ignoring that the market has always required such risk-retention²⁴—to solutions that address the more complex realities.

¹⁸ Aleksandar Lukic, *Bank Demand Guarantee and Standby Letter of Credit as Collaterals in International Trading Operations*, 4 INT’L J. MGMT. EXCELLENCE 508, 509 (2014).

¹⁹ JPMorgan North America Equity Research, *Financial Guarantors: In a Difficult Market, Growth of International Business is Key* (Sep. 5, 2006), at 12.

²⁰ *Id.* Monoline insurance, for example, typically raises BBB-rated securities to a AAA level, making the securities more widely eligible for investment. *See, e.g.*, James P. McNichols, *Monoline Insurance and Financial Guaranty Reserving*, <https://www.casact.org/pubs/forum/03fforum/03ff231.pdf>, at 235 (observing that “rating agencies require that all potential transactions be of investment grade quality (i.e., at least BBB- or equivalent) before any insurance wrap is considered. Therefore, each transaction generally receives a ‘shadow’ (non-public) rating by at least two of the three major rating agencies and, thus, a full deal rating agency review.”).

²¹ *See infra* notes 35–37 and accompanying text.

²² *Cf. infra* notes 60–62 and accompanying text (explaining cognitive biases).

²³ For example, assume a firm is considering two options: to lend \$1,000,000 to a borrower for a year with 3% interest and a 0.5% chance of the borrower defaulting on payment; or to guarantee a one-year \$1,000,000 loan made by another lender to the same borrower (and thus with the same 0.5% chance of default), for a guarantee fee having the same economic value. Although the expected value of these options to the firm would be equivalent, this Article hypothesizes that the firm would view the guarantee option less seriously.

²⁴ Matthew C. Turk, *Securitization Reform after the Crisis: Regulation by Rulemaking or Regulation by Settlement*, 37 REV. BANKING & FIN. L. 861, 880–82 (2018) (observing that

Abstraction bias also helps to solve a puzzle that several scholars, including the author, argue has been distorting post-financial-crisis regulation.²⁵ Politicians and the media have attributed much of the crisis-related excessive risk-taking to the so-called originate-to-distribute model (OTD) of securitization,²⁶ in which originators of risky loans sell them to third parties. These sales are presumed to transfer risk on the loans away from the originators, thereby creating moral hazard that encourages originators to make even riskier loans.²⁷ That explanation fails to explain, however, why those third parties—or why investors in and financial guarantors of securitization transactions sponsored by those third parties—accept that risk. Although risk marginalization can help to explain why investors individually might accept that risk,²⁸ it cannot explain why a financial guarantor—which takes on most if not all of a transaction’s risk—might do so. Abstraction bias provides an explanation: the financial guarantor underestimates the risk because it views the risk-taking more abstractly.

Some might question whether abstraction bias is related to the endowment effect—the cognitive bias that we value what we own more than what we do not own.²⁹ It is, however, fundamentally different: the endowment effect does not apply to commodified assets, such as money.³⁰ Nonetheless, abstraction bias and the endowment effect appear to have a common root in

“[i]n reality, it was common practice for the bank sponsoring a securitization to retain a substantial amount of the materialized risk” on those loans, and thus “the entire [risk retention] rule rests on a mistaken premise”).

²⁵ Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 256 (2009) [hereinafter Schwarcz, *Regulating Complexity*].

²⁶ “Securitization” refers to a category of financing transactions in which companies sell income-producing financial assets, such as mortgage loans, accounts receivable, and lease rentals, to a trust or other special-purpose entity (an “SPE,” sometimes interchangeably called a special-purpose vehicle or “SPV”), which in turn directly or indirectly sells to investors securities backed by rights to payments from these assets. The SPE uses the sale proceeds of those securities to pay the original company for the SPE’s purchase of the financial assets. The net effect of a securitization therefore is to transfer, via an SPE, rights to payments from financial assets owned by a company to investors in exchange for a transfer of cash from the investors to the company. Cf. Steven L. Schwarcz, *The Future of Securitization*, 41 CONN. L. REV. 1313 (2009).

²⁷ Schwarcz, *Regulating Complexity*, *supra* note 25, at 218.

²⁸ Cf. Steven L. Schwarcz, *Marginalizing Risk*, 89 WASH. U. L. REV. 487 (2012) (arguing that dispersing risk among numerous investors can sometimes cause even rational investors to underestimate and under-protect against risk).

²⁹ Cf. Richard Thaler, *Toward a Positive Theory of Consumer Choice*, 1 J. OF ECON. BEHAV. & ORG. 39, 44 (1980) (describing the endowment effect). The less common term used to describe the endowment effect, divestiture aversion, may capture the superficial similarity more intuitively.

³⁰ See, e.g., Nathan Novemsky & Daniel Kahneman, *The Boundaries of Loss Aversion*, 42 J. MARKETING RESEARCH 119, 125 (2005) (finding no endowment effect for goods that are owned for exchange and thus given up “as intended”—such as money given up in purchases); Nathan Novemsky & Daniel Kahneman, *How Do Intentions Affect Loss Aversion?*, 42 J. MARKETING RESEARCH 139, 139 (2005) (discussing that the endowment effect relates primarily to goods for which there is emotional attachment); cf. e-mail from Iman Anabtawi, Professor of Law, UCLA Law School, to the author (Aug. 4, 2019) (on file with author) (concluding that this Article is “saying something new and interesting that is not a corollary to the endowment effect”).

loss aversion—the observation that people weigh losses more heavily than gains in evaluating potential risks and outcomes.³¹ Loss aversion has “been invoked in the domain of riskless choice to explain the endowment effect”³² Abstraction bias similarly might be rooted in loss aversion: an investor that transfers its capital at the outset of a project—the time when investors usually price a deal³³—may focus more heavily on suffering a loss to that property than gaining a return on its investment. Therefore, intuitively, the investor may demand a relatively high return to compensate for that potential loss. Because financial guarantors do not transfer their property at the outset of a project, they may be less subject to loss aversion at that time—and thus unlikely to demand as high a return. This Article later shows that the pricing of actual deals supports these observations.³⁴

The Article’s analysis proceeds as follows. Part I of the Article shows that financial guarantors engage in excessive risk-taking that is not explained by existing theories of SIFI and other corporate risk-taking. Part II examines abstraction bias and analyzes why it helps to explain financial guarantor risk-taking. It also provides empirical research data and other evidence that support the existence of abstraction bias and its influence on financial guarantors. Part III analyzes how understanding financial guarantor risk-taking, as influenced by abstraction bias, can inform its regulation. Finally, Appendix A sets forth a detailed analysis and explanation of the empirical research data discussed in Part II.

The Article is primarily concerned with financial guarantor risk-taking that could cause systemic harm and with regulation that could help control that harm. Financial guarantor risk-taking could cause systemic harm in at least three ways: the risk-taking (a) causes a financial guarantor—a SIFI—to fail; (b) causes the financial guarantor—whether or not categorized as a SIFI—to default on one or more of its guarantee payments to a SIFI, causing a “knock-on” effect by undermining that SIFI’s financial condition³⁵; or (c) causes the credit rating of the financial guarantor—whether or not categorized as a SIFI—to be downgraded, in turn causing the downgrading of the

³¹ Markku Kaustia & Milla Perttula, *Overconfidence and Debiasing in the Financial Industry*, 4 REV. BEHAV. FIN. 46, 48 (2012); cf. Daniel Kahneman, Jack L. Knetsch, & Richard H. Thaler, *Fairness As a Constraint on Profit Seeking: Entitlements in the Market*, 76 AM. ECON. REV. 731, 731–32 (1986) (observing that people tend to feel more pain when they perceive a loss than a reduction in a gain, even though the absolute dollar amount change is the same); Amos Tversky & Daniel Kahneman, *Advances in Prospect Theory: Cumulative Representation of Uncertainty*, 5 J. RISK & UNCERTAINTY 297, 310 (1992) (observing that, psychologically, the pain of loss is twice as powerful as the joy of gain).

³² Novemsky & Kahneman, *The Boundaries of Loss Aversion*, *supra* note 30, at 119. See also Daniel Kahneman, Jack L. Knetsch, & Richard H. Thaler, *Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias*, 5 J. ECON. PERSPECTIVES 193 (1991).

³³ See, e.g., Albert Choi & George Triantis, *The Effect of Bargaining Power on Contract Design*, 98 Va. L. Rev. 1665, 1690–91 (2012) (describing the typical negotiation process for price and non-price terms in commercial loans, private equity investments, and corporate acquisitions).

³⁴ See *infra* notes 75–83 and accompanying text and Appendix A.

³⁵ This might be considered as a heightened form of counterparty risk.

securities guaranteed by that financial guarantor³⁶ and also raising possible adverse-selection concerns.³⁷ The Article addresses each of these possibilities.

I. EXISTING THEORIES DO NOT FULLY EXPLAIN FINANCIAL GUARANTOR RISK-TAKING

Existing theories of excessive SIFI risk-taking do not fully explain the unusually excessive risk-taking by financial guarantors.³⁸ To understand why, first consider the most typical forms of financial guarantees.

A. Forms of Financial Guarantees

Bond insurance represents a commercially important form of financial guarantee. This is usually provided by specialized insurance companies, which guarantee the payment of principal and interest to investors in bonds and other debt securities. These companies are referred to as “monoline” insurers because their business is in that single (*that is*, mono) line of insurance.³⁹

CDS contracts represent another widespread form of financial guarantee. In these contracts, one party (the protection “seller”) agrees, in exchange for the payment to it of a fee by a second party (the protection “buyer”), to assume the credit risk of certain debt obligations of a specified

³⁶ See, e.g., Buddy, *Could You Spare Us \$15 Billion?*, *ECONOMIST*, Jan. 24, 2008, at 38 (reporting that in the aftermath of the financial crisis, insurers were increasingly at risk for being downgraded by rating agencies, and that “from a systemic point of view, when a monoline [insurer] is downgraded all of the paper it had insured must be downgraded too”).

³⁷ See, e.g., Schwarcz, *Regulating Complexity*, *supra* note 25, at 226 (observing that after some monoline insurers lost their AAA rating in early 2008, investors began avoiding auction-rate-note (ARN) securities—which usually were guaranteed by monoline insurers—because of uncertainty over which securities were creditworthy; and that led to a collapse of the market for ARN securities) (citing to Ted Phillips, *Moody’s Warns of Negative Impacts from Auction-Rate Securities*, *THE BOND BUYER*, Feb. 21, 2008, at 4 (observing that failed auctions of ARN securities are “occurring in spite of the fact that the underlying credit quality of issuers remains strong”)).

³⁸ Cf. Martin Eling & David Antonius Pankoke, *Systemic Risk in the Insurance Sector: A Review and Directions for Future Research*, 19 *RISK MGMT. & INS. REV.* 249, 276–77 (2016) (observing that “certain nontraditional insurance activities appear to be relevant to systemic risk. The literature agrees that some underwriting activities in the nonlife segment (financial guarantees and CDSs) increase insurers’ vulnerability to impairments of the financial system. A majority of academic studies, working papers, regulator reports, and industry studies claim that these activities also contribute to systemic risk; only a minority argues that these products make a very limited contribution to systemic risk. . . . We systematically searched the extant literature for open research questions on the topic of systemic risk and discovered that there is ample room for future research.”); Dulani D. Jayasuriya, *The Rise and Fall of the Monoline/Bond Insurers: Icarus of the 21st Century* (Jan. 18, 2019), <https://ssrn.com/abstract=3318631> (“The Bond insurance literature is sparse and plagued by lack of data availability [although] monoline insurers [represent] an important sector in the economy.”).

³⁹ Schwarcz, *Regulating Complexity*, *supra* note 25, at 226 (citing *A Monoline Meltdown?*, *ECONOMIST*, July 28, 2007, at 77).

borrower or other obligor.⁴⁰ If a “credit event” (for example, default or bankruptcy) occurs in respect of that obligor, the protection seller will either pay the protection buyer an amount calculated by reference to the post-default value of the debt obligations or buy the debt obligations for their full face value from the protection buyer.⁴¹

Standby letters of credit represent a third commercially significant form of financial guarantee. These are instruments, usually issued by a bank, that guarantee payment of debt securities and other financial obligations upon the beneficiary’s presentation of documents certifying that a payment default has occurred.⁴² Other than the fact that payment is triggered by presentation of a document as opposed to the actual occurrence of the default, there is no substantive difference between standby letters of credit and more standard guarantees.⁴³ Indeed, substantively, there are strong functional similarities among all these forms of financial guarantees.⁴⁴

Although credit enhancement in securitization transactions⁴⁵ often uses a range of these forms of financial guarantees, it sometimes also utilizes non-guarantee subordinated investments.⁴⁶ The purpose of those investments parallels that of financial guarantees: to try to improve the creditworthiness and likelihood of full and timely payment of the securities issued in those transactions.⁴⁷

B. Financial Guarantors Underprice their Risk-Taking

Regardless of their form of financial guarantee, financial guarantors fail at a much higher rate than do other financial firms. This suggests that financial guarantors underprice, and thus engage in unusually excessive, risk-taking. Consider, for example, the case of monoline insurers. Of the nine

⁴⁰ JAN JOB DE VRIES ROBBE: SYNTHETIC SECURITIZATION in STEVEN L. SCHWARCZ, *STRUCTURED FINANCE: A GUIDE TO THE PRINCIPLES OF ASSET SECURITIZATION* § 10:1.1. (Adam D. Ford ed., 3d ed., rev. 2010) [hereinafter Schwarcz, *Structured Finance*].

⁴¹ *Id.* § 10:3.2.

⁴² Henry D. Gabriel, *Standby Letters of Credit: Does the Risk Outweigh the Benefits*, 1988 COLUM. BUS. L. REV. 705, 717–18 (1988); Boris Kozolchik, *The Emerging Law of Standby Letters of Credit and Bank Guarantees*, 24 ARIZ. L. REV. 319, 320–21 & 323 (1982).

⁴³ Gabriel, *supra* note 42, at 706, 714, 717–18; TIMOTHY D. NAEGELE, *STANDBY LETTERS OF CREDIT AND OTHER BANK GUARANTIES*, COMPENDIUM OF MAJOR ISSUES IN BANK REGULATION, COMMITTEE ON BANKING, HOUSING AND URBAN AFFAIRS, UNITED STATES SENATE 621, 658 (1975). The bank issuing a standby letter of credit need not determine if any non-documentary requirements for payment have been met. Kozolchik, *supra* note 42, at 320–21 & 323.

⁴⁴ Matthew C. Turk, *The Convergence of Insurance with Banking and Securities Industries*, COLUM. BUS. L. REV. 967, 970–71 (2015) (discussing the functional similarities of various forms of financial guarantee instruments).

⁴⁵ Securitization transactions are described in note 26.

⁴⁶ See *infra* notes 68–76 and accompanying text (referring to these types of investments made in senior-subordinated structures).

⁴⁷ Schwarcz, *Structured Finance*, *supra* note 40, at § 2:3.

monolines operating prior to the financial crisis, all but one failed⁴⁸—a failure rate far higher than that of banks.⁴⁹ That failure rate has been attributed to inadequate risk management.⁵⁰ But what explains the inadequacy, especially given that most of the monoline insurers were highly sophisticated and regulated financial firms?⁵¹

The AIG debacle provides evidence of unusually excessive risk-taking by CDS protection sellers. An AIG subsidiary sold so much protection under CDS contracts prior to the financial crisis that its parent, one of the world's largest and most sophisticated financial firms, was forced to post massive amounts of collateral to the swap counterparties.⁵² Ultimately, the federal government bailed out AIG, fearing its failure would have greatly exacerbated the crisis's severity.⁵³ The AIG risk-taking as protection seller, as well as the risk taken by CDS protection sellers more generally, is viewed as underpriced.⁵⁴ Again, what explains that?

⁴⁸ D. Dulani Jayasuriya, *The Rise and Fall of the Monoline/Bond Insurers: Icarus of the 21st Century*, NAT'L BUS. & MGMT. CONF., 640, 641 (2016), <https://nbmconference.files.wordpress.com/2017/03/648-665.pdf>. Jayasuriya observes that MBIA, Ambac, Financial Security Assurance (FSA), FGIC, SCA (aka XL Capital Assurance), Radian Asset Assurance, ACA Financial Guarantee Corporation, and CIFG failed and only Assured Guaranty continued to operate post-crisis. *Id.* at 641, 647; cf. Julia Kagan, *Monoline Insurance Company*, INVESTOPEDIA (June 23, 2020), <https://www.investopedia.com/terms/m/monolineinsurance.asp> (reporting that the financial crisis “nearly ran the entire monoline insurance industry into extinction”). In a personal e-mail, the former CEO of FSA has informed the author that all but two, not all but one, of the monoline insurers failed. Even in that case, the monoline-insurer failure rate would be far higher than that of banks. See *infra* note 49 and accompanying text.

⁴⁹ Data from the Federal Deposit Insurance Corporation (FDIC) show that 25 banks failed in 2008, 140 failed in 2009, and 157 failed in 2010. *Bank Failures in Brief – Summary 2001 through 2020*, FED. DEPOSIT INS. CORP., <https://www.fdic.gov/bank/historical/bank/> (last updated Apr. 3, 2020). During that period, therefore, 322 banks failed compared to roughly 7,000 banks in operation, cf. *Looking Back at Bank Failure Rates*, FORBES (Mar. 25, 2013, 9:00 AM), <https://www.forbes.com/sites/moneybuilder/2013/03/25/looking-back-at-bank-failure-rates/#3a8c4cb5581b> (reporting 7,053 FDIC-insured banks in operation in as of the date of that report), for a failure rate of less than five percent.

⁵⁰ See, e.g., Shadab, *supra* note 12, at 417 (“Unmanageable CDS losses arose because the risk management practices undertaken by certain bond insurers . . . were inadequate.”). Serving as an expert in certain litigations involving monoline insurers, the author personally has observed inadequate monoline risk-management practices.

⁵¹ Cf. Pamela Peterson Drake & Faith Roberts Neale, *Financial Guarantee Insurance and the Failures in Risk Management*, 1–2 (Oct. 2010), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1703602 (discussing the size and sophistication of monoline insurers). Monoline insurers are regulated by the applicable state insurance regulators. *The State of the Bond Insurance Industry: Hearing on H.R. Before the Subcomm. on Cap. Mkts., Ins., and Gov't Sponsored Enter.*, 110th Cong. 252 (2008) (statement of Erik R. Sirri, Director of SEC Division of Trading and Markets).

⁵² See, e.g., William K. Sjostrom, Jr., *The AIG Bailout*, 66 WASH. & LEE L. REV. 943, 960–61 (2009) (observing that during the summer of 2008, the amount of collateral posted was equivalent to 34 percent of the cash and cash equivalents that AIG had available to meet the cash needs of its operations).

⁵³ *Id.* at 963–75.

⁵⁴ Cf. Scott E. Harrington, *The Financial Crisis, Systemic Risk, and the Future of Insurance Regulation*, 76 J. RISK & INS. 785, 791 (2009) (“Given the large losses stemming from [the AIG subsidiary’s] CDO swap portfolio, it is obvious that the swaps can be viewed as

Standby letters of credit also may be underpriced. Several banks have failed, for example, because of their issuance of excessively risky standby letters of credit.⁵⁵ A Federal Reserve Board governor even cautioned that banks unable to quickly obtain reimbursement from their customers of monies paid out on standby letters of credit would likely fall into a liquidity crisis.⁵⁶ Why, therefore, do banks consistently appear to underestimate the risk of issuing such letters of credit?⁵⁷

C. Existing Theories Do Not Explain that Underpricing

Existing theories of SIFI risk-taking do not provide satisfactory answers to these questions. SIFI risk-taking has been ascribed to a range of factors, including intra-firm management conflicts, herding behavior, risk marginalization, mutual misinformation caused by complexity, leverage,⁵⁸ and even the shareholder-primacy model of corporate governance.⁵⁹ However, none of

underpriced *ex post*. Many observers believe that the contracts were underpriced *ex ante*; that is, they were too cheap given the risk of loss at the time they were written.”); PERRY MEHRLING, *THE NEW LOMBARD STREET: HOW THE FED BECAME THE DEALER OF LAST RESORT* 129–30 (2011) (arguing that AIG significantly underpriced the protection it sold under CDS contracts); RAGHURAM G. RAJAN, *FAULT LINES: HOW HIDDEN FRACTURES STILL THREATEN THE WORLD ECONOMY* 135 (2010) (noting that, “[p]rivately, AIGFP executives said the swaps contracts were like selling insurance for catastrophic events that would never happen: they brought in money for nothing!”); Richard Squire, *Shareholder Opportunism in a World of Risky Debt*, 123 HARV. L. REV. 1151, 1191 (2010) (suggesting that CDS buyers “may be acting on a belief that the swaps are underpriced relative to the expected value of future payouts”).

⁵⁵ United States National Bank, for example, had issued approximately \$100 million in letters of credit, of which \$91 million were standby letters of credit. It ultimately was required to pay many of those standby letters of credit but was unable to obtain reimbursement because many of the customers for whom it issued the credits became insolvent. See Paul R. Verkuil, *Bank Solvency and Standby Letters of Credit: Lessons from the USNB Failure*, 53 TUL. L. REV. 314, 315 (1979); see also *id.* at 318 n.20 (noting the additional failures of Franklin National Bank and Beverly Hills National Bank, both due to their issuance of standby letters of credit).

⁵⁶ Naegele, *supra* note 43, at 641–42 (discussing this observation by Federal Reserve Board Governor Holland).

⁵⁷ See, e.g., *id.* at 633 (observing that “banks . . . apparently had no reluctance [to issue standby letters of credit guaranteeing the payment of corporate commercial paper] owing to the fact that the fees involved were sufficiently attractive and *such transactions were perceived as high yield, no risk situations*”) (emphasis added).

⁵⁸ See, e.g., John Geanakoplos, *Leverage Caused the 2007-09 Crisis, in SYSTEMIC RISK IN THE FINANCIAL SECTOR: TEN YEARS AFTER THE GREAT CRASH* (Douglas W. Arner et al. eds., 2019), <https://pdfs.semanticscholar.org/7add/aaa9720ef6615e921626929eb517a2854863.pdf>; cf. Steven L. Schwarcz, *Systematic Regulation of Systemic Risk*, 2019 WIS. L. REV. 1 (2019) [hereinafter, Schwarcz, *Systematic Regulation*] (arguing that the triggers of systemic risk also include complexity, behavioral limitations, change, and maturity transformation). For example, the investor “feeding frenzy” for residential mortgage-backed securities (RMBS) that occurred from around 2005 until mid-2008 at least partly resulted from investor belief that housing prices would continue to increase and thus the underlying mortgage loans would eventually become overcollateralized. See Schwarcz, *Systematic Regulation*, at 19–20, 29–30.

⁵⁹ See Schwarcz, *Misalignment*, *supra* note 1, at 2–5. Shareholder primacy, for example, encourages firms to engage in risk-taking that has a positive expected value to the firm and its shareholders, regardless of harm to third parties. This works well for most firms because, as discussed, the third-party harm is usually minimal or outweighed by the economic benefits of

those factors differentiates financial guarantors from other financial firms. Therefore, none fully explains why financial guarantors underprice their risk and engage in more excessive risk-taking than other financial firms.

The Article next attempts to provide answers, arguing that abstraction bias helps to explain financial guarantor risk-taking. It also provides empirical research data and other evidence that support the existence of abstraction bias and its influence on financial guarantors.

II. ABSTRACTION BIAS HELPS TO EXPLAIN FINANCIAL GUARANTOR RISK-TAKING

A. *Hypothesizing Abstraction Bias to Explain Financial Guarantor Risk-Taking*

This Article recognizes abstraction bias as a type of cognitive bias—an implicit simplification of our perception of reality.⁶⁰ By distorting the internalization of information, cognitive biases violate the perfect-market assumption that parties have full information.⁶¹ That, in turn, can trigger financial market failures.⁶²

Similarly, by distorting the internalization of information about risk, abstraction bias helps to explain why financial guarantors take excessive risks. They do so because they do not actually transfer their property at the time they make a guarantee. Therefore, they may view risk to that property less seriously than would a firm that pays out capital at the outset of a project, such as a bank that makes loans. Complexity might even heighten abstraction bias by increasing the abstraction. That would help to explain why some of the riskiest financial guarantees were of the highly complex ABS CDO securities.⁶³

profitability or required to be internalized through regulations and tort law. *See id.* It is problematic for SIFIs, however, because systemic harm from a SIFI's failure can be substantial and is not internalized. *Id.* at 18–21.

⁶⁰ Steven L. Schwarcz, *Regulating Complacency: Human Limitations and Legal Efficacy*, 93 NOTRE DAME L. REV. 1073, 1079 (2018) [hereinafter Schwarcz, *Regulating Complacency*].

⁶¹ *See* Christine Jolls & Cass R. Sunstein, *Debiasing Through Law*, 35 J. LEGAL STUD. 199, 204–05, 207 (2006).

⁶² *Cf.* Schwarcz, *Regulating Complacency*, *supra* note 60 at 1085 (discussing certain parallels between the Great Depression and the financial crisis that show how cognitive biases can combine to create a tendency to define future events by the recent past, causing shocks that can trigger a systemic economic collapse).

⁶³ *Cf.* Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk*, 64 STAN. L. REV. 657 (2012) (observing the “importance of . . . CDOs to the market for mortgage securities in the years leading into the 2007–2009 financial crisis,” *id.* at 679, and the complexity of these securities, *id.* at 682–83). Abstraction bias might even add to optimism bias to enable people to see what they want to see. [Compare the reputed interpretation of the Delphic Oracle by King Croesus of Lydia, who wanted to make war on Cyrus. The Oracle advised that the war “would destroy a mighty kingdom.” T. DEMPSEY, *THE DELPHIC ORACLE: ITS EARLY HISTORY, INFLUENCE, AND FALL* 70 (1918). Croesus heard what he wanted to hear—that Cyrus would fall—but in fact, his empire was the one destroyed. *Id.* at

Even after accepting abstraction bias as a cognitive bias, some may question whether it can actually affect the behavior of sophisticated financial guarantors. The reality, though, is that cognitive biases can change the behavior of sophisticated professional parties even in business contexts.⁶⁴ It has been shown, for example, that loss aversion—in which abstraction bias is rooted⁶⁵—helps to explain conservatism in accounting, where profits are not recognized until they are certain whereas losses are often anticipated and recognized in advance.⁶⁶

B. Testing the Hypothesis

This Article so far treats abstraction bias as a hypothesis. To test this hypothesis, the author, with the valuable help of a research assistant,⁶⁷ has undertaken empirical research that compares the pricing of otherwise parallel risk-taking by financial guarantors and by financial firms that pay out capital at the outset of a project. This parallel risk-taking occurs in senior-subordinate securitization structures.⁶⁸ The findings, discussed below and in Appendix A, help to confirm that abstraction bias exists and that it can influence even sophisticated financial guarantors.⁶⁹

70–71. Knightian uncertainty—an occurrence whose risk is so uncertain that it cannot be quantified, FRANK H. KNIGHT, RISK, UNCERTAINTY, AND PROFIT 20 (1921),—might also increase the abstraction. At least some of the theoretical economic models describing the financial system pre-crisis (if not afterwards) were “dominated by . . . decisionmaking under risk.” Andrew G. Haldane & Vasileios Madouros, Federal Reserve Bank of Kansas City’s 366th Economic Policy Symposium: The Dog and the Frisbee, 110 (Aug. 31, 2012). The modern financial system’s complexity, however, “generates uncertainty, not risk.” *Id.* at 152; *cf. id.* at 110–11 (contrasting studying decisionmaking “under risk” with studying decisionmaking “under uncertainty”). And uncertainty requires a radically different regulatory response than does risk. *Id.* at 112 (observing that if the consequences of complexity were “risk and rational expectations,” the optimal response would be a “fine-tuned,” “fully state-contingent rule”; but if the consequences are uncertainty rather than risk, “that logic is reversed”). Economists have yet to adapt to an “uncertainty” model of finance. *See id.* at 152 (arguing that changing from a risk model of finance to an uncertainty model “would require an about-turn from the regulatory community from the path followed for the better part of the past 50 years,” and observing that even the financial crisis was “not able to deliver that change”).

⁶⁴ Indeed, the empirical research discussed *infra* notes 69, 76–83 and accompanying text, and in Appendix A demonstrates that abstraction bias can affect the behavior of monoline insurers, which epitomize sophisticated financial guarantors.

⁶⁵ *See supra* notes 33–34 and accompanying text.

⁶⁶ David Hirshleifer & Siew Hong Teoh, *The Psychological Attraction Approach to Accounting and Disclosure Policy*, 26 CONTEMP. ACCT. RES. 1067, 1074 (2009).

⁶⁷ Qinwen (“Kevin”) Zhang.

⁶⁸ These are also called “waterfall” structures because they represent an allocation of payments within the larger so-called “waterfall” of payments. Judge, *supra* note 63, at 673–76 (“The general idea [behind waterfall provisions] is to create a hierarchical structure in which losses on the underlying loans are allocated first to the subordinate tranches.”). The analysis of parallel risk-taking is informed also by the author’s expertise—judicially certified in various litigations in which the author served as an expert—in both senior-subordinate securitization structures and in monoline insurance.

⁶⁹ *Cf. supra* notes 64–66 and accompanying text (observing that cognitive biases can change the behavior of sophisticated professional parties even in business contexts).

In senior-subordinate securitization structures, the SPE issues multiple classes (sometimes called “tranches”) of securities, with losses on the underlying financial assets being absorbed by the different classes in sequence—that is, the most senior-priority securities are paid first, and the most subordinated-priority (sometimes referred to as “junior”) securities are paid last.⁷⁰ In other words, collections are allocated to payment of the most senior-priority securities first, while losses are first absorbed by the most junior-priority securities.

The goal of senior-subordinate securitization structures is to ensure payment of—in other words, effectively to guarantee—the senior securities.⁷¹ As a result of the overcollateralization provided by this structure, the senior securities thus receive AAA ratings.⁷² To understand this, consider an SPE with \$1,000 face amount of financial assets (*for example*, mortgage loans) and \$900 of liabilities consisting of \$700 of senior securities and \$200 of subordinated securities. If \$150 of the financial assets turn out to be bad (*for example*, borrowers default on \$150 of the \$1,000 in mortgage loans and, for this example, the collateral securing those defaulted loans has no remaining value), the remaining \$850 of collections would repay the \$700 senior securities in full, leaving only \$150 (*that is*, \$850 minus \$700) to pay the subordinated securities (ignoring the time value of money). Investors in the subordinated securities would thus be paid only 75 cents on the dollar (*that is*, \$150 on their \$200 of claims), whereas investors in the senior securities would be paid in full.⁷³

Abstraction bias would predict that subordinate investors, who pay their capital investment at the outset of a securitization transaction, would demand a relatively higher rate of return than would financial guarantors, who commit to pay out capital only if the securities issued in the transaction default in the future.⁷⁴ To test this prediction, the author compared the pricing of otherwise parallel risk-taking, for the purpose of credit enhancement,⁷⁵ by

⁷⁰ Schwarcz, *Regulating Complexity*, *supra* note 25, at 220.

⁷¹ *See id.* at 220 n. 46.

⁷² Joshua Coval, Jakub Jurek & Erik Stafford, *The Economics of Structured Finance*, 23 J. ECON. PERSP. 3, 6 (2009) (“The degree of protection offered by the junior claims, or overcollateralization, plays a crucial role in determining the credit rating for a more senior tranche, because it determines the largest portfolio loss that can be sustained before the senior claim is impaired.”).

⁷³ *Cf.* Adam J. Levitin & Susan M. Wachter, *Explaining the Housing Bubble*, 100 GEO. L. J., 1177, 1237–38 (2012) (explaining the senior-subordinated structure).

⁷⁴ Transaction parties may be prepared to accept that higher pricing because there are relatively few AAA-rated financial guarantors. *See, e.g.*, Joshua Hudson, *How to Evaluate the Strength and Performance of Bond Insurers*, MUNICIPALBONDS.COM (Oct. 17, 2018), <https://www.municipalbonds.com/bond-insurance/how-to-evaluate-the-strength-and-performance-of-bond-insurers/>.

⁷⁵ In the securitization industry, financial guarantees and senior-subordinate structures are often referred to as forms of credit enhancement. *Cf. supra* notes 45–47 (discussing credit enhancement).

monoline insurers⁷⁶ and by subordinated investors in senior-subordinate securitization structures during a two-year test period.⁷⁷

During the test period, the range of monoline insurer premiums in RMBS securitizations was 0.09% to 0.24%.⁷⁸ Monoline insurer credit enhancement generally increases the rating on senior securities from a shadow rating⁷⁹ of investment grade (that is, BBB+, BBB, or BBB-) to an actual rating of AAA.⁸⁰ The range of risk premiums on subordinated securities—which would be the equivalent of monoline insurer premiums for subordinated investors⁸¹—in RMBS securitizations during that period, in which the senior securities were shadow-rated merely investment grade prior to the credit enhancement but were actually rated AAA after such (subordinated debt) credit enhancement,⁸² was 0.75% to 4.99%.⁸³ In other words, investors in subordinated securities demand not only relatively higher—but in fact, substantially higher—pricing than monoline insurers for taking the same

⁷⁶ The fees paid to monoline insurers are usually called premiums to reflect the insurance industry. See Drake & Neale, *supra* note 51, at 1–2 (referring to the fees collected by monoline insurers as “premiums”).

⁷⁷ The two-year test period was 2006–2007. During that time, numerous monoline insurers and subordinated investors engaged in otherwise parallel risk-taking to credit enhance securitization transactions. See Appendix A. Because the financial crisis caused monoline insurers to begin to fail, see *supra* note 48, significantly less comparative data was available after 2008. Furthermore, any such data might be distorted by stresses associated with the financial crisis.

⁷⁸ See Appendix A.

⁷⁹ A shadow rating is an unofficial rating given to a bond or other debt security. See Adam Hayes, *Shadow Rating*, INVESTOPEDIA (Mar. 9, 2020), <https://www.investopedia.com/terms/s/shadowrating.asp>.

⁸⁰ Cf. Judge, *supra* note 63, at 675 (discussing credit enhancement of securitization transactions as including “letters of credit, guarantees, or insurance policies [that create AAA-rated securities by virtue of being] insured by a AAA-rated insurance company”); Sebastian Schich, *Challenges Related to Financial Guarantee Insurance*, 2008 OECD J., FIN. MKT. TRENDS 81, 91 (2008) (observing that financial guarantors “effectively lend[] their high credit rating to less creditworthy debt issuers. . .”). With only two exceptions, which did not change the range of pricing, the monoline insurer credit enhancement referenced in Appendix A similarly increased the rating on the senior securities in the MBS transactions shown from a shadow rating of merely investment grade (that is, BBB+, BBB, or BBB-) to an actual rating of AAA. See *infra* note 171.

⁸¹ A risk premium is the return in excess of the risk-free rate of return an investment is expected to yield; an investment’s risk premium is a form of compensation for investors who tolerate the extra risk, compared to that of a risk-free asset, such as similar term U.S. Treasury securities. Because a monoline insurer does not invest cash at the outset of a transaction, its premium is equivalent to a risk premium on a loan. Cf. Judge, *supra* note 63, at 675 (“So long as the amount paid for [an] insurance policy [from a AAA-rated guarantor] was less than the savings realized in the form of the lower interest rate that could be paid on the MBSs protected by the insurance, these policies made economic sense from the perspective of the transaction sponsor.”).

⁸² These data ignore the premium-equivalent pricing on any subordinated debt that might be needed to credit enhance the senior securities to merely investment grade.

⁸³ See Appendix A.

amount of risk.⁸⁴ These data points support the existence of abstraction bias⁸⁵ and its influence on financial guarantors.⁸⁶

The author also attempted to test the abstraction bias hypothesis by comparing CDS risk premiums and the risk premiums on corporate bonds. Finance theory predicts that these premiums could match.⁸⁷ Practical reality suggests that CDS risk premiums could be slightly higher because CDS protection sellers are exposed to a double credit risk: that of the bond issuer, and also that of the protection buyer, as counterparty.⁸⁸ Abstraction bias would predict, however, that CDS risk premiums would be lower. The past decade of empirical data show that CDS risk premiums have in fact been generally

⁸⁴ Because it is less expensive to credit enhance securitization transactions by using monoline insurance than a senior-subordinated structure, one might ask why monoline insurance is not used for all such transactions. The answer is that the rating agencies impose credit limits on a monoline insurer's aggregate credit exposure, so monoline insurers cannot credit enhance all such transactions (and there are virtually no other AAA-rated guarantors willing to provide such credit enhancement). Compare *supra* note 74 (observing that there are relatively few AAA-rated financial guarantors), with *infra* note 167 (observing that rating agencies require monoline insurers to be capitalized at a minimum ratio above the expected losses on their insured portfolio). Senior-subordinated structures are therefore used to credit enhance those non-guaranteed transactions. This might raise concern that the non-guaranteed transactions could represent riskier deals, and thus naturally should be priced higher. This Article avoids that concern by comparing only senior-subordinated structures in which the senior securities would be rated at least BBB (investment grade) absent the subordinated investment and AAA afterwards, which parallels the risk profile of the credit enhancement provided by monoline insurance. See *supra* notes 20, 79–81 and accompanying text.

⁸⁵ Because these data show only relative pricing differences, they support the existence of abstraction bias but do not necessarily prove that monoline insurers underprice risk in absolute terms. However, the fact that 89% of monoline insurers failed, see *supra* note 50 and accompanying text, supports the absolute underpricing of risk by monoline insurers.

⁸⁶ I recognize that there are certain differences between monoline insurer and subordinated investor risk-taking for the purpose of credit enhancement. In my experience, subordinated investors, unlike monoline insurers, are subject to prepayment risk: if the underlying mortgage loans are prepaid at a faster-than-expected rate and interest rates have declined, the investor may be unable to re-invest the prepaid monies at a rate as high as the originally contracted-for rate. They also have some loan-administration costs and might have some mismatching between their borrowing and investing maturities. The above differences might explain a modest pricing disparity between monoline insurers and subordinated investors; however, they do not explain the substantial disparity. Also, non-insurer financial guarantors might charge slightly higher pricing than monoline insurers because, in case of a default on the guaranteed financial obligation, a typical guarantor usually pays the defaulted obligation immediately whereas (again, in my experience) a monoline insurer usually contracts to pay the defaulted obligation according to its original (that is, non-accelerated) maturity schedule. Again, that difference does not explain the substantial pricing disparity between monoline insurers and subordinated investors.

⁸⁷ See, e.g., Darrell Duffie, *Credit Swap Valuation*, 55 FIN. ANALYSTS J. 73, 75 (1999) (explaining the assumptions under which CDS spreads would be expected to equal spreads on the underlying bond).

⁸⁸ Cf. John Hull & Alan White, *Valuing Credit Default Swaps II: Modeling Default Correlations*, 8 J. DERIVATIVES 12, 17 (2001) (investigating the impact of counterparty default risk on CDS valuation).

lower.⁸⁹ Economists find that “hard[] to explain.”⁹⁰ One possible explanation is that CDS protection sellers are subject to abstraction bias.⁹¹

Abstraction bias is also indirectly supported by credit-card research and by observations from bank regulation. There is a difference in perception, for example, when parties pay for goods in cash and when they pay by credit card. Raghurir and Srivastava find that “the more transparent the payment outflow, the greater the aversion to spending or higher the ‘pain of paying’ . . . leading to less transparent payment modes such as credit cards and gift cards (vs. cash) being more easily spent or treated as play or ‘monopoly money.’”⁹² Their explanations for the distinction are different than this Article’s explanation for abstraction bias,⁹³ possibly because they focus on consumer perception. In principle, though, abstraction bias would provide an independent explanation for their findings because Raghurir and Srivastava observe a “salience of parting with money.”⁹⁴

Observations from bank regulation further support the existence of abstraction bias. Traditionally, banks have been prohibited from making guarantees⁹⁵ due to a perception that guarantees do not reflect prudent banking.⁹⁶ This prohibition suggests, incongruously, that banks can prudently assess a firm’s creditworthiness for purposes of making a loan but cannot prudently

⁸⁹ See, e.g., Jennie Bai & Pierre Collin-Dufresne, “The CDS-Bond Basis” 16–17 (Sep. 12, 2018) (Georgetown McDonough School of Business Research Paper No. 2024531), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2024531. More in keeping with the double-credit-risk observation in the text above, Bai and Collin-Dufresne note that CDS risk premiums tended to be equal to or slightly higher than bond premiums prior to the financial crisis. *Id.* at 2.

⁹⁰ *Id.* at 5.

⁹¹ This is not definitive proof, however, because there may be other explanations. See *id.* (discussing other possible explanations). Furthermore, the data may be distorted by covariance between those risk premiums, reflecting that “[w]hile traditionally US Dollar and Sterling corporate bond markets have relied upon the spread of a corporate bond over the reference government bond, increasingly investors use the swap curve as their risk free reference.” Daniel Berman, *The Relationship between CDS and Bond Spreads*, THE TREASURER 50, 50 (May 2005), <https://www.treasurers.org/ACTmedia/May05TTBerman50-52.pdf>. Cf. *id.* (observing “there are many factors” that can distort the comparison).

⁹² Priya Raghurir & Joydeep Srivastava, *Monopoly Money: The Effect of Payment Coupling and Form on Spending Behavior*, 14 J. EXPERIMENTAL PSYCH: APPLIED 213, 214 (2008). Cf. *id.* (finding that consumers were willing to spend \$175 to throw a Thanksgiving party when using a credit card to buy the food, but only \$145 when using cash).

⁹³ They argue that using credit cards, rather than paying in cash, dulls the “pain of paying” because there is a separation in time between when the credit card is used to buy something and when the bill has to be paid and also because using a credit card allows different purchases to be mixed together (and therefore, when the credit-card bill is later paid, the consumer is unable to attribute the payment to any given purchase). *Id.* at 224.

⁹⁴ Raghurir & Srivastava, *supra* note 92, at 214.

⁹⁵ See, e.g., Boris Kozolchik, *Bank Guarantees and Letters of Credit: Time for a Return to the Fold*, 11 U. PA. J. INT’L BUS. L. 1, 12 (1989).

⁹⁶ *Id.*; cf. Richard A. Lord, *The No-Guaranty Rule and the Standby Letter of Credit Controversy*, 96 BANKING L.J. 46, 47 (1979) (“There has, at least since the beginnings of the banking industry in the United States, been a rule spoken equally fervently by courts and legal commentators alike, to the effect that a bank is unable to serve in the capacity of surety or guarantor.”).

assess the same firm's creditworthiness for purposes of guaranteeing that firm's obligation to repay a loan for the same amount and maturity.⁹⁷ An implicit recognition of abstraction bias provides a possible explanation for this seemingly illogical distinction:

[B]ankers may overlook the true credit risk involved [with standby letters of credit]. For instance, a loan officer intent on maximizing the bank's fees may adopt an unrealistically optimistic attitude that the letter will never be drawn on rather than ferreting out and evaluating the significant risks, originating from sources other than the customer, that attend standby letters of credit. Even in evaluating the creditworthiness of its own customer, a loan officer is likely to underestimate the risks of standby letters of credit, which are contingent [liabilities].⁹⁸

The history of bank efforts to circumvent the guarantee prohibition, by issuing standby letters of credit, provides evidence that the distinction may have some logic. As previously observed, there is no substantive but merely a formalistic difference between guarantees and standby letters of credit: the former is payable upon the actual occurrence of a default, the latter is payable upon presentation of a document certifying the occurrence of a default.⁹⁹ Standby letters of credit nonetheless are regarded as prudent banking instruments because they evolved on a path-dependent progression from traditional commercial letters of credit,¹⁰⁰ which facilitate commerce by serving as a reliable source of payment for the sale of goods.¹⁰¹

In a typical commercial letter-of-credit transaction, a seller of goods obtains a receipt—a document¹⁰²—when conveying the goods to a shipper, such as a railroad, truck, or airplane, for delivery to the buyer. The seller then gives the receipt to the bank issuing the letter of credit, which thereupon pays the seller for the goods. The bank, in turn, seeks reimbursement from its customer, the buyer.¹⁰³ This arrangement is considered prudent

⁹⁷ This means, in other words, that a bank could prudently assess a firm's creditworthiness to make a \$1,000,000 loan to the firm, repayable in one year, but it could not prudently assess the same firm's creditworthiness in order to guarantee a \$1,000,000 one-year loan made to that firm.

⁹⁸ Gabriel, *supra* note 42, at 730 (implicitly recognizing abstraction bias).

⁹⁹ See *supra* note 43 and accompanying text.

¹⁰⁰ Kozolchyk, *supra* note 42, at 322 (discussing standby letters of credit as "an offspring of the commercial letter of credit").

¹⁰¹ Gabriel, *supra* note 42, at 707–08 n.8 ("Letters of credit evolved as a mercantile specialty entirely separate from common law contract concepts and they must still be viewed as entities unto themselves. [They had been] [c]ompletely absorbed into the English common law by the 1700s along with the Law Merchant—of which it had become an integral part by the year 1200." (citing W. HOLDSWORTH, A HISTORY OF ENGLISH LAW 570-72 (1922))).

¹⁰² This receipt, or document, is traditionally called a bill of lading. Uniform Commercial Code (U.C.C.) § 1-201(a)(6) (AM. LAW INST. & UNIF. LAW COMM'N 2012).

¹⁰³ Robert D. Aicher, Deborah L. Cotton & TK Khan, *Credit Enhancement: Letters of Credit, Guaranties, Insurance, and Swaps (The Clash of Cultures)*, 59 BUS. LAW. 897, 901–02 (May 2004).

banking because of the relatively small amounts involved, the fact that the purchased goods usually collateralize the buyer's obligation to reimburse the bank, the relatively short duration (usually only weeks) between the issuance of the letter of credit and the bank's reimbursement for payment thereunder, and the many centuries of successfully using commercial letters of credit in banking.¹⁰⁴

Because standby letters of credit, like commercial letters of credit, are payable upon presentation of documents, regulators regard them as prudent banking instruments.¹⁰⁵ As discussed, however, there is evidence that standby letters of credit are much riskier than commercial letters of credit.¹⁰⁶ That stands to reason: the amounts payable on standby letters of credit can be huge because they are not tied to the sale of goods. Also, a standby letter of credit can remain outstanding for years, during which time the bank issuing the standby letter of credit is liable to pay the beneficiary regardless of whether the bank's customer remains creditworthy and able to reimburse the bank.¹⁰⁷ In other words, standby letters of credit can be as risky as financial guarantees, which they substantively resemble.

As a result, some jurisdictions, including the United States, specially regulate the issuance of standby letters of credit. For example, "federal regulatory agencies have required banks under their jurisdiction to count standby[] [letters of credit] toward each customer's section 84 lending limits and to disclose their issuance in footnotes to the bank's balance sheet."¹⁰⁸ Banks also must report at least the amounts of their outstanding standby letters of credit on their financial statements.¹⁰⁹ These regulations might inform the broader question of regulating financial guarantors.¹¹⁰

¹⁰⁴ Paul R. Verkuil, *Bank Solvency and Guaranty Letters of Credit*, 25 STAN. L. REV. 716, 716, 721 (May 1973) (describing the history and uses of commercial letters of credit and referring to them as "basic tool[s] of a fully developed bank business" which are "in function, secured loan[s]").

¹⁰⁵ Gabriel, *supra* note 42, at 719 (observing that the Comptroller of the Currency has distinguished standby letters of credit from guarantees by noting that the obligation to pay under a standby arises from the presentation of specific documents). *Cf.* Kozolchyk, *supra* note 42, at 332 ("The regulatory policy concerning standbys has been, on the whole, consistent with that of commercial letters of credit.").

¹⁰⁶ See *supra* notes 55–56 and accompanying text.

¹⁰⁷ Naegele, *supra* note 43, at 676 ("In the case of a standby letter of credit . . . , the bank must honor its obligation to the [beneficiary] immediately [upon presentation of conforming documents], even though the bank cannot collect from its 'client' or some other party.").

¹⁰⁸ Kozolchyk, *supra* note 42, at 332–33.

¹⁰⁹ 12 C.F.R. § 337.2 (2004).

¹¹⁰ See Part III, *infra*.

III. UNDERSTANDING FINANCIAL GUARANTOR RISK-TAKING CAN INFORM ITS REGULATION

This Article has observed that misunderstanding financial guarantor risk-taking leads to ineffective regulation.¹¹¹ Effective regulation of that risk-taking is critical. Whether a financial guarantor is actually categorized by regulators as a SIFI, its high degree of interconnectedness and resulting potential to trigger systemic harm justify regulation.¹¹² As discussed, a financial guarantor's excessive risk-taking could cause it to default on one or more of its guarantee payments to a SIFI, causing a "knock-on" effect.¹¹³ Excessive risk-taking also could cause a financial guarantor's credit rating to be downgraded, requiring the downgrading of the securities guaranteed by that guarantor and also raising possible adverse-selection concerns.¹¹⁴ This widespread impact reflects that interconnectedness—in this case, the interconnection between a financial guarantor and the numerous securities, issued by a multitude of firms, that it guarantees—is a key factor associated with the transmission of systemic risk.¹¹⁵

Effective regulation of financial guarantor risk-taking would require the law to correct abstraction bias. Next, this Article considers how regulators could try to accomplish that.

A. Regulation to Try to Correct Abstraction Bias

Although human nature cannot be easily changed, recent studies have shown that cognitive biases—which this Article argues would include abstraction bias—can be addressed and sometimes improved.¹¹⁶ Legal scholars

¹¹¹ See *supra* notes 24–26 and accompanying text (observing, for example, that the Dodd-Frank Act's requiring securitizer risk-retention as a purported solution to OTD-generated moral hazard ignores that the market has always required such risk-retention and deflects regulators from addressing more complex realities).

¹¹² Cf. *supra* notes 12–21 and accompanying text (discussing the immense size and impact of the financial guarantee industry).

¹¹³ See *supra* note 35 and accompanying text.

¹¹⁴ See *id.*

¹¹⁵ See, e.g., IMF et al., *Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations*, 13 (Oct. 2009), <https://www.imf.org/external/np/g20/pdf/100109.pdf> [<https://perma.cc/TB2P-XJWN>]; Basel Committee on Banking Supervision, *Consultative Document: Global Systemically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement 1* (July 2011) <https://www.bis.org/publ/bcbst201.pdf> [<https://perma.cc/VAA2-U5Y6>]. Systemic risk refers generally to the risk that the financial system could fail to function as a network. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, at 204, 207–08 (2008).

¹¹⁶ David Z. Hambrick & Alexander P. Burgoyne, *The Difference Between Rationality and Intelligence*, N.Y. TIMES (Sept. 16, 2016), <http://www.nytimes.com/2016/09/18/opinion/sunday/the-difference-between-rationality-and-intelligence.html> (describing a pair of studies published by psychologist Carey Morewedge and colleagues that found that computer training led to decreases in decision-making bias).

are beginning to explore how regulatory intervention can help to counteract irrationality and correct cognitive error.¹¹⁷

Professors Jolls and Sunstein have argued that cognitive biases can be regulated through an approach they call “debiasing through law.”¹¹⁸ The goal is to give people more control over the process of information.¹¹⁹ Regulators could engage in debiasing through law by making an event more “available” to individuals, such as by exposing them to a concrete instance of the event’s occurrence.¹²⁰ Ironically, in other words, this uses availability heuristics, another type of cognitive bias, to correct cognitive biases.

For example, smokers are more likely to believe that smoking will harm their health if they are exposed to specific, poignant, and concrete narratives rather than general information of health risks.¹²¹ Foreign cigarette package warnings that are more pictorially graphic than U.S. text-only warnings have been found to be more effective to discourage smoking.¹²² In the context of offering credit cards to consumers, Professor Juurikkala has similarly suggested giving consumers “vivid—perhaps even shocking—information about real cases that have gone wrong.”¹²³

Social scientists have suggested additional debiasing strategies, including changing optimizing choice architecture, changing incentives, and training.¹²⁴ Changing optimizing choice architecture generally parallels the Jolls and Sunstein approach of framing the presentation of information.¹²⁵ Changing incentives focuses on making people more accountable for their decisions by increasing the cost of making bad decisions or providing positive incentives for making good decisions.¹²⁶ Training focuses on helping decisionmakers learn how to better process information and make more accurate decisions.¹²⁷

¹¹⁷ See, e.g., Barry Schwartz, *Why Not Nudge? A Review of Cass Sunstein’s Why Nudge*, PSYCH REP. (Apr. 17, 2014), <http://thepsychreport.com/essays-discussion/nudge-review-cass-sunsteins-why-nudge/>; Schwarcz, *Regulating Complacency*, *supra* note 60.

¹¹⁸ Jolls & Sunstein, *supra* note 61, at 200.

¹¹⁹ See ROY F. BAUMEISTER & BRAD J. BUSHMAN, *SOCIAL PSYCHOLOGY AND HUMAN NATURE* 181 (5th ed. 2020); cf. Cass R. Sunstein, *People Prefer System 2 Nudges (Kind of)*, 66 DUKE L.J. 121, 131–32 (2016) (arguing that people are generally more receptive to requirements that allow them to exercise flexibility and agency than to more cut-and-dried rules such as requiring a display of graphics).

¹²⁰ Jolls & Sunstein, *supra* note 61, at 210.

¹²¹ *Id.*

¹²² See generally Hua-Hie Yong et al., *Mediational Pathways of the Impact of Cigarette Warning Labels on Quit Attempts*, 33 HEALTH PSYCHOL. 1410 (2014) (comparing Canadian, Australian, United Kingdom, and U.S. cigarette-package warnings).

¹²³ Oskari Juurikkala, *The Behavioral Paradox: Why Investor Irrationality Calls for Lighter and Simpler Financial Regulation*, 18 FORDHAM J. CORP. & FIN. L. 33, 56 (2012).

¹²⁴ See Carey K. Morewedge et al., *Debiasing Decisions: Improved Decision Making with a Single Training Intervention*, 2 POL’Y INSIGHTS FROM BEHAV. & BRAIN SCI. 129, 130 (2015).

¹²⁵ See *id.*; Jolls & Sunstein, *supra* note 61, at 210.

¹²⁶ See Carey K. Morewedge et al., *Debiasing Decisions: Improved Decision Making with a Single Training Intervention*, 2 POL’Y INSIGHTS FROM BEHAV. & BRAIN SCI. 129, 130 (2015).

¹²⁷ See *id.* at 131.

The foregoing debiasing strategies can inform the regulation of financial guarantor risk-taking. For example, regulators might consider explicitly warning financial guarantors of abstraction bias in order to help reduce that bias. Even a simple reminder that financial guarantors have been devastatingly wrong in the past can encourage more critical reflection and accurate risk assessments.¹²⁸

Regulators might also consider requiring credit officers of financial guarantors to attend lectures that emphasize that warning and caution against abstraction bias. Supplementing warnings with lectures has been shown to reduce investor overconfidence more effectively than merely providing warnings.¹²⁹

Regulators could also try to further reduce abstraction bias by making the possibility of having to pay on the guarantees more concrete. For example, they could consider requiring financial guarantors to engage in the type of stress testing currently mandated for SIFIs, requiring those firms to engage in periodic financial “stress test” scenarios¹³⁰ in order to motivate them to consider the possibility of, and to better prepare for, future periods when previously adequate liquidity and capital resources might prove inadequate.¹³¹ Officials from the Federal Reserve argue that these tests create a “strong, accountable, and proactive risk culture.”¹³² Similar stress testing of financial guarantors might posit, for example, that multiple guarantees become payable simultaneously. This requirement would be consistent with a

¹²⁸ See Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk: Towards an Analytical Framework*, 86 NOTRE DAME L. REV. 1349, 1389 (2011). Although some may argue that, after the financial crisis, financial guarantors already should see the event of a failure as “available,” the reality is that even the most sophisticated parties have relatively short memories when making investment decisions. See, e.g., Erik F. Gerding, *The Next Epidemic: Bubbles and the Growth and Decay of Securities Regulation*, 38 CONN. L. REV. 393, 418, 421–22 (2006) (“The availability bias means that, as time passes since the last financial crisis, regulators and policymakers discount the potential for new crises and the need for regulations to avert those crises.”). Cf. Larry Light, *Bondholder Beware: Value Subject to Change Without Notice*, BLOOMBERG, (Mar. 29, 1993), <http://www.bloomberg.com/bw/stories/1993-03-28/bondholder-beware-value-subject-to-change-without-notice> (observing that bondholders generally chose higher interest rates, thereby “go[ing] for the gold,” over protective event-risk covenants within only a few years after an event that seriously harmed unprotected bondholders).

¹²⁹ See Kaustia & Perttula, *supra* note 31, at 47, 57.

¹³⁰ BASEL COMM. ON BANKING SUPERVISION, *BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS* 46–47 (2011), <http://www.bis.org/publ/bcbs189.pdf>.

¹³¹ See CHRIS BRUMMER, *SOFT LAW AND THE GLOBAL FINANCIAL SYSTEM: RULE MAKING IN THE 21ST CENTURY* 225 (2d ed. 2015).

¹³² Charles Evans, President and CEO, Fed. Reserve Bank of Chi., Address at the Chicago Banking Symposium: The Call for Proactive Risk Culture (Jun. 3, 2015) (“It is incumbent on financial institutions to serve as their own first line of defense. A strong risk culture enables institutions to proactively identify and manage not only broad risks, but also risks that are specific to their business.”).

framing approach; by better understanding potential adverse outcomes, financial guarantors should be able to assess risks more accurately.¹³³

Also, although not yet technologically feasible, future scientific advances may even enable an integration of artificial and human intelligence in decision making. To that extent, regulation may require financial guarantors to integrate that artificial intelligence in making their credit decisions.

B. Regulation to Try to Mitigate Abstraction Bias's Harm

Even the best regulatory efforts, however, are unlikely to fully correct abstraction bias. We do not yet understand human nature well enough to avoid being influenced by cognitive biases in all cases. Until we do, regulation should be designed not only to try to prevent abstraction bias from influencing financial guarantors but also to try to mitigate the harm that that influence can cause. This dual approach takes inspiration from chaos theory which holds that in complex engineering systems, as well as in complex financial systems, failures are almost inevitable.¹³⁴ Therefore, the system should be designed to also limit the consequences of these failures.¹³⁵

Consider how to try to mitigate the harm caused by abstraction bias. The most direct harm, as discussed,¹³⁶ is that abstraction bias can cause a financial guarantor to engage in excessive risk-taking, leading to its failure. Consequence-limiting regulation may therefore focus on making financial guarantors robust enough to resist failure. Abstraction bias also can cause indirect harm, insofar as a financial guarantor's failure would cause it to default on its guarantee payments. Furthermore, even without causing a financial guarantor's failure, abstraction bias can cause a financial guarantor to engage in excessive risk-taking that leads to a downgrading of its credit rating, requiring the downgrading of the securities guaranteed by that guarantor and raising possible adverse-selection concerns. Following these leads, the analysis next examines possible consequence-limiting regulatory approaches.

¹³³ Jolls & Sunstein, *supra* note 61, at 216 ("A strategy of debiasing through substantive law in response to consumers' optimism bias is to require that firms identify the potential negative consequences associated with their product or a particular use of their product rather than the positive consequences associated with (for instance) an alternative usage.").

¹³⁴ See Schwarcz, *Regulating Complexity*, *supra* note 25, at 248. One aspect of chaos theory is deterministic chaos in dynamic systems, which recognizes that the more complex the system, the more likely it is that failures will occur. Thus, the most successful (complex) systems are those in which the consequences of failures are limited. In engineering design, for example, this can be done by decoupling systems through modularity that helps to reduce a chance that a failure in one part of the system will systemically trigger a failure in another part.

¹³⁵ *Id.* at 248–49; see also Iman Anabtawi & Steven L. Schwarcz, *Regulating Ex Post: How Law Can Address the Inevitability of Financial Failure*, 92 TEX. L. REV. 75, 92, 102 (2013) (developing that argument).

¹³⁶ See *supra* notes 35–37 and accompanying text.

1. Regulation Making Financial Guarantors Robust Enough to Resist Failure

There are at least three ways to accomplish this. Informed by the regulation of standby letters of credit issued by banks,¹³⁷ regulators could consider requiring financial guarantors to limit the amount of their credit exposure to any given party whose obligations are being guaranteed, such as an issuer of guaranteed securities. That amount should be calculated by including any credit exposure to affiliates of that party because their creditworthiness would normally be correlated.¹³⁸ This approach would parallel regulation that imposes lending limits on banks.¹³⁹ From a cost-benefit standpoint, the approach would provide relatively weak protection, but it should not impose a significant cost.¹⁴⁰

Another approach might be to subject financial guarantors to risk-based capital requirements, like the capital requirements imposed on banks¹⁴¹ and the claims-reserve requirements imposed on insurance companies.¹⁴² Capital requirements represent the most widespread approach to make SIFIs, for example, robust enough to resist failure. Such requirements are intended to protect firms both against unexpected losses¹⁴³ and against becoming excessively leveraged¹⁴⁴ by requiring them to hold minimum levels of capital.¹⁴⁵

¹³⁷ Cf. *supra* notes 108–109 and accompanying text (discussing imposing lending limits on standby letters of credit).

¹³⁸ Cf. Franklin A. Gevurtz, *Groups of Companies*, 66 AM. J. COMP. L. 181, 181, 210 (2018) (discussing the correlated creditworthiness of affiliated companies).

¹³⁹ Lending limits restrict national banks from lending more than the value of 15 percent of their unimpaired capital to a single customer. Kenneth J. Rojc, *National Bank Lending Limits—A New Framework*, 40 BUS. LAW. 903, 906–07 (1985). Loans made to a customer are also attributed to those with whom the customer forms a “common enterprise,” which includes affiliation. *Id.* at 919, 921–24.

¹⁴⁰ See BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT’L SETTLEMENTS, AN ASSESSMENT OF LONG-TERM ECONOMIC IMPACT OF STRONGER CAPITAL AND LIQUIDITY REQUIREMENTS 7 (2010) (“On balance, the analysis suggests that there is considerable room to tighten capital and liquidity requirements while still yielding positive net benefits, measured in terms of output.”). See also Eric A. Posner, *How do Bank Regulators Determine Capital-Adequacy Requirements?*, 82 U. CHI. L. REV. 1853, 1878–80 (2015) (discussing the merits of the above-referenced Basel Comm. on Banking Supervision cost-benefit analysis of capital requirements).

¹⁴¹ Cf. Aldasoro & Ehlers, *supra* note 13, at 10 (observing a shift of credit risk from monoline insurers to banks).

¹⁴² A claims reserve, sometimes called a balance-sheet reserve, is an actuarially determined amount of money set aside by insurance companies to pay policyholders. See Claims Reserve, Investopedia, <https://investopedia.com/terms/c/claims-reserve.asp> (last visited Sept. 28, 2020).

¹⁴³ Kern Alexander & Steven L. Schwarcz, *The Macroprudential Quandary: Unsystematic Efforts to Reform Financial Regulation*, in RECONCEPTUALISING GLOBAL FINANCE AND ITS REGULATION 127, 136 (Ross Buckley et al. eds., 2016).

¹⁴⁴ See Hervé Hannoun, Gen. Manager, Bank for Int’l Settlements, *The Basel III Capital Framework: A Decisive Breakthrough*, BoJ-BIS High Level Seminar on Financial Regulatory Reform: Implications for Asia and the Pacific Hong Kong SAR 2 (Nov. 22, 2010), <http://www.bis.org/speeches/sp101125a.pdf>.

Capital requirements can be very effective to make firms more robust, but their costs are uncertain. Some economists argue that capital requirements have little associated public costs; others argue to the contrary.¹⁴⁶ The misapplication of capital requirements also could have substantial costs.¹⁴⁷ Because of these uncertainties, regulators should be cautious about subjecting financial guarantors to capital requirements and also should be circumspect about which financial guarantors might be subjected to such requirements.

A third possible approach might be to consider requiring financial guarantors to “reinsure” their guarantee liabilities, as do traditional insurance companies. Reinsurance refers to insurers contractually transferring portions of their risk, especially in the case of major catastrophes, to other parties, known as reinsurers. Reinsurance helps to prevent an insurer from failing by enabling it to recover all or part of the payments it makes to its insured policyholders.¹⁴⁸ Because the field of reinsurance can be highly specialized, a detailed analysis may require the collaboration of financial law and insurance scholars.¹⁴⁹

¹⁴⁵ BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT’L SETTLEMENTS, *BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS*, 12 (Dec. 2010), http://www.bis.org/publ/bcbs189_dec2010.pdf. In its most pristine form, capital consists of equity. Hervé Hannoun, Gen. Manager, Bank for Int’l Settlements, *The Basel III Capital Framework: A Decisive Breakthrough*, 6–8 (Nov. 22, 2010), <http://www.bis.org/speeches/sp101125a.pdf>.

¹⁴⁶ Cf. Eduardo Porter, *Recession’s True Cost Is Still Being Tallied*, N.Y. TIMES (Jan. 21, 2014), <http://www.nytimes.com/2014/01/22/business/economy/the-cost-of-the-financial-crisis-is-still-being-tallied.html> (discussing criticisms of capital requirements). Compare ANAT ADMATI & MARTIN HELLWIG, *THE BANKERS’ NEW CLOTHES: WHAT’S WRONG WITH BANKING AND WHAT TO DO ABOUT IT* 98 (2013) (arguing that higher capital requirements on banks would have no associated public costs), with Jean Dermine, *Bank Regulations After the Global Financial Crisis: Good Intentions and Unintended Evil*, 19 EUR. FIN. MGMT. 658, 662 (2013) (arguing that higher capital requirements “might lead to inefficiently higher interest rates on bank loans [and also] induce social costs as banks reduce their supply of loans or securitize assets”), and Emiliós Avgouleas, *Bank Leverage Ratios and Financial Stability: A Micro- and Macroprudential Perspective*, 16–17 (Levy Econ. Inst. Working Paper No. 849, 2015) (arguing that higher capital requirements can create “uncertainty [that] severely undermines rather than reinforces market discipline”).

¹⁴⁷ Cf. Steven L. Schwarcz, *Too Big to Fool: Moral Hazard, Bailouts, and Corporate Responsibility*, 102 MINN. L. REV. 761, 779–80 (2017) (observing that capital requirements are generally imposed on a countercyclical basis, and the mistiming or misapplication of countercyclical regulation can be devastating).

¹⁴⁸ See American Academy of Actuaries Catastrophe Management Work Group, *Catastrophe Exposure and Insurance Industry Catastrophe Management Practices* 15–16 (2001).

¹⁴⁹ For an overview of reinsurance and its costs and benefits, see Daniel Schwarcz & Steven L. Schwarcz, *Regulating Systemic Risk in Insurance*, 81 U. CHI. L. REV. 1569, 1613–18 (2014).

2. Regulation Mitigating the Harm Caused by a Financial Guarantor's Default

One way to accomplish this would, again, be informed by the regulation of standby letters of credit issued by banks.¹⁵⁰ That regulation requires those banks to disclose at least the amounts of their outstanding standby-letter-of-credit contingent liabilities on their financial statements.¹⁵¹ This helps parties seeking protection under a standby letter of credit to assess the issuing bank's creditworthiness, and thus its ability (if needed) to pay the letter of credit in the future.

Regulators could similarly consider whether to require financial guarantors to disclose the amounts of their outstanding guarantee liabilities on their financial statements, thereby helping parties seeking the protection of such a guarantee to assess the financial guarantor's ability to pay the guarantee in the future. A disclosure requirement imposes relatively little cost.¹⁵² At least one commentator believes that disclosure of AIG's liabilities as a CDS protection seller might have alerted protection buyers, and possibly even regulators, to the AIG situation.¹⁵³

A more costly but protective regulatory approach would be to require financial guarantors to pay into a financial guarantee protection fund.¹⁵⁴ The fund would be available to pay guaranteed parties in the event of a financial guarantor's default. This would parallel the approaches used in the banking industry to mitigate the harm to depositors caused by a bank's default,¹⁵⁵ used in the nuclear industry to protect against the costs of reactor acci-

¹⁵⁰ See *supra* notes 108–109 and accompanying text.

¹⁵¹ Subsection (d) of 12 C.F.R. § 337.2 (2004) provides in relevant part that “all . . . standby letters of credit must be adequately reflected on the bank's published financial statements.” Ideally, this disclosure should also include the identity—enabling investors to assess the creditworthiness—of the party responsible for reimbursing the bank should the standby letter of credit be drawn down.

¹⁵² Indeed, generally accepted accounting principles already require the disclosure of loss contingencies in financial statements, although usually in notes to the statement, and include “guarantees of indebtedness of others” as an example of a loss contingency. FINANCIAL ACCOUNTING STANDARDS BOARD, STATEMENT OF FINANCIAL ACCOUNTING STANDARDS NO. 5 5–6 (Mar. 1975).

¹⁵³ See Shadab, *supra* note 12, at 417.

¹⁵⁴ Alternatively, regulators may require counterparties to post collateral, at least for CDS transactions. This approach could reduce default by protecting against liquidity risk, and the very posting of the collateral could mitigate abstraction bias. On the other hand, posting collateral can be costly. Also, the very requirement to post collateral might lead to a default, such as that which Lehman suffered when it could not satisfy its margin calls to post collateral. *But cf.* Patrick Fitzgerald & Marie Beaudette, *Geithner: Lehman Wasn't Felled by J.P. Morgan Collateral Calls*, WALL ST. J. (May 17, 2012), <https://www.wsj.com/articles/SB1000142405702303360504577410353589465814> (arguing that “Lehman wasn't felled by JP Morgan collateral calls”).

¹⁵⁵ The Federal Deposit Insurance Corporation (FDIC) guarantees deposit accounts up to specified limits and requires deposit-taking banks to pay into a fund that reimburses the FDIC for such guarantee payments. 12 U.S.C. §§ 1811, 1821 (2012).

dents,¹⁵⁶ and used in the insurance industry to ensure that policyholders are paid even if an insurer fails.¹⁵⁷ The very fact that financial guarantors would be making a protection-fund payment up front would also help to de-bias them.

Some argue, however, that such a protection fund could create moral hazard.¹⁵⁸ Those arguments appear to be wrong. A protection fund paid for by risk-taking market participants should motivate those participants to monitor and help control each other's risky behavior, in order to reduce risk-taking that could deplete the fund and require those participants to pay even more into the fund.¹⁵⁹

3. Regulation Mitigating the Harm Caused by a Financial Guarantor's Credit-Rating Downgrade

This approach to regulation is informed by post-financial-crisis derivatives regulation. Although the following discussion is in the context of mitigating the harm caused by a financial guarantor's rating downgrade, the approach also could mitigate the above-discussed harm caused by a financial guarantor's default because it would require a creditworthy central party to make those payments.

Post-crisis derivatives regulation focuses on the centralized clearing of those contracts through central counterparties (CCPs), which are well-capitalized entities often associated with derivatives, commodities, or other securities exchanges.¹⁶⁰ The CCP legally substitutes its credit for that of the contracting parties, making the CCP the primary counterparty on both sides of the contract—for example, the buyer to every seller and the seller to

¹⁵⁶ The Price-Anderson Act requires a first-tier funding of \$450 million by each owner of a nuclear reactor into a fund to compensate for possible reactor accidents. It also requires a \$13.4 billion self-insurance fund, financed collectively by all owners of nuclear reactors. U.S. NUCLEAR REG. COMM'N, *Background on Nuclear Insurance and Disaster Relief Funds*, <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/nuclear-insurance.html> (last updated April, 2019).

¹⁵⁷ See, e.g., Martin F. Grace & Hal S. Scott, *An Optional Federal Charter for Insurance: Rationale and Design*, in *THE FUTURE OF INSURANCE REGULATION IN THE UNITED STATES* 90–91 (Martin F. Grace & Robert W. Klein, eds., 2009) (comparing state insurance funds with the FDIC deposit fund).

¹⁵⁸ Cf. Thomas M. Hoenig, Vice Chairman, FDIC, *Deposit Insurance: Addressing Its Moral Hazard Effect* (Oct. 11, 2017), <https://www.fdic.gov/news/news/speeches/spoct1117.pdf> (discussing the moral hazard debate concerning government deposit insurance of banks).

¹⁵⁹ Steven L. Schwarcz, *Controlling Financial Chaos: The Power and Limits of Law*, 2012 WIS. L. REV. 815, 831 (2012). Regulators also might consider parties seeking financial guarantees to protect themselves. For example, CDS protection buyers sometimes further protect themselves by requiring the protection seller to put up collateral, which is marked to market. Shadab, *supra* note 12, at 436.

¹⁶⁰ Steven L. Schwarcz, *Central Clearing of Financial Contracts: Theory and Regulatory Implications*, 167 U. PA. L. REV. 1051–53 (2019) [hereinafter Schwarcz, *Central Clearing*].

every buyer.¹⁶¹ The CCP thereby ensures the performance of a derivatives contract even if a contracting party fails.¹⁶²

This central clearing requirement already applies to certain CDS contracts, which will help to mitigate the harm caused by the credit-rating downgrade of protection sellers under those contracts. I have separately argued, however, that regulators should consider extending central clearing to financial contracts more generally, in order to mutualize financial contract risk.¹⁶³ Financial contracts include financial guarantees. Regulators therefore might consider extending central clearing to such guarantees.

If regulation required well-capitalized CCPs to pay financial guarantee obligations, the financial guarantor's credit-rating downgrade would not impact the rating of the guaranteed securities.¹⁶⁴ Although a full discussion of the benefits, costs, and mechanics of centrally clearing financial guarantees is beyond this Article's scope, such a discussion could begin by applying the analysis of centrally clearing financial contracts to financial guarantees as a subset of those contracts. That discussion also would have to take into account CCP credit ratings. To mitigate the harm caused by a financial guarantor's rating downgrade, the CCP's credit rating would have to be at least as high as the financial guarantor's original credit rating.

CONCLUSIONS

Scholars have not yet fully explained why financial guarantors, such as bond insurers, CDS protection sellers, credit enhancers, and issuers of standby letters of credit, engage in unusually excessive risk-taking. This Article argues that financial guarantor risk-taking is influenced by a previously unrecognized cognitive bias, which it calls "abstraction bias." Unlike banks and other financial firms that pay out capital—for example, by making a loan—at the outset of a project, financial guarantors do not actually transfer their property at the time they make a guarantee. As a result, they may view their risk-taking more abstractly, causing them to underestimate the risk.¹⁶⁵

The Article then tests the abstraction-bias hypothesis. The testing includes empirical research comparing the pricing of otherwise parallel risk-

¹⁶¹ See PETER NORMAN, *THE RISK CONTROLLERS* 7-8 (2011); Richard Squire, *Clearing-houses as Liquidity Partitioning*, 99 *CORNELL L. REV.* 857, 862 (2014) ("The clearinghouse interposes itself between the parties, serving as the counterparty to each. Instead of selling the cattle future to Buyer, Seller sells it to the clearinghouse, which sells an identical future to Buyer."). The substitution of credit is legally referred to as a "novation," which arises when a new party assumes a payment obligation that was incurred by a debtor on a contract and the original debtor is totally released from the obligation. 66 C.J.S. *Novation* § 1 (2019).

¹⁶² NORMAN, *supra* note 161, at 7. This reduces counterparty risk—the risk that a contracting party's default will harm other parties to the contract. *Id.* at 9.

¹⁶³ Schwarcz, *Central Clearing*, *supra* note 160, at 1052.

¹⁶⁴ Once such a CCP makes a payment, it would have to make a subrogation claim against the financial guarantor for reimbursement. *Id.* at 1095.

¹⁶⁵ This takes into account, of course, the fact that payment on a guarantee is merely a contingent obligation. See *supra* note 23.

taking by financial firms that invest capital at the outset of securitization transactions and by financial guarantors of those transactions. The comparison shows that the investors demand substantially higher pricing than the financial guarantors for taking the same amount of risk. This helps to confirm that abstraction bias actually influences financial guarantors.

The Article also analyzes how understanding abstraction bias could improve the regulation of financial guarantor risk-taking. Regulators could consider debiasing strategies, for example, to help prevent abstraction bias from influencing financial guarantors. Because even the best efforts could not eliminate that bias, the Article also examines how regulatory design could help mitigate the harm caused by abstraction bias.

In writing this Article, the author originally was puzzled that abstraction bias influences monoline insurers but not, apparently, traditional insurance companies. The answer appears to be that traditional insurers insure events for which there are rigorous statistical and actuarial data,¹⁶⁶ which reduces the need to apply human judgment.¹⁶⁷ Such data would be rare, however, for financial obligations, which can be much more *sui generis*.¹⁶⁸ This observation invites a broader inquiry into the possible influence of abstraction bias on other forms of risk-taking that lack rigorous statistical and actu-

¹⁶⁶ See, e.g., CHARLES NYCE, AM. INST. FOR CPCU/INS. INST. OF AM., PREDICTIVE ANALYTICS WHITE PAPER, 1–3 (2007), <https://www.the-digital-insurer.com/wp-content/uploads/2013/12/78-Predictive-Modeling-White-Paper.pdf> (demonstrating the use of predictive analytics by insurance companies and explaining that proprietary data, as well as data from “numerous third party sources,” allow insurance companies to develop predictive models by which to determine premiums).

¹⁶⁷ Another possible answer might be that traditional insurers need to pay money into claims reserves, requiring at least partial initial outlays of money. See *supra* note 142 and accompanying text. Monoline insurers do not have to create such reserves because they are capitalized at a minimum ratio above the expected losses on their insured portfolio. MOODY’S, MOODY’S PORTFOLIO RISK MODEL RESULTS FOR FINANCIAL GUARANTORS 2-3 (2006), https://www.moody’s.com/research/Moodys-Portfolio-Risk-Model-Results-for-Financial-Guarantors—PBC_98601. For example, to rate a monoline insurer’s guarantee as Aaa, Moody’s requires that the ratio be at least 1.3. MOODY’S, THE CHANGING BUSINESS OF FINANCIAL GUARANTY INSURANCE 6 (2008), https://www.moody’s.com/research/The-Changing-Business-of-Financial-Guaranty-Insurance—PBC_111991.

¹⁶⁸ Cf. Levitin & Wachter, *supra* note 73, at 1234 (discussing the failure of rating agencies to provide reliable ratings on MBS because of the securities’ lack of “multicycle experience” and the variety of “collateral, borrower strength, and credit enhancement” across deals, none of which are alike); Protiviti KnowledgeLeader, *What is Financial Instrument Risk?*, KnowledgeLeader Blog (Jan. 25, 2018, 5:13 PM), <https://info.knowledgeleader.com/financial-instrument-risk> (observing that “there are no standardized agreements or controls that exist” for over-the-counter debt securities). Furthermore, decades of residential-mortgage-loan data did not predict the unprecedented 2008–2009 housing-price decline, which was greater than during the Great Depression. Even the rating agencies failed to predict that decline. See, e.g., CORELOGIC, EVALUATING THE HOUSING MARKET SINCE THE GREAT RECESSION 4 (Feb. 2018), <https://www.corelogic.com/downloadable-docs/corelogic-peak-totrough-final-030118.pdf> (noting S&P’s pre-crisis model that housing prices could fall as much as 20%, whereas they actually fell around 33%—more than their fall in the Great Depression). This raises a broader question for further study: should financial guarantors guarantee obligations whose risks are so uncertain that they cannot be quantified? Cf. *supra* note 63 (discussing Knightian uncertainty). Answering this question would confront other cognitive biases, such as optimism bias, which could cause the financial guarantor to believe it can quantify those risks.

arial data. That inquiry could inform such policy questions, for example whether insurers should be permitted to expand their coverage to non-traditional areas of risk¹⁶⁹ and whether companies should be required to take special precautions when incurring novel risks that do not involve an initial outlay of money.¹⁷⁰

¹⁶⁹ Cf. Schwarcz, *Regulating Complexity*, *supra* note 25, at 223–24 (arguing that complexity causes people to see what they want to see and to overlook contingent correlations).

¹⁷⁰ Cf. Anabtawi & Schwarcz, *supra* note 128, at 1358–59 (discussing how underestimating the risk of guaranteeing its stock price in an innovative hedging structure led to Enron’s failure).

APPENDIX A

ANALYSIS AND COMPARISON OF MONOLINE INSURER
PREMIUMS AND SUBORDINATED INVESTOR
RISK PREMIUMS FOR TAKING THE SAME AMOUNT OF RISK

MONOLINE INSURER PREMIUMS¹⁷¹

TABLE 1: MONOLINE INSURER PREMIUMS OF MBIA

No.	MBS Name	Principal Balance (millions)	Premium Rate (per annum)	Premium Amount (millions)	Maturity (years)
1	CWHEQ 2006-E ¹⁷²	1,500.000	0.10%	1.500	30
2	CWHEQ 2006-G ¹⁷³	1,000.000	0.165%	1.650	30
3	CWHEQ 2006-S8 ¹⁷⁴	1,000.000	0.12%	1.200	30
4	CWHEQ 2006-S9 ¹⁷⁵	1,000.000	0.12%	1.200	30
5	CWHEQ 2006-S10 ¹⁷⁶	1,597.600	0.14%	2.237	30
6	CWHEQ 2007-S1 ¹⁷⁷	1,600.000	0.13%	2.080	30
7	CWHEQ 2007-S2 ¹⁷⁸	999.000	0.17%	1.698	30
8	CWHEQ 2007-S3 ¹⁷⁹	700.000	0.24%	1.680	30

¹⁷¹ With only two exceptions, the monoline insurer credit enhancement, referenced in this Appendix A, increased the rating on the senior securities in the MBS transactions shown from a shadow rating of merely investment grade (that is, BBB+, BBB, or BBB-) to an actual rating of AAA. That reflects the standard function of monoline insurance. See *supra* notes 79–80 and accompanying text. The exceptions were FGIC’s 2006-S2 Transaction for which the shadow rating was A-/A3, and FGIC’s 2007-C Transaction for which the shadow rating was A-/Baa2. The pricing on those transactions was, nonetheless, within the range of FGIC’s pricing for credit enhancing senior securities that were shadow-rated merely investment grade.

¹⁷² CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-E, Prospectus Supplement (Form 424B5) S-85 (Jun. 28, 2006).

¹⁷³ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-G, Prospectus Supplement (Form 424B5) S-81 (Aug. 29, 2006).

¹⁷⁴ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S8, Prospectus Supplement (Form 424B5) S-41 (Dec. 27, 2006).

¹⁷⁵ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S9, Prospectus Supplement (Form 424B5) S-45 (Dec. 28, 2006).

¹⁷⁶ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S10, Prospectus Supplement (Form 424B5) S-46 (Dec. 28, 2006).

¹⁷⁷ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2007-S1, Prospectus Supplement (Form 424B5) S-48 (Feb. 27, 2007).

¹⁷⁸ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2007-S2, Prospectus Supplement (Form 424B5) 51 (Mar. 29, 2007).

¹⁷⁹ CWHEO Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2007-S3, Prospectus Supplement (Form 424B5) S-50 (Mar. 29, 2007).

TABLE 2: MONOLINE INSURER PREMIUMS OF SYNCORA

No.	MBS Name	Principal Balance (millions)	Premium Rate (per annum)	Premium Amount (millions)	Maturity (years)
1	CWHEQ 2006-D ¹⁸⁰	1,850.000	0.09%	1.665	30
2	CWHEQ 2006-S7 ¹⁸¹	994.500	0.09%	0.895	30

TABLE 3: MONOLINE INSURER PREMIUMS OF FGIC

No.	MBS Name	Principal Balance (millions)	Premium Rate (per annum)	Premium Amount (millions)	Maturity (years)
1	CWHEQ 2006-H ¹⁸²	2,000.000	0.11%	2.200	30
2	CWHEQ 2006-S2 ¹⁸³	1,050.000	0.11%	1.155	30
3	CWHEQ 2006-S3 ¹⁸⁴	1,000.000	0.12%	1.200	30
4	CWHEQ 2006-S5 ¹⁸⁵	900.000	0.12%	1.080	30
5	CWHEQ 2007-C ¹⁸⁶	950.000	0.14%	1.330	30

¹⁸⁰ CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-D, Prospectus Supplement (Form 424B5) S-89 (Mar. 29, 2006).

¹⁸¹ CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S7, Prospectus Supplement (Form 424B5) S-42 (Nov. 29, 2006).

¹⁸² CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-H, Prospectus Supplement (Form 424B5) S-87 (Sep. 28, 2006).

¹⁸³ CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S2, Prospectus Supplement (Form 424B5) S-43 (Mar. 29, 2006).

¹⁸⁴ CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S3, Prospectus Supplement (Form 424B5) S-38 (Jun. 26, 2006).

¹⁸⁵ CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2006-S5, Prospectus Supplement (Form 424B5) S-41 (Sep. 26, 2006).

¹⁸⁶ CWHEQ Inc., CWHEQ Revolving Home Equity Loan Trust, Series 2007-C, Prospectus Supplement (Form 424B5) S-77 (Mar. 29, 2007).

TABLE 4: MONOLINE INSURER PREMIUMS OF AMBAC:

No.	MBS Name	Principal Balance (millions)	Premium Rate (per annum)	Premium Amount (millions)	Maturity (years)
1	CWABS 2006-11 ¹⁸⁷	690.200	0.14%	0.966	30
2	CWABS 2006-13 ¹⁸⁸	442.125	0.13%	0.575	30
3	CWHEQ 2006-B ¹⁸⁹	1,150.000	0.12%	1.380	40
4	CWHEQ 2006-C ¹⁹⁰	1,850.000	0.12%	2.220	40
5	CWHEQ 2006-S1 ¹⁹¹	860.000	0.15%	1.290	15
6	CWHEQ 2006-S4 ¹⁹²	1,000.000	0.13%	1.300	30
7	CWHEQ 2006-S6 ¹⁹³	1,100.000	0.12%	1.320	30

¹⁸⁷ CWABS Inc., CWABS Asset-Backed Certificates Trust 2006-11, Prospectus Supplement (Form 424B5) S-81 (Jun. 28, 2006).

¹⁸⁸ CWABS Inc., CWABS Asset-Backed Certificates Trust 2006-13, Prospectus Supplement (Form 424B5) S-76 (Jul. 27, 2006).

¹⁸⁹ CWHEO Inc., CWHEQ Revolving Home Equity Loan Tr., Series 2006-B, Prospectus Supplement (Form 424B5) S-83 (Mar. 28, 2006).

¹⁹⁰ CWHEO Inc., CWHEQ Revolving Home Equity Loan Tr., Series 2006-C, Prospectus Supplement (Form 424B5) S-88 (Mar. 28, 2006).

¹⁹¹ CWHEO Inc., CWHEQ Revolving Home Equity Loan Tr., Series 2006-S1, Prospectus Supplement (Form 424B5) S-44 (Mar. 29, 2006).

¹⁹² CWHEO Inc., CWHEQ Revolving Home Equity Loan Tr., Series 2006-S4, Prospectus Supplement (Form 424B5) S-39 (Sep. 7, 2006).

¹⁹³ CWHEO Inc., CWHEQ Revolving Home Equity Loan Tr., Series 2006-S6, Prospectus Supplement (Form 424B5) S-44 (Sep. 28, 2006).

SUBORDINATED INVESTOR RISK PREMIUMS

Table 5: MBS (S&P rated) with fixed coupon rates

Average premium: 2.13

Security Name	Issue Date	Maturity	Cpn	S&P Init Rtg	T-bonds YTM ¹⁹⁴	Premium
BSSP 2006-16 1A2	4/24/06	3/25/36	6.00	BBB-	5.07	0.93
BSSP 2006-17 2A2	5/24/06	5/26/36	6.00	BBB-	5.13	0.87
BSSP 2006-17 3A2	5/24/06	5/27/36	6.00	BBB	5.13	0.87
DBARN 2006-AR6 N2	2/13/07	2/25/37	7.50	BBB-	4.93	2.57
BSSP 2007-N2 2A2	2/23/07	1/27/37	6.50	BBB	4.79	1.71
BSSP 2007-N2 9A2	2/23/07	1/26/37	6.00	BBB-	4.79	1.21
CWALN 2007-AH1 N2	3/9/07	2/25/47*	8.50	BBB-	4.72	3.78
BSSP 2007-N3 6A2	3/23/07	2/26/37	6.00	BBB-	4.80	1.20
BSSP 2007-N3 9A2	3/23/07	2/26/37	6.00	BBB-	4.80	1.20
BSSP 2007-N4 1A2	4/24/07	3/25/37	6.50	BBB	4.80	1.70
BSSP 2007-N4 5A2	4/24/07	4/25/37	6.00	BBB-	4.80	1.20
GSMSC 2007-NIM3 N2	4/26/07	5/26/37	8.00	BBB-	4.87	3.13
DBARN 2007-AR3 1N2	5/23/07	5/25/37	9.00	BBB-	5.01	3.99
DBARN 2007-AR3 2N2	5/23/07	6/25/37	9.00	BBB-	5.01	3.99
BSSP 2007-N6 3A2	6/22/07	5/25/37	6.00	BBB-	5.25	0.75
MANM 2007-HF2 N2	8/8/07	9/25/37	10.00	BBB-	5.01	4.99

*: 40-yr maturity MBS

TABLE 6: MBS (S&P RATED) WITH FLOATING COUPON RATES

Average premium: 2.11

Security Name	Issue Date	Maturity	Cpn	S&P Init Rtg	T-bonds YTM	Premium
GSR 2006-AR2 1B3	4/28/06	12/25/35	7.29	BBB	5.17	2.12
HMBT 2006-2 B1	11/30/06	12/25/36	6.65	BBB	4.56	2.09

¹⁹⁴ The yields of 30-year treasury bonds were selected as risk-free rates. See *Daily Treasury Yield Curve Rates*, U.S. DEP'T OF THE TREASURY, <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>. (last visited Sep. 27, 2020).

TABLE 7: MBSs (MOODY'S RATED) WITH FIXED COUPON RATES

Average premium: 1.89

Security Name	Issue Date	Maturity	Cpn	Moody Init Rtg	T-bonds YTM	Premium
GSMSC 2007-NIM1 N2	12/25/06	8/25/46*	8.00	Baa3	4.73	3.27
BSSP 2007-N2 10A2	2/23/07	12/26/36	6.00	Baa3	4.79	1.21
BSSP 2007-N3 4A2	3/23/07	1/26/37	6.00	Baa3	4.80	1.20

*: 40-year maturity MBS

TABLE 8: MBS (MOODY'S RATED) WITH FLOATING COUPON RATES

Average premium: 1.55

Security Name	Issue Date	Maturity	Cpn	Moody Init Rtg	T-bonds YTM	Premium
IMSA 2006-1 2B	3/30/06	5/25/36	6.23	Baa3	4.89	1.34
IMSA 2006-2 2B	6/29/06	8/25/36	6.45	Baa3	5.26	1.19

TABLE 9: TREASURY YIELD CURVE

