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# Using Insights into Human Rationality to Improve Financial Regulation

Steven L. Schwarcz

## Key Points

- The limitations of human rationality constrain the efficacy of law. This policy brief examines how insights into human rationality could improve financial regulation.
- Four categories of limitations — herd behaviour, cognitive biases, overreliance on heuristics and a proclivity to panic — constrain the efficacy of financial regulation by undermining the perfect-market assumption that parties have full information and will act in their rational self-interest.
- Regulators could improve financial regulation by addressing these limitations. Since we do not yet fully understand our limitations, even improved regulation will remain imperfect. As a result, future financial failures are inevitable. Financial regulation should be designed to address that inevitability by not only deterring financial crises but also mitigating their harm when they inevitably occur.

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## Introduction

Since the 1970s, the field of behavioural psychology has been exploring limitations on human rationality. Herbert Simon first outlined the theory of “bounded rationality,” which posits that we cannot access and process all the information needed to maximize our benefit. The human mind therefore “necessarily restricts itself” by relying on cognitive shortcuts.<sup>1</sup> Recent studies have shown, however, that these human limitations can sometimes be improved. Legal scholars are now beginning to explore how these studies could inform more effective regulation.

This policy brief explores how these studies could inform more effective financial regulation.<sup>2</sup> The following section entitled “Categories of Human Limitations” begins by showing that four categories of human limitations can undermine two of the perfect-market assumptions that underlie financial regulation: that parties have full information and that they will act in their rational self-interest.<sup>3</sup>

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1 “Herbert Simon”, *The Economist* (20 March 2009), online: <[www.economist.com/node/13350892](http://www.economist.com/node/13350892)>.

2 This policy brief is based on the author’s article, “Regulating Complacency: Human Limitations and Legal Efficacy” (2018) 93 *Notre Dame L Rev* 1073.

3 *Farlex Financial Dictionary*, s.v. “perfect market assumptions”, online: <<http://financialdictionary.thefreedictionary.com/Perfect+market+assumptions>> (discussing perfect market assumptions, including that market participants have equal access to information and are completely rational).

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## About the Author

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## Categories of Human Limitations

Although there is no generally accepted way to categorize the limitations on human rationality, scholars often discuss the limitations associated with herd behaviour, cognitive biases and overreliance on heuristics.<sup>4</sup> For studying financial regulation, the author proposes a fourth category: the human proclivity to panic, which is strongly connected to the stability of financial markets. The author next shows why these limitations can undermine the perfect-market assumptions that underlie financial regulation.

### Herd Behaviour

Herd behaviour refers to the human tendency to follow others. This can be beneficial if a firm's managers follow the behaviour of other firms whose managers have more or better information.<sup>5</sup> However, herd behaviour becomes problematic if followers act against their self-interest. This can happen when a firm's managers follow the behaviour of other firms' managers whom they mistakenly think have more or better information, whereas, in fact, they are following a misleading information cascade — a convergence of action that reflects imitation more than good information.<sup>6</sup>

An information cascade can undermine financial regulation's perfect-market assumption that parties have full information. For example, early diners who arbitrarily choose restaurant A over nearby restaurant B “convey [...] information to later diners about what they knew. A cascade then develops when people abandon their own information in favor of inferences based on earlier people's actions,”<sup>7</sup> i.e., that restaurant A is better than restaurant B.

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4 See Richard H Thaler & Cass R Sunstein, *Nudge: Improving Decisions about Health, Wealth, and Happiness* (New York: Penguin Group, 2008) at 23–31, 53–71.

5 See Lynne L Dallas, “Short-Termism, the Financial Crisis, and Corporate Governance” (2012) 37:2 J Corp L 265 at 314.

6 Sushil Bikhchandani et al, “A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades” (1992) 100:5 J Political Economy 992 at 993–94.

7 David Easley & Jon Kleinberg, *Networks, Crowds, and Markets: Reasoning about a Highly Connected World* (Cambridge, UK: Cambridge University Press, 2010) at 426.

The frenzied worldwide demand to purchase certain highly leveraged mortgage-backed securities (MBS) in the years prior to the 2008-2009 financial crisis (the “financial crisis”) almost certainly represented herd behaviour of investors following a misleading information cascade about the value of those MBS.

## Cognitive Biases

People often implicitly simplify their perception of reality in order to cope. Two such cognitive biases are called availability bias<sup>8</sup> and optimism bias.<sup>9</sup> By distorting the internalization of information,<sup>10</sup> both violate the perfect-market assumption that parties have full information.

Availability bias is the tendency to overemphasize a recent or especially vivid event and to underemphasize a long-past event.<sup>11</sup> For example, people with recently divorced friends tend to overestimate the divorce rate.<sup>12</sup>

Optimism bias is the tendency to be unrealistically positive when thinking about negative events with which one has no recent experience.<sup>13</sup> This helps to explain the reputed interpretation of the Delphic Oracle by King Croesus of Lydia, who wanted to wage war against Cyrus. The Oracle advised that the war “would destroy a mighty kingdom.”<sup>14</sup> Croesus heard what he wanted to hear — that Cyrus would fall — but, in fact, Croesus’s empire was the one destroyed.<sup>15</sup>

The author will later show how cognitive biases can combine to trigger financial market failures.<sup>16</sup>

## Overreliance on Heuristics

Overreliance on heuristics refers to undue reliance on explicitly adopted simplifications of reality. These simplifications can distort the perfect-market assumption that parties have full information.

Although this category superficially overlaps with cognitive biases, the categories can be distinguished by whether the simplification of reality is implicit or explicit.<sup>17</sup> Cognitive biases refer to simplifications that *implicitly* occur as a psychological coping mechanism, whereas heuristics usually refer to *explicitly* adopted simplifications.<sup>18</sup>

Heuristics are especially important in complex financial markets.<sup>19</sup> Investors routinely use credit ratings, for example, to help estimate risks associated with securities.<sup>20</sup> Financial firms routinely rely on mathematical modelling, such as value-at-risk, to evaluate and report market risk.<sup>21</sup> Without reliance on heuristics, financial markets could not operate.<sup>22</sup>

Problems can occur, however, when there is *overreliance* on heuristics. Prior to the financial crisis, for example, investors rarely questioned the accuracy of credit ratings because of their long record for reliably assessing the creditworthiness of relatively simple debt instruments, such as corporate bonds.<sup>23</sup> But that unquestioning faith continued even when ratings were extrapolated to much more complex and highly leveraged MBS.<sup>24</sup>

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8 See e.g. Norbert Schwarz et al, “Ease of Retrieval as Information: Another Look at the Availability Heuristic” (1991) 61:2 J Personality & Social Psychology 195 at 195.

9 See e.g. Tali Sharot, “Optimism Bias: Why the Young and the Old Tend to Look on the Bright Side”, *Washington Post* (31 December 2012), online: <[www.washingtonpost.com/national/health-science/optimism-bias-why-the-young-and-the-old-tend-to-look-on-the-bright-side/2012/12/28/ac4147de-37f8-11e2-a263-f0ebffed2f15\\_story.html](http://www.washingtonpost.com/national/health-science/optimism-bias-why-the-young-and-the-old-tend-to-look-on-the-bright-side/2012/12/28/ac4147de-37f8-11e2-a263-f0ebffed2f15_story.html)>.

10 See Christine Jolls & Cass R Sunstein, “Debiasing through Law” (2006) 35:1 J Leg Stud 199 at 204–05, 207.

11 Iman Anabtawi & Steven L Schwarcz, “Regulating Systemic Risk: Towards an Analytical Framework” (2011) 86 Notre Dame L Rev 1349 at 1366–67.

12 *Ibid* at 1367, n 72.

13 *Ibid* at 1366.

14 T Dempsey, *The Delphic Oracle: Its Early History, Influence, and Fall* (New York: Benjamin Blom, 1972) at 70.

15 *Ibid* at 71, 105–07.

16 See *infra* notes 32–38 and accompanying text.

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17 Steven L Schwarcz & Lucy Chang, “The Custom-to-Failure Cycle” (2012) 62 Duke LJ 767 at 768, n 2.

18 *Cf ibid* at 768 (defining heuristics as “simplifications of reality that allow us to make decisions in spite of our limited ability to process information”).

19 *Ibid* at 769.

20 *Ibid* at 772.

21 *Ibid*.

22 *Ibid* at 769.

23 *Ibid* at 772–73.

24 *Ibid* at 774–75.

## Proclivity to Panic

Sudden financial market changes can cause “information overload” that sparks a panic.<sup>25</sup> This impairs the perfect-market assumption that parties have full information. Panic can also activate a flight reflex, to run from a perceived danger.<sup>26</sup> Some engage in collective flight, exemplified by a run on a bank that is solvent, but unable to repay all of its depositors at once.<sup>27</sup> Others respond in an “every man for himself” scramble, exemplified by the difficulty of allocating lifeboats to passengers on a sinking ship.

Whichever way one responds, a panicked person will rarely attempt to deal rationally with the threat. That also distorts the perfect-market assumption that parties act in their rational self-interest.

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## Human Limitations as a Trigger of Financial Market Failures

The following human behavioural limitations can trigger financial market failures.

### Herd Behaviour and Market Failures

Herd behaviour threatens financial stability when, for example, it causes correlated investments in the same asset categories.<sup>28</sup> In the years prior to the financial crisis, for example, investors “became euphoric about” investing in high-yield MBS.<sup>29</sup> Many of these investors were following the herd, thinking other investors had more or better

information.<sup>30</sup> In fact, they all turned out to be following a misleading information cascade.<sup>31</sup>

### Cognitive Biases and Market Failures

Certain parallels between the Great Depression and the financial crisis show how cognitive biases can combine to create a tendency to define future events by the recent past, triggering financial market failures.

In the years preceding the Great Depression, banks making “margin” loans, in which borrowers used the proceeds to purchase shares of stock and then pledged that stock as collateral, assumed they were protected even for loans made to risky borrowers.<sup>32</sup> Although these loans were not initially over-collateralized — the value of the pledged stock initially equalled, but did not exceed, the amount of the loan — banks expected the stock market to continue rising, as it had for decades. That expectation reflects the tendency to define future events by the recent past. If stock prices had continued rising, the increasing collateral value would have protected the loans. In October 1929, however, the collapse in stock prices caused many of those risky borrowers to default on their now under-collateralized margin loans, contributing to the bank failures that characterized the Depression.<sup>33</sup>

Similarly, prior to the financial crisis, many banks and private mortgage lenders made loans to risky “subprime” borrowers who used the proceeds to purchase homes and then mortgaged their homes as collateral. The lenders assumed these loans were protected,<sup>34</sup> as did the rating agencies.<sup>35</sup> Although these mortgage loans were not originally over-collateralized — the value of a mortgaged home initially equalled, but did not exceed,

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25 Geoffrey P Miller & Gerald Rosenfeld, “Intellectual Hazard: How Conceptual Biases in Complex Organizations Contributed to the Crisis of 2008” (2010) 33 Harv JL & Pub Pol’y 807 at 820.

26 EL Quarantelli, “The Nature and Conditions of Panic” (1954) 60:3 American J Sociology 267 at 269.

27 See Dion Harmon et al, “Anticipating Economic Market Crises Using Measures of Collective Panic” (2015) 10:7 PLoS ONE 1.

28 Office of Financial Research, *Asset Management and Financial Stability* (2013) at 2, online: <[www.financialresearch.gov/reports/files/ofr\\_asset\\_management\\_and\\_financial\\_stability.pdf](http://www.financialresearch.gov/reports/files/ofr_asset_management_and_financial_stability.pdf)>.

29 Randolph C Thompson, “Mortgage-Backed Securities, Wall Street, and the Making of a Global Financial Crisis” (2008) 5 American University Business Law Brief 51 at 52.

30 Brett McDonnell, “Don’t Panic! Defending Cowardly Interventions during and after a Financial Crisis” (2011) 116 Penn St L Rev 1 at 13.

31 Martin Neil Baily et al, “The Origins of the Financial Crisis” (2008) Initiative on Business and Public Policy at Brookings, *Fixing Finance Series Paper 3* at 16, online: <[www.brookings.edu/wp-content/uploads/2016/06/11\\_origins\\_crisis\\_baily\\_litan.pdf](http://www.brookings.edu/wp-content/uploads/2016/06/11_origins_crisis_baily_litan.pdf)>.

32 Anabtawi & Schwarcz, *supra* note 11 at 1356.

33 See *ibid* at 1357.

34 See *ibid* at 1359–60.

35 Cf Dallas, *supra* note 5 at 316, n 373 (quoting Alan Greenspan’s observation that “the data inputted into the risk management models generally covered only the past two decades, a period of euphoria,” whereas the data more appropriately should have reflected “historic periods of stress”).

the amount of the loan — the parties expected housing prices to continue rising, as had been the case for decades.<sup>36</sup> That expectation again reflects the tendency to define future events by the recent past. If housing prices had continued rising, the increasing collateral value would have protected the loans.<sup>37</sup> In the fall of 2007, however, the collapse in housing prices caused many subprime borrowers to default on their now under-collateralized mortgage loans, contributing to the loss of confidence and institutional failures that characterized the financial crisis.<sup>38</sup>

## Overreliance on Heuristics and Market Failures

Overreliance on heuristics can also trigger financial market failures. As discussed, prior to the financial crisis, investors rarely questioned the accuracy of credit ratings, often over-relying on them without performing their own due diligence. This continued even when rating agencies extrapolated their ratings to leveraged, high-yield MBS. Many of those MBS ultimately defaulted or were downgraded, contributing to the financial crisis.<sup>39</sup>

## Proclivity to Panic and Market Failures

Panic can trigger a wide range of financial market failures, going beyond the archetypal bank run. Prior to the financial crisis, for example, the unexpected defaults and downgradings on certain leveraged, high-yield MBS<sup>40</sup> caused uncertainty and investor loss of confidence in credit ratings as a gauge of risk.<sup>41</sup> Investors not only stopped buying MBS — which caused prices in the MBS market

to collapse even further<sup>42</sup> — but also stopped buying even the most highly rated corporate debt securities,<sup>43</sup> causing credit to collapse.<sup>44</sup>

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## Regulation Addressing Human Limitations

Next, consider how regulators could improve financial regulation by addressing these human limitations.

### Regulating Herd Behaviour

To the extent it results from misleading information cascades, herd behaviour could be regulated by addressing the cascades directly — such as by studying how information cascades develop in order to identify and correct them and reduce their occurrence. Requiring increased due diligence might also help to strengthen the reliability of market information, thereby reducing reliance on a misleading information cascade. Members of a firm's risk committee could be tasked, for example, with reviewing market information to ascertain its reliability.

### Regulating Cognitive Biases

Cognitive biases could be regulated by making events more “available” to individuals, such as by exposing them to concrete instances of an event's occurrence.<sup>45</sup> Ironically, this uses the availability heuristic to correct other 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 on health risks.<sup>46</sup> Requiring cigarette-package warnings that are more pictorially graphic than text-only warnings has been found to be more

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36 See Anabtawi & Schwarcz, *supra* note 11 at 1359–60.

37 See Barry Ritholtz, “Case Shiller 100 Year Chart (2011 Update)” (13 April 2011), *Big Picture* (blog), online: <[www.ritholtz.com/blog/2011/04/case-shiller-100-year-chart-2011-update](http://www.ritholtz.com/blog/2011/04/case-shiller-100-year-chart-2011-update)>.

38 Anabtawi & Schwarcz, *supra* note 11 at 1360 (“When home prices began falling, some of these asset-backed securities began defaulting, requiring financial institutions heavily invested in these securities to write down their value, causing these institutions to appear, if not be, financially risky” [footnote omitted]).

39 See Schwarcz & Chang, *supra* note 17 at 778.

40 See *supra* note 38 and accompanying text.

41 See e.g. Mortimer B Zuckerman, “Preventing a Panic”, *U.S. News & World Report* (1 February 2008), online: <[www.usnews.com/opinion/mzuckerman/articles/2008/02/01/preventing-a-panic](http://www.usnews.com/opinion/mzuckerman/articles/2008/02/01/preventing-a-panic)> (arguing that “the credit system has been virtually frozen” because “few people even know where the liabilities and losses are concentrated”).

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42 Schwarcz & Chang, *supra* note 17 at 778.

43 *Ibid.*

44 Steven L Schwarcz, “Keynote Address: The Financial Crisis and Credit Unavailability: Cause or Effect?” (2017) 72 *Business Lawyer* 409.

45 Jolls & Sunstein, *supra* note 10 at 200, 210; Roy F Baumeister & Brad J Bushman, *Social Psychology & Human Nature*, 2nd ed (Belmont, CA: Wadsworth, 2011) at 155.

46 Jolls & Sunstein, *supra* note 10 at 210.

effective at discouraging smoking.<sup>47</sup> This suggests that regulators should consider requiring the “risk factors” discussion in securities-disclosure documents to include a concrete narrative of how losses on the securities might cause the investor to fail, possibly including examples of how risk on those securities might be correlated with risk on related investments. Such a narrative could even describe how Lehman Brothers’ failure resulted from seemingly unrelated investments in MBS, whose value was correlated with housing prices.

Cognitive biases could also be regulated by requiring information to be framed more intuitively. For example, people usually weigh losses more heavily than gains in evaluating potential risks and outcomes.<sup>48</sup> Thus, a person is more likely to choose to have an operation if told “[o]f one hundred patients who have this operation, ninety are alive after five years” than if told “[o]f one hundred patients who have this operation, ten are dead after five years.”<sup>49</sup> This suggests that regulators should consider requiring securities-disclosure documents to more clearly emphasize and attempt to quantify the risk of loss.

Regulators should also consider trying to correct the market misconceptions and factual errors caused by the availability bias. The financial crisis may have been less likely to occur, for example, if regulators had required stronger financial market awareness “that loans that are not initially overcollateralized are inherently risky, given that a decline (or even a plateau) in collateral”<sup>50</sup> value could jeopardize repayment.

## Regulating Overreliance on Heuristics

Regulation could also help to reduce overreliance on heuristics by requiring firms to adopt more transparent and self-aware risk-management and reporting practices.<sup>51</sup> Even a simple reminder that negative economic shocks have

occurred in the past can encourage more critical reflection and accurate risk assessments.<sup>52</sup>

For example, the US Dodd-Frank Act requires certain systemically important firms to prepare so-called living wills,<sup>53</sup> which are resolution plans that “describe the company’s strategy for rapid and orderly resolution in the event of material financial distress or failure of the company.”<sup>54</sup> By effectively requiring firms to contemplate their own mortality, living wills are reminiscent of the *memento mori*, an ancient Roman tradition designed to increase a victorious general’s self-awareness of his human limitations. During the victory parade, a slave would repeatedly whisper “*memento mori*” to the general — translated as “remember you will die.”<sup>55</sup>

## Regulating the Proclivity to Panic

Regulation could address the proclivity to panic by promoting market stability and calming the out-of-control feeling that activates the flight reflex. The classic example is a government guarantee of bank accounts to help deter the collective flight of depositors known as a bank run. Regulation might similarly promote market stability by requiring a privatized securities-purchase backstop facility to stabilize pricing at pre-panic levels.<sup>56</sup> Although not itself privatized, the Commercial Paper Funding Facility (CPFF) otherwise represents a possible model for such a facility.<sup>57</sup> Created by the US Federal Reserve in response to the post-Lehman panicked collapse of the commercial paper market, the CPFF’s goal was to address “temporary liquidity distortions” by purchasing

47 See generally HH Yong et al, “Mediational Pathways of the Impact of Cigarette Warning Labels on Quit Attempts” (2014) 33:11 Health Psychology 1410 (comparing Canadian, Australian, UK and US cigarette-package warnings).

48 See e.g. Markku Kaustia & Milla Perttula, “Overconfidence and Debiasing in the Financial Industry” (2012) 4:1 Rev Behavioral Finance 46 at 48.

49 Thaler & Sunstein, *supra* note 4 at 36.

50 Schwarcz & Chang, *supra* note 17 at 784 (making that argument).

51 See *ibid* at 783–84.

52 See Anabtawi & Schwarcz, *supra* note 11 at 1389.

53 See e.g. Clay R Costner, “Living Wills: Can a Flexible Approach to Rulemaking Address Key Concerns Surrounding Dodd-Frank’s Resolution Plans” (2012) 16:1 North Carolina Banking Institute 133 at 138.

54 Board of Governors of the Federal Reserve System, “Living Wills (or Resolution Plans)”, online: <[www.federalreserve.gov/bankinfo/reg/resolution-plans.htm](http://www.federalreserve.gov/bankinfo/reg/resolution-plans.htm)>.

55 “Memento mori: it’s time we reinvented death”, *New Scientist* (17 October 2012), online: <[www.newscientist.com/article/mg21628872-900-memento-mori-its-time-we-reinvented-death/](http://www.newscientist.com/article/mg21628872-900-memento-mori-its-time-we-reinvented-death/)> [emphasis omitted].

56 Steven L Schwarcz, “Keynote Address: The Case for a Market Liquidity Provider of Last Resort” (2009) 5:339 *New York U J L & Business* 346 (examining how to create such a backstop facility without increasing moral hazard).

57 There is significant precedent for requiring the private sector to contribute funds to this type of effort. The Federal Deposit Insurance Corporation (FDIC), for example, requires member banks to contribute to a Deposit Insurance Fund to ensure that depositors of failed banks are repaid. See e.g. FDIC, *Deposit Insurance Assessments*, online: <[www.fdic.gov/deposit/insurance/assessments/proposed.html](http://www.fdic.gov/deposit/insurance/assessments/proposed.html)>.

commercial paper from highly rated issuers that could not otherwise sell their paper.<sup>58</sup> It succeeded in stabilizing the commercial paper market.<sup>59</sup>

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## Addressing the Inevitable Failures

Notwithstanding the best regulatory efforts, people do not yet understand their nature well enough to fully overcome human limitations. Although government deposit insurance has long been a successful strategy for preventing panic-induced bank runs, bank depositors did not believe their funds would be safe during the financial crisis.<sup>60</sup> Because of human limitations, regulation cannot prevent every financial crisis.

Financial regulation should therefore be designed not only to try to prevent financial crises but also to try to mitigate their harm when they inevitably occur. Scholars have separately engaged that topic,<sup>61</sup> arguing that regulation should also try to stabilize the afflicted financial system after a systemic shock has been triggered and is being transmitted.<sup>62</sup> This approach is inspired by chaos theory, which holds that because failures are inevitable in complex engineering systems, systems should be designed to also limit the consequences of such failures.<sup>63</sup>

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## Conclusion

Human limitations undermine at least two perfect-market assumptions on which financial regulation is based: that parties have full information and that they will act in their rational self-interest. This policy brief examines how insights into these limitations can be used to try to improve that regulation.

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58 See Tobias Adrian, Karin Kimbrough & Dina Marchioni, “The Federal Reserve’s Commercial Paper Funding Facility” (2011) FRBNY Economic Policy Review 1.

59 *Ibid* at 11 (concluding that “[t]he CPFF indeed had a stabilizing effect on the commercial paper market”).

60 See James Bullard et al, “Systemic Risk and the Financial Crisis: A Primer” (2009) 91 Federal Reserve Bank St. Louis Rev 403 at 408.

61 See Iman Anabtawi & Steven L. Schwarcz, “Regulating *Ex Post*: How Law Can Address the Inevitability of Financial Failure” (2013) 92:75 Tex L Rev 75 at 92.

62 *Ibid* at 102.

63 *Ibid*.





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The International Law Research Program (ILRP) at CIGI is an integrated multidisciplinary research program that provides leading academics, government and private sector legal experts, as well as students from Canada and abroad, with the opportunity to contribute to advancements in international law.

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