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Understanding Market Failure in the 2007–08 Crisis

By Borys Grochulski and Wendy Morrison

Did market failures cause the 2007–08 financial crisis? While economists have made substantial progress exploring this question, the answer remains unclear. The answer is important because financial regulation that does not address a specific market failure risks causing new inefficiencies and unintended consequences in the financial system and broader economy. To demonstrate how economic theory can be used to identify market failures and guide policy, this *Economic Brief* discusses a common market failure called a "pecuniary externality" and demonstrates the pitfalls of applying regulations in situations where the precise sources of market failures are not well-understood.

In the wake of the 2007–08 financial crisis, there have been many calls to expand regulatory oversight in the financial sector. Previously, regulation focused primarily on the health of individual financial institutions. Since the crisis, however, regulatory reform efforts, such as the 2010 Dodd-Frank Act, have focused more on stability in the financial sector as a whole, a concept known as "macroprudential" or "systemic risk" regulation.

Macroprudential regulation hinges on the notion of externalities, or spillovers. If a firm's shareholders and creditors alone face the costs of its failure, the firm is likely to fully account for the risks of its operations, leaving no room in principle for macroprudential regulation. But if financial difficulties can affect other companies, individuals, or the real economy in ways that the firm's stakeholders are not forced to pay for, or "internalize," the firm may take excessive risks. Those risks could make the financial system too fragile and prone to widespread crises like the one in 2007 and 2008.[1]

Many observers have alleged that much of the volatility and external losses experienced during the 2007–08 crisis resulted from market failures. In particular, many firms faced a shortfall of liquidity, as demonstrated by a pervasive inability to pay or roll over short-term liabilities despite being arguably solvent. The illiquidity crisis motivated several extraordinary government interventions, such as the Troubled Asset Relief Program and emergency lending facilities from the Fed that a variety of firms, not just commercial banks, could access. In the market-failure view, some fundamental market feature provides firms with insufficient incentive to maintain adequate liquidity. This view has motivated reforms since the crisis, such as new minimum liquidity requirements for banks under section 165 of the Dodd-Frank Act. These are the first such requirements of their kind for large U.S. banks, and similar measures have appeared around the world under the newest phase of the international Basel Committee standards.

Understanding the nature and magnitude of a market failure is critical to identifying and calibrating appropriate regulatory solutions. Regulations that are not directed at specific market failures risk causing new inefficiencies rather than eliminating existing ones. This *Economic Brief* explores how theoretical research can be used to guide real-world regulation. It considers one type of potential market failure known as a "pecuniary externality," which may be associated with the financial system's core function of maturity transformation. In a class of theoretical models, pecuniary externalities are the primary catalyst leading to underprovision of liquidity. Whether this market failure characterizes real-world financial markets, however, is an open question. The resulting discussion demonstrates the difficulties of identifying and evaluating potential market failures and points out how macroprudential policy designed without insight from theory may fail to solve the problem and may risk introducing additional inefficiencies.

Identifying Market Failures

Aside from pursuing social goals of redistributing wealth, government intervention in markets is generally warranted only when there is a market failure—a situation where markets lead to inefficient allocations. Market failures often are caused by what economists call externalities—a situation where an economic agent is affected by the actions of others not only through price changes but also directly. One classic example is an industrial plant that emits pollution. The plant only charges its customers enough to cover its private production costs, ignoring the costs 'paid' by its neighbors who breathe the polluted air. This externality will lead the factory to produce more pollution than is socially optimal. By mandating lower pollution levels or by levying a tax equal to the size of the externality, regulators may force firms to internalize the social costs of pollution, resulting in an efficient level of emissions.

A "pecuniary externality" is a special type of externality that leads to an inefficient market allocation even in situations where agents are only affected by the actions of others through the resulting price changes. Ordinarily, price changes that negatively affect some parties do not imply a market failure. For instance, if the price of carrots increases, carrot buyers are made worse off as their budgets tighten, but the sellers of carrots benefit as their budget constraints are relaxed. This price change, therefore, is not inefficient, that is, it does not make everyone worse off. Pecuniary externalities, however, can occur if a change in a price, in addition to affecting buyers' and sellers' budget constraints, also affects the buyers' or sellers' incentives to engage in free-riding or other opportunistic behavior. In these situations, a price change can constitute an externality and lead to a market failure.

Theoretical research has identified many examples of pecuniary externalities.[2] One particular example is the pecuniary externality that leads to underprovision of liquidity in the banking model developed by economists Douglas Diamond and Philip Dybvig (DD).[3] Given that widespread illiquidity was a core catalyst of volatility and government intervention during the 2007–08 financial crisis, pecuniary externalities have been of particular interest lately.

In the DD model, banks help depositors attenuate the tradeoff between liquidity and return by investing the pool of deposits in the appropriate mix of low-return, liquid assets and high-return, illiquid assets. Despite holding illiquid assets, banks are able to offer depositors on-demand access to their funds, as, typically, not all depositors will want to withdraw at the same time. Thereby, by allowing for a mismatch in the maturity of their liabilities and assets, banks provide depositors with liquidity insurance against negative shocks that create a need for immediate withdrawal while still allowing them to benefit from the high return produced by the part of the deposit pool invested in the illiquid assets.[4]

A pecuniary externality may arise in the DD framework if illiquid financial institutions have the ability, in the face of a shock, to trade with market participants that are more liquid. Liquid participants with no immediate need for their liquidity would be willing to trade their liquidity because they could reap part of the higher returns from the illiquid institution's portfolio in addition to the returns from the illiquid assets they hold directly. Illiquid institutions could then

expect to take advantage of the higher returns of an illiquid portfolio while counting on being able to purchase liquidity in the market if faced with a shock while their assets are locked in illiquid investments.

The possibility of this kind of retrade represents an externality because the high return offered by the illiquid institutions results in insufficient liquidity in the overall financial market. This is because counting on market liquidity ex post, not only some but all institutions prefer the illiquid portfolio position ex ante. As all actors attempt to free-ride off of market liquidity, initial investment in illiquid assets is too large in the aggregate—that is, maturity mismatch is excessive—and the resulting resale price of these assets is too small and the market allocation of investment and liquidity is inefficient. This mimics the observed real-world pattern of overinvestment followed by "fire sales," in which firms that experience losses are forced to sell assets, reducing asset prices and hurting the balance sheets of other firms holding the same type of assets.[5]

Evaluating the Market Failure

In theoretical models, it can be simple to design regulatory solutions to market failures. For example, one possible solution to the pecuniary externality is to impose minimum liquidity requirements on financial institutions that are perfectly calibrated to offset the payoff from engaging in retrade. This idea was modeled in a 2009 article by Emmanuel Farhi, Mikhail Golosov, and Aleh Tysvinski.[6] If the potential for using retrading to free-ride on market liquidity leads to underinvestment in liquid assets, then mandating a minimum level of liquidity directly addresses the externality.

However, one also must evaluate whether the theoretical model is a good representation of real-world financial markets. It is unclear whether this holds in the pecuniary externality case. Recent theoretical work by Weerachart Kilenthong and Robert Townsend suggests that market participants may be able to force insufficiently liquid institutions to internalize the costs of their illiquidity.[7] In their model, market participants are capable of credibly restricting trade between institutions with different levels of liquidity. They allow for segmented exchanges formed on the basis of the level of liquid assets held by an institution. In order to trade in a given exchange, members would be required to either hold the "right" amount of liquidity or pay a fee proportional to their deviation from it. Such fees force financial institutions to internalize the impact of their own liquidity position on the price of liquidity within the exchange. As a result, the pecuniary externality vanishes and the exchange members' depositors realize the optimal amount of liquidity insurance.

If the assumptions of the Kilenthong and Townsend model reflect real-world financial markets, then the level of liquid investment provided by the market is the optimal level and government intervention via minimum liquidity requirements may, at best, simply crowd out market-driven solutions. At worst, liquidity requirements would distort outcomes and reduce welfare.

At the same time, the environment described by Kilenthong and Townsend is highly specialized and dependent on specific market-access restrictions. Whether this is an accurate depiction of real-world financial markets must be evaluated empirically, which is no easy task. Depositors' preferences for liquidity are hard to measure, making it difficult for regulators to evaluate whether institutions hold too few liquid assets at any given time. Given these difficulties, and others like them, economic research has not yet settled the question of whether pecuniary externalities are likely to have contributed to the 2007–08 crisis.[8]

Lessons for Policymakers

It is tempting for policymakers to observe high market volatility or large financial losses and conclude that a market failure has occurred. The presumption of market failures provides a rationale for policy intervention, allowing policymakers to respond to the public's strong demand for remedy in the face of crisis. Indeed, there is a long tradition in the United States of major regulatory reforms following crises.[9]

Although there is a wealth of theoretical research on market failures at the level of the individual firm, there has been relatively little theoretical work on

possible market failures that might produce macroprudential risk.[10] Another example is the aforementioned notion of fire sales. While the possibility of fire sales may be unproblematic from a microprudential perspective—since each individual firm may be responding rationally to losses—the potential for fire sales seems to present a source of systemic risk. Fire sales, however, are not well-understood theoretically, and it is hard to pinpoint the source of market failure and distinguish fire sales from simply a downward revision in expectations. Nonetheless, the threat of fire sales motivated policy intervention during the crisis.[11]

As the discussion of pecuniary externalities shows, regulations that are not appropriately targeted and calibrated risk crowding out private solutions and may lead to unintended consequences. For example, heightened regulation in the traditional banking sector is thought to have contributed to maturity transformation moving into the unregulated "shadow" banking sector over the past several decades. The 2007–08 financial crisis largely took place within this shadow banking sector.

To avoid the unintended consequences of misdirected regulation, economists' starting point for regulatory analysis is to identify whether a market failure has occurred. Economists generally do this by observing a problem—such as a widespread lack of liquidity across markets and firms in 2008—and trying to replicate that problem inside a theoretical model as a lab for evaluating policy interventions or other solutions. Building the lab itself presents challenges, though. Even from an economic theorist's point of view, it is not completely clear under the current state of research that pecuniary externalities could be affecting the liquidity of markets. On one hand, one can have pecuniary externalities with private retrade, as in the model by Farhi, Golosov, and Tsyvinski. On the other hand, retrade itself may not imply a pecuniary externality, as Kilenthong and Townsend show.

This ambiguity about present market failures forces one to consider other possible causes of mass illiquidity. A competing hypothesis is that traditional government policy led creditors to believe that government liquidity would be available in a crisis, causing them to underprice credit extended to firms engaging in maturity transformation. This is a consequence of the well-known "too big to fail" problem. To be sure, the systemic inefficiencies caused by the government safety net also are not well-explored theoretically.[12] However, there is a wealth of empirical evidence indicating that creditors underprice the risk of firms expected to benefit from the government's safety net.[13] Rather than suggesting a new regulation as a remedy, this hypothesis suggests scaling back existing explicit and implicit policies that provide excessively risky firms with liquidity in a crisis. Though some observers argue that the government safety net is necessary for financial stability, it also appears to be one important cause of instability, leading to efforts since the crisis to scale back the safety net.[14]

In actuality, multiple issues—market failures and policy failures alike—may be present, and policymakers must decide which problems they have the best hope of solving without causing new problems, which are often difficult to predict. Theoretical research tested against empirical evidence is the best path to crafting macroprudential regulations that may help to prevent future financial crises. ■

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Endnotes

[1] See Hetzel, Robert L., "Should Increased Regulation of Bank Risk-Taking Come from Regulators or from the Market?" Federal Reserve Bank of Richmond *Economic Quarterly*, Spring 2009, vol. 95, no. 2, pp. 161–200.

[2] See, for example, Kehoe, Timothy J., and David K. Levine, "Debt-Constrained Asset Markets," *Review of Economic Studies*, October 1993, vol. 60, no. 4, pp. 865–888; Golosov, Mikhail, and Aleh Tsyvinski, "Optimal Taxation with Endogenous Insurance Markets," *Quarterly Journal of Economics*, May 2007, vol. 122, no. 2, pp. 487–534; Lorenzoni, Guido, "Inefficient Credit Booms," *Review of Economic Studies*, July 2008, vol. 75, no. 3, pp. 809–833; Di Tella, Sebastian, "Optimal Financial Regulation and the Concentration of Aggregate Risk," Stanford Graduate School of Business Manuscript, July 2014.

[3] Diamond, Douglas W., and Philip H. Dybvig, "Bank Runs, Deposit Insurance, and Liquidity," *Journal of Political Economy*, June 1983, vol. 91, no. 3, pp. 401–419.

[4] The DD model is perhaps most commonly used as a model of bank runs. For a nontechnical summary of that literature, see Ennis, Huberto M., and Todd Keister, "On the Fundamental Reasons for Bank Fragility," Federal Reserve Bank of Richmond *Economic Quarterly*, First Quarter 2010, vol. 96, no. 1, pp. 33–58.

[5] Allen, Franklin, and Douglas Gale, "Limited Market Participation and Volatility of Asset Prices," *American Economic Review*, September 1994, vol. 84, no. 4, pp. 933–955.

[6] Farhi, Emmanuel, Mikhail Golosov, and Aleh Tsyvinski, "A Theory of Liquidity and Regulation of Financial Intermediation," *Review of Economic Studies*, July 2009, vol. 76, no. 3, pp. 973–992.

[7] Kilenthong, Weerachart T., and Robert M. Townsend, "Information-Constrained Optima with Retrading: An Externality and Its Market-Based Solution," *Journal of Economic Theory*, May 2011, vol. 146, no. 3, pp. 1042–1077.

[8] For a detailed discussion of pecuniary externalities and mass illiquidity, see Grochulski, Borys, "Pecuniary Externalities, Segregated Exchanges, and Market Liquidity in a Diamond-Dybvig Economy with Retrade," Federal Reserve Bank of Richmond *Economic Quarterly*, Fourth Quarter 2013, vol. 99, no. 4, pp. 305–340.

[9] See, Haltom, Renee, and Jeffrey M. Lacker, "Should the Fed Have a Financial Stability Mandate? Lessons from the Fed's First 100 Years," Federal Reserve Bank of Richmond *2013 Annual Report*, pp. 4-25.

[10] Some economists have argued that theory has played too small a role in the policymaking process. For example, in assessing the role of capital requirements as a component of macroprudential regulation, Douglas Gale and Franklin Allen of the University of Pennsylvania argue that "the area of financial regulation is somewhat unique in the extent to which the empirical developments have so far outstripped theory."

[11] This point was argued in a speech by Richmond Fed President Jeffrey M. Lacker. See "Economics after the Crisis: Models, Markets, and Implications for Policy," Speech at the Center for Advanced Study in Economic Efficiency, Arizona State University, Tempe, Ariz., February 21, 2014.

[12] There is some theoretical evidence, however. For example, see Farhi, Emmanuel, and Jean Tirole, "Collective Moral Hazard, Maturity Mismatch, and Systemic Bailouts," *American Economic Review*, February 2012, vol. 102, no. 1, pp. 60–93.

[13] For example, see "Our Perspective: Too Big to Fail" on the Richmond Fed's website, as well as Santos, João, "Evidence from the Bond Market on Banks' 'Too-Big-to-Fail' Subsidy," Federal Reserve Bank of New York *Economic Policy Review*, March 2014, vol. 20, no. 2.

[14] For a discussion on those efforts and how to make them successful, see Lacker, Jeffrey M., "Committing to Financial Stability," Speech at the George Washington University Center for Law, Economics and Finance, Washington, D.C., November 5, 2014.