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# **Interconnectedness, Fragility and the Financial Crisis**

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## *INTRODUCTION*<sup>1</sup>

There is near universal agreement that a well functioning financial system is necessary for a thriving, modern economy and that the financial system is an important conduit through which central bank policy influences prices and economic activity. Naturally, a well functioning financial system will evolve with the economy, and this has certainly been true in the United States. One of the most pronounced changes in the structure of the financial system has been the growth of the non-bank sector. In 1950, depository institutions (banks for short) accounted for 60 percent of the assets held by the financial sector, by 2006 that share fell to 30 percent. Money market mutual funds (MMMFs) alone, for example, hold roughly \$4 trillion, while total bank deposits are roughly \$8 trillion.

Accompanying the diminished role of banks has been an increase in the length and complexity of financial intermediation chains.<sup>2</sup> Rather than a single bank accepting deposits from households and making commercial loans to firms or mortgage loans to other households, the financial system has evolved so that a lending household might purchase shares in a money-market mutual fund that holds commercial paper issued by a bank that engages in a repurchase agreement with a securities firm that has a special purpose vehicle that issues asset-backed securities that funds a pool of residential mortgages and that purchases credit derivatives from other financial institutions to hedge its exposure to these securities and others in its portfolio, etc. You get the picture.

No matter what the driving forces may be behind this increase in the layers of financial intermediation - ranging from a more efficient allocation of risk to regulatory arbitrage aimed at

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<sup>1</sup> This section updates and draws upon Kroszner (2009a) and Kroszner and Melick (2009).

<sup>2</sup> The concept of “intermediation chains” is developed in a number of papers by, for example, Tobias Adrian, Hyun Song Shin and Markus Brunnermeier, among others. See Adrian and Shin (2009), Brunnermeier (2009) and Shin (2009).

avoiding capital requirements - the many layers of intermediation create chains of inter-linkages that can make the entire system more vulnerable to shocks in any one market or at any single institution. As the banking and intermediation system has come to be characterized by long chains with many of the crucial links in the chain being market-based, non-bank intermediaries that do not rely on deposits for their funding, mismanagement or misjudgments about risk in particular institutions or markets (rather than being self-correcting through the elimination of players who made the mistakes) can cascade through the system and raise questions about the viability of institutions throughout the system. A market-wide break down of confidence can then occur due to the potential inter-linkages as firms lack knowledge of counterparty exposures and face uncertainty about how those exposures may be resolved. Previously deep and liquid markets can suddenly freeze, revealing the high reliance on leverage and, in particular, on short-term funding of longer-term assets.

In such a financial system, a crucial policy issue is how best to deal with institutions whose failure might result in important negative consequences for the financial system and the economy as a whole. This issue has traditionally been characterized as the “too big to fail” problem but that is simply a subset of the broader “too interconnected to fail” problem, because it is the potential consequences for other institutions, markets, and overall economic performance that is the key. Some institutions, such as Bear Stearns, may not have been particularly large by traditional size metrics but potentially could be “large” in the sense of their failure triggering a reaction throughout the intermediation chain that could have significant consequences for the entire financial system.

In the next section, I will discuss how such an “externality” could in principle arise in banking and finance. There is a long and ongoing debate, however, about the extent of this

“externality,” that is, are there institutions whose failure would have such dire consequences for the economy that a case could be made to intervene? If such a case can be made, then where and how to draw the line is extremely difficult. It is unlikely to be fully settled by either empirical or theoretical analyses, at least in part because the financial system is constantly evolving, and I will not try to resolve it here.

The uncertainty about the potential consequences, however, can lead policy-makers to be risk averse and to intervene, leading to the potential for “moral hazard,” which can undermine market discipline and contribute to financial fragility. I define and discuss moral hazard in the subsequent section and discuss some of the Federal Reserve actions in response to the recent crisis in the section that follows.

Dealing with moral hazard is a fundamental problem of political economy. As long as markets expect policy makers to intervene, moral hazard problems can arise. Thus, one important way to deal with the moral hazard problem is to create a legal and institutional infrastructure that would give policy makers sufficient comfort that the failure of a key player would be highly unlikely to have negative consequences for the system and, thereby, make it credible to market participants that an intervention is highly unlikely to occur. Many proposals have been put forth that would try to accomplish this goal. In the final section, I will touch on some of those proposals in light of the recent financial crisis.

### ***INTERLINKAGES, FRAGILITY AND “TOO INTERCONNECTED TO FAIL”<sup>3</sup>***

The increasing interlinkages in the financial system combined with the funding structures of financial institutions forms the basis for the concerns about “too interconnected to fail.” As noted above, it is important to understand these arguments because these are the basis for policy

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<sup>3</sup> This section updates and draws upon Kaufman and Kroszner (1996).

makers' concerns about the fragility of the system. Financial institutions, particularly banks, are often viewed as more fragile than nonfinancial firms. This perception is due mainly to two features of a typical bank's financial structure. First, banks and financial institutions tend to be highly leveraged, that is, they have a low capital to assets ratio compared with nonfinancial firms. Consequently, they have a relatively smaller cushion against insolvency than do nonfinancial firms.

Second, they typically hold a low ratio of liquid assets relative to their highly liquid liabilities. By providing demand and other short-term deposits on a fractional reserve basis, banks have a much greater liquidity and duration mismatch between assets and liabilities than do nonfinancial firms. This mismatch makes banks particularly sensitive to abrupt large withdrawals of funds (bank runs) that cannot be met in full and on time by the banks' cash holdings and thus may require the hurried sale of earning assets. To the extent that these assets are not traded in highly liquid markets, the banks may suffer fire-sale losses that may exceed their small capital base and drive them into economic insolvency. The duration mismatch also exposes banks to interest rate risk so that abrupt changes in interest rates can induce (realized and unrealized) losses that can quickly exceed their capital.

This fragility also arises in highly leveraged non-depository financial institutions that rely heavily on short term funding, such as overnight "repurchase" agreements, short-term asset backed commercial paper, etc. Such institutions can be subject to sudden "funding runs," exactly in parallel to depositor runs at traditional commercial banks. If funders lose confidence in the institution, then that institution will not have the liquidity to support its operations and will have to make "firesales" of its assets. Those losses can lead to further questions about the viability of the institution and, if many institutions are scrambling for liquidity at the same time,

asset markets that had been deep and liquid may become illiquid, exactly in parallel to the example from a bank above.

Not only might banks and financial institutions with maturity mismatch be fragile individually, but the banking and financial system may be particularly fragile due to the close interconnections among them. Through interbank deposits and lending, for example, losses at any one bank may thus produce losses at other banks, which can cascade throughout the system. Moreover, if depositors or other short-term funders may find it difficult to obtain sufficient information to differentiate among the financial health of individual banks, troubles at one or a few institutions could spread quickly throughout the system as depositors and other short-term funders withdraw or withhold funds from institutions regardless of their financial fundamentals. In the absence of offsetting actions by the central bank (and for smaller, open economies a decline in the exchange rate), such runs from deposits at domestic banks into either currency or short-term Treasury securities (or for smaller, open economies into foreign currency deposits abroad) will worsen fire-sale losses, increase the number of bank failures, and cause a multiple contraction of money and credit and macroeconomic instability. In addition, the loss of the banks' information and monitoring services could make it more difficult for firms to re-establish lending relationships, thereby slowing recovery (e.g., Bernanke (1983)).

In the modern financial system, the interconnections are not simply among banks but among many types of financial institutions. With lengthy and complex intermediation chains, it can be difficult to assess the health of an individual institution because its health will depend significantly upon the health of its counterparties, which in terms depend upon the health of their counterparties, as well as upon the health and behavior of their funders. The difficulty in determining the actual health of a particular financial firm caused by this opacity – in parallel to

the inability of depositors to determine the solvency of individual banks -- makes the entire system vulnerable to funding runs. Even a sophisticated player would have a difficult time assessing the health of an institution giving how much information on other institutions would be needed to do so. In this way, broader “funding runs” that can be much more rapid than classic depositor runs, can quickly bring institutions to their knees and disrupt the financial system.

These dynamics were at play, for example, in the money market mutual fund market in September 2008. As mentioned previously, money market mutual funds are very large sources of funding for the rest of the financial system. When the Reserve Fund “broke the buck” in September 2008, money market mutual funds began to experience significant withdrawals, akin to runs. They responded by pulling back from the short term funding of banks and other financial institutions in order to enhance their liquidity to meet their withdrawal, effectively triggering a multi-trillion dollar funding run on the entire banking and financial system. In addition, “secured” funding from other sources also broke down as funders were uncertain about how they would be treated in bankruptcy and they also stopped funding.

The important lesson here is to understand the correlation of the behavior across classes of institutions. It did not matter whether there were a few large institutions or many smaller institutions – funding from key sources suddenly dried up and firms relying upon this funding, large or small, were forced into fire-sales by liquidity squeezes. The key is the interconnection and the correlation, not the size in and of itself.

### ***MORAL HAZARD***

Given these perceptions about the fragilities and importance of the financial system, how are policy makers then to think about taking actions in a crisis and the potential for “moral



hazard”? Moral hazard is so often associated narrowly with “bailouts” that it is worthwhile to step back and understand exactly what it means and the broader contexts in which moral can occur. Moral hazard arises in any situation where one thinks one can get away with taking a risk without having to pay the consequences if the risk doesn’t turn out well. Any type of insurance contract involves the potential for moral hazard. Consider auto insurance. With auto insurance, you might take a bit less care where you park if you know that the insurance company will pay for a stolen or damaged vehicle. This is precisely why the insurance company requires a deductible, so that you will experience some loss if anything goes wrong, that is, so you will bear at least some cost of taking on additional risk. Similarly, this incentive problem provides exactly the same rationale for minimum capital requirements when banks have deposit insurance: by requiring owners to have a minimum amount to lose (that is, their capital), banks may not simply shoot for the moon since the owners have some “skin in the game.” The key policy question is how much skin needs to be in the game to get the incentives right and avoid excessive risk taking.

The potential for moral hazard, however, is widespread in *any* system with limited liability. Consider a highly leveraged non-financial enterprise. Owners have relatively little to lose compared with the size of the highly-leveraged operations of the enterprise. Since the liabilities are limited, the owners enjoy the upside of any bets that turn out well but are not on the hook for the full extent of the losses if the bets don’t turn out well – their losses are limited to the value of their equity investment.

Why then does moral hazard seem to be so much greater for financial firms than non-financial firms? Certainly, explicit deposit insurance or implicit insurance through expectations of bailouts affect behavior. But before turning to that I want to underscore another source,

independent of the explicit or perceived safety net. As described in the previous section, financial firms tend to be much more highly leveraged than non-financial firms. A bank with ten percent equity capital would be considered extremely well-capitalized, but a non-financial firm with a ten-to-one debt-to-equity ratio would likely be seen as on the brink of collapse.

Given that financial firms tend to be more leveraged than non-financial, the potential for moral hazard is greater. This was true long before the development of the modern safety net. So how was this moral hazard problem dealt with prior to the safety net? Typically, bank owners and/or the directors and executives would have some form of “extended” liability if the bank were to fail. Most common in the U.S. prior to federal deposit insurance was “double liability.” Under double liability, not only would the owners of a failed bank lose the value of their shares but also they would be subject to a call to pay to depositors and other liability holders up to 100 percent of the par value of the shares they owned<sup>4</sup>. Today, some countries, such as Brazil, have a form of extended liability for executives and directors.

Let’s now turn back to the more frequently discussed element of the moral hazard problem, namely, the moral hazard that can arise from implicit or explicit government safety nets. What is a policy maker to do? In a crisis, can (and should) policy makers stand by and not act due to concerns about moral hazard? In the UK, the Bank of England made statements that implied that there would be no bail-outs for the likes of Northern Rock and, partially due to making such statements, the Bank of England a few weeks later was bailing out Northern Rock. On the cold moonlit night when the Titanic hit the iceberg and did not have enough lifeboats, should one stand by and not try to rescue those aboard, even though that could generate a “moral hazard” problem with regard to the future choices of the thickness of ship hulls? Certainly not.

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<sup>4</sup> Grossman (2001).

In a financial crisis, it is very difficult for policy makers at either the central bank or Treasury to simply stand aside and risk a panic and/or depression. In 1907, JP Morgan was faced with a choice: he could use the private clearinghouse system that he effectively ran to provide support to (“bail out”) Knickerbocker Trust, which was not part of the system and had not played by the rules he had laid out, or take the chance to let Knickerbocker Trust collapse to ensure that others would play by the rules in the future. Morgan chose the latter and the Panic of 1907 ensued, bringing an end to the private clearinghouse system and ushering in the congressional action that led to the Federal Reserve Act. The uncertainties associated with the failure of an important institution make it difficult for policy makers to stand by. Making markets more robust to the collapse of an important financial institution is crucial for policy makers to have sufficient comfort to allow such an institution to fail. I will discuss some proposals to increase that robustness after discussing some responses by the Federal Reserve to the recent crisis.

### ***THE CURRENT CRISIS AND THE RESPONSE OF THE FEDERAL RESERVE<sup>5</sup>***

As noted above, the financial crisis of 2007 and 2008 involved funding runs. The U.S. financial system experienced a both a sharp fall in the market value of assets held by financial intermediaries coupled with uncertainty over which intermediaries are most affected by the drop in asset values. Funding dried up for all intermediaries due to lack of information on intermediaries’ exposures to the troubled assets and potentially troubled institutions along with an increase in risk aversion. Long intermediation chains compounded this effect, as firms were concerned not only about the balance sheet of their immediate counterparty, but the balance

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<sup>5</sup> This section draws upon Kroszner and Melick (2009), which provides a more detailed discussion of the Federal Reserve’s response to the crisis.

sheet of firms throughout the intermediation chain. The balance sheet of their counterparties' counterparty thus became crucial to evaluating the soundness of an institution. It was not sufficient, for example, to know the amount of asset-backed securities (ABS) or credit protection purchased by an institution but the health of monoline insurers of those ABS and the soundness of sellers of insurance through credit derivatives held by the institution. Concerns about the "fire sale" of assets, due to liquidity or funding problems or requirements to post additional collateral, and the uncertainties of the exposures led to "funding runs." It then became extremely difficult to disentangle liquidity from solvency, particularly in such circumstances bid-ask spreads widened so much that in many markets the price-discovery process broke down. As confidence collapsed, the financial system slammed to a halt and with it economic activity.

The current crisis, however, also highlighted the limited usefulness of the Fed's traditional toolkit in the face of modern financial collapse. Textbook descriptions of central bank policy usually list three key tools: open market operations, discount lending, and reserve requirements, before going on to say that reserve requirements are a relatively blunt and rarely used tool. As the financial market turmoil spread in August 2007, the Fed responded in what can certainly be described as a textbook or traditional manner with an emphasis on the target federal funds rate (open market operations) and the primary credit rate (discount lending).

By December 2007 it was evident that the traditional financial crisis playbook for central bank policy was not achieving the desired result. Traditional central bank policy tools can flood the banking system with liquidity, but this liquidity may not spill over to the market-based intermediaries when the financial markets linking the various institutions are not functioning. Open market operations and discount window lending will increase bank reserves, but there is no guarantee that these bank reserves will revive bank lending, or much less the entire chain of

intermediation. Bank deposits, protected by deposit insurance, may be slow to runoff, but bank deposits are a much smaller fraction of the funding of financial activity than once was the case. Institutions increasingly relied on the ability to securitize (that is, to sell) assets, to issue short-term commercial paper, to finance portfolios through secured repurchase agreements, etc., that is, on market-based intermediation rather than deposits. Thus, traditional policy tools can liquefy banks but have little direct effect on either bank traditional lending or market-based intermediaries. Even for banks, but more so for market-based intermediaries, questions about asset quality and capital adequacy remain.

In response, from December 2007 through March 2009 the Federal Reserve put in place 16 different facilities or programs to combat the crisis. The policy initiatives can all be thought of as supplementing the traditional central bank policy tools in three dimensions: expanding the type of counterparties receiving support, broadening the collateral required to access the support, and lengthening the maturity of the support. As discussed earlier, the traditional tools of open market operations and discount lending are almost exclusively aimed at short-term liquidity support for the bank-based piece of the financial system. In particular, the direct effect of these traditional tools is felt on bank balance sheets via either short-term transactions involving Treasury securities or the lending of reserves against high quality collateral. Dealing with new counterparties is critical to extending assistance to important markets and firms in the intermediation chain, thereby acknowledging the interconnectedness of institutions and markets that has evolved. Accepting a wider range of collateral allows the Fed to support the financial system that has evolved from simple bank-based lending towards greater reliance upon securitization and market-based intermediation. Finally, extending the maturity of the support provides important flexibility in countering a long-lived crisis and provides confidence to market

participants that institutions and counterparties will have a source of funding for longer periods to reduce the likelihood that sudden liquidity problems do not force “fire sales” of assets that could compromise their solvency.

Initiative	Description					Objectives		
	Announced	First Used	Status (Authorized Through)	Maximum Size (Billions)	Current Size (Billions)	Lengthen Maturity	Broaden Collateral	Expand Counterparties
Term Auction Facility	12/12/2007	12/17/2007	Ongoing	493	109	x		
Central Bank Swap Lines	12/12/2007	12/20/2007	2/1/2010	583	28			x
Term Securities Lending Facility	3/11/2008	3/27/2008	2/1/2010 <sup>6</sup>	234	0	x		
Maiden Lane (Bear Stearns)	3/14/2008	6/26/2008	Ongoing	30	26		x	x
Primary Dealer Credit Facility <sup>4</sup>	3/16/2008	3/19/2007 <sup>2</sup>	2/1/2010	148	0			x
Term Securities Lending Facility Options	7/30/2008	8/27/2008	Suspended <sup>3</sup>	50	0	x		
AIG								
FRBNY Lending to AIG	9/16/2008	9/17/2008 <sup>2</sup>	Ongoing	90	45		x	x
Maiden Lane II	11/10/2008	12/12/2008	Ongoing	20	16		x	x
Maiden Lane III	11/10/2008	11/25/2008	Ongoing	28	23		x	x
Asset-Backed Commercial Paper Money								
Market Mutual Fund Liquidity Facility	9/19/2008	9/24/2008 <sup>2</sup>	2/1/2010	152	0			
Commercial Paper Funding Facility	10/7/2008	10/27/2008	2/1/2010	351	15		x	x
Money Market Investor Funding Facility	10/21/2008	Not used	10/30/2009	Not used	0		x	x
Citigroup Support	11/23/2008	Not used	Not used	Not used	0			x
Term Asset-Backed Securities Loan Facility	11/25/2008	3/25/2009	3/31/2010 6/30/2010 <sup>5</sup>	44	44	x	x	x
Purchase of MBS guaranteed by GSEs	11/25/2008	1/5/2009	3/31/2010 <sup>1</sup>	847	847	x		x
Purchases of direct GSE Debt	11/25/2008	12/5/2008	3/31/2009 <sup>7</sup>	153	153	x		x
Bank of America Support	1/16/2009	Not Used	Not used	Not used	0			x
Purchases of Longer-Term Treasuries	3/18/2009	3/25/2009	10/31/2009 <sup>6</sup>	311	311	x		

Source: Federal Reserve Board of Governors weekly H.4.1 statistical release.

1. Includes transitional support for Goldman Sachs, Morgan Stanley, and Merrill Lynch announced on 9/21/2008

2. Based on first appearance in the H.4.1

3. Suspension on 6/25/2009

4. Terminated on 11/10/2008

5. Loans against newly issued ABS and legacy CMBS authorized through March 31, 2010, loans against newly issued CMBS through June 30, 2010.

6. Auctions against Schedule 1 collateral suspended on 7/1/2009

7. Based on FOMC statements

Table 1 presents a chronological listing and some information for the nontraditional policies, including an assessment of the function(s) served by each. The actions undertaken by the Fed during the crisis to expand lending to non-traditional counterparties broaden the acceptable collateral against which it would lend, and lengthen the maturity of its lending were an acknowledgement of the narrowness of the traditional tool set to deal with a modern financial crisis. In a crisis, financial firms need access to sufficient liquidity and capital to instill confidence in counterparties in order to successfully intermediate and thereby keep the credit channel open to support economic activity. And this liquidity and capital must be accessed in a

timely matter. The U.S. experience during the turmoil indicates that speed is essential in preventing the unraveling of intermediation chains.

### **PRELIMINARY CONCLUSIONS**

One of the lessons from the recent crisis is that supervision, regulation, and the tools of the central bank must keep pace with developments and change in financial markets and institutions. In the U.S., the focus had been too narrow on commercial banks and commercial bank deposits, partially a legacy of the Glass-Steagall Act. As the crisis revealed, many institutions beyond commercial banks are crucial to the healthy functioning and stability of the financial system and that “funding runs” can pose perhaps a greater threat to the stability of banking and financial institutions than traditional depositor runs. The interconnectedness of financial institutions and markets globally through long market-based intermediation chains should be taken into account when assessing the winding down of new various facilities and proposals for regulatory reform.

Given the extent of interventions world-wide, issues of moral hazard will remain. The Rubicon cannot be uncrossed and financial market behavior will surely anticipate the return of the “temporary” programs and guarantees in the event of another crisis. To maintain the stability of the system and to protect taxpayers, the “too interconnected to fail” problem needs to be addressed in two ways: through improvements in the supervision and regulation framework as well as improvements in the legal and market infrastructure to make markets more robust globally.

Giving supervisors the information and ability to monitor risks throughout the system, not just in traditional banks, is an important part of the improvements going forward, and

international cooperation will be a necessary part of this. Exactly who should bear the responsibility of being the “systemic risk regulator” and what authorities would be necessary for effective systemic risk monitoring and mitigation is the subject of much controversy. In the U.S., proposals have ranged from giving those powers to the Federal Reserve, to setting up a systemic risk council of existing regulators including the Federal Reserve, to taking away those powers from existing regulators and giving them to a stand-alone Financial Supervisory Agency, much like the FSA in the UK. I will not attempt to resolve this debate here but do want to caution that the task of defining the boundaries of what types of organizations and activities would be subject to systemic risk monitoring is particularly vexing, given the ability of the financial institutions and markets to innovate and move risk-taking activity just one step beyond those boundaries.

Some have argued that a return to the separation of commercial and investment banking embodied in the Glass-Steagall Act would insulate banks from financial market shocks and help to promote stability<sup>6</sup>. The experience of the last few years, however, does not provide strong support for such an argument. In the U.S., for example, the interconnected problems arose not primarily from the mixing of commercial and investment banking at individual institutions. Recall that Bear Stearns, Merrill Lynch, and Lehman Brothers were not commercial bank holding companies and so their troubles had nothing to do with allowing commercial and investment banking to occur in the same holding company. The exposures that led to the downfall of Indymac, Washington Mutual, and Wachovia, for example, were primarily related to risky choices and concentrations within the traditional commercial banking sphere of mortgage

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<sup>6</sup>Volcker (2010), Johnson (2010), King (2009) and Stiglitz (2009) favor such a separation. This legislative response has gained recent notoriety through the proposed “Volcker Rule” legislation. In general, those who support Glass-Steagall-style separation believe that by clearly delineating which firms are inside and outside of the government “safety net” and then closely regulating those firms that are inside, the government can ensure that banks take on appropriate levels of risk (thus diminishing the potential for a taxpayer bailout) and insulate systemically important firms from future crises.



origination and lending, again not related to investment banking activities of underwriting or dealing in securities.

In addition, re-introducing a Glass-Steagall separation (or Glass-Steagall “lite” such as the Volker rule) or limiting the size of institutions<sup>7</sup> would likely result in greater fragmentation of the financial system, with the likely consequence of increasing rather than decreasing interconnectedness of banking institutions funding sources to other financial institutions and markets. Pushing risk-taking activities just outside of the commercial banking system could have the unintended consequence of making the entire system more, rather than less, fragile.

Certainly, ensuring that financial firms have enough “skin in the game” through appropriate capital requirements against their risk-taking activities is important for mitigating moral hazard problems and maintaining confidence in the system. Appropriate capital requirements, however, are only one piece of the puzzle. High capital requirements on banks or other classes of financial institutions, for example, can lead to strong incentives for getting around them, through either off balance sheet activities or activities being undertaken by entities not facing the requirements. After all, regulatory burden and high capital requirements are part of the reasons that finance moved to the long and increasingly complex intermediation chains.

It is thus crucial for reform to acknowledge the challenges posed by modern financial market developments and focus on making market infrastructure more robust to mitigate the fragilities of the intermediation chains. Of primary importance is improving the resolution regime for large financial institutions. Uncertainties associated with contract enforcement and delays in bankruptcy made it difficult or impossible for firms to obtain even secured funding and customers and counterparties pull away, as was evident in September of 2008. The market-based

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<sup>7</sup> Some argue that strictly limiting the size of banks would diminish the moral hazard problem, e.g., Johnson (2009); Haldane (2009).

intermediation chain relies heavily upon clarity in contract enforcement and rules for resolution. The stress situation in 2008 revealed the extent of those uncertainties and how they could lead to “funding runs.” Greater reliance on “living wills” would give greater clarity about how a troubled institution will operate as it winds down operations. Pre-packaged bankruptcy could reduce uncertainty about how various stakeholders will be treated if an institution fails. Greater international cooperation and clarity on the cross-border aspects of bankruptcy resolution also are important for reducing uncertainty and, hence, fragility.

Many other proposals have been put forward to enhance market resiliency and mitigate the interconnectedness problems in a modern financial system, such as central clearing of derivatives. An important lesson to draw from the recent financial crisis is that a key criterion for judging the effectiveness of the reforms is how they deal with the interconnectedness of financial institutions and markets both within and across national borders. Ultimately, to mitigate the potential for moral hazard, policy makers must feel that the markets are sufficiently robust that institutions can be allowed to fail with extremely low likelihood of dire consequences for the system.

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