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Bank Resolution Concepts, Trade-offs, and Changes in Practices

- As the 2007-08 financial crisis demonstrated, the failure or near-failure of banks entails heavy costs for customers, the financial sector, and the overall economy.
- Methods used to resolve failing banks range from private-sector solutions such as mergers and acquisitions to recapitalization through the use of public funds.
- The feasibility and cost of these methods will depend on whether the bank failure is idiosyncratic or part of a systemic crisis, and on factors such as the size, complexity, and interconnectedness of the institution in distress.
- This study proposes a simple analytical framework—useful to firms and regulators alike—for assessing these issues and determining the optimal resolution policy in the case of particular bank failures.

1. Introduction

During the recent crisis, some of the world's largest and most prominent financial institutions failed or nearly failed, requiring intervention and assistance from regulators. Measures included extended access to lender-of-last-resort facilities, debt guarantees, and injection of capital to mitigate the distress.[1]

Chart 1 shows some of the largest financial institutions that failed and/or received government support during the recent crisis. As we can see, these institutions were large and systemically important. For example, for a brief period in 2009, Royal Bank of Scotland (RBS) was the largest company by both assets and liabilities in the world. Table 1 summarizes the interventions and resolutions of major financial institutions that experienced difficulties during the recent crisis. The chart and the table indicate the extraordinary levels of distress throughout the system and the unprecedented range of actions taken by resolution

[1] For a discussion of the disruptions and the policy responses during the recent crisis, see Yorulmazer (2014).

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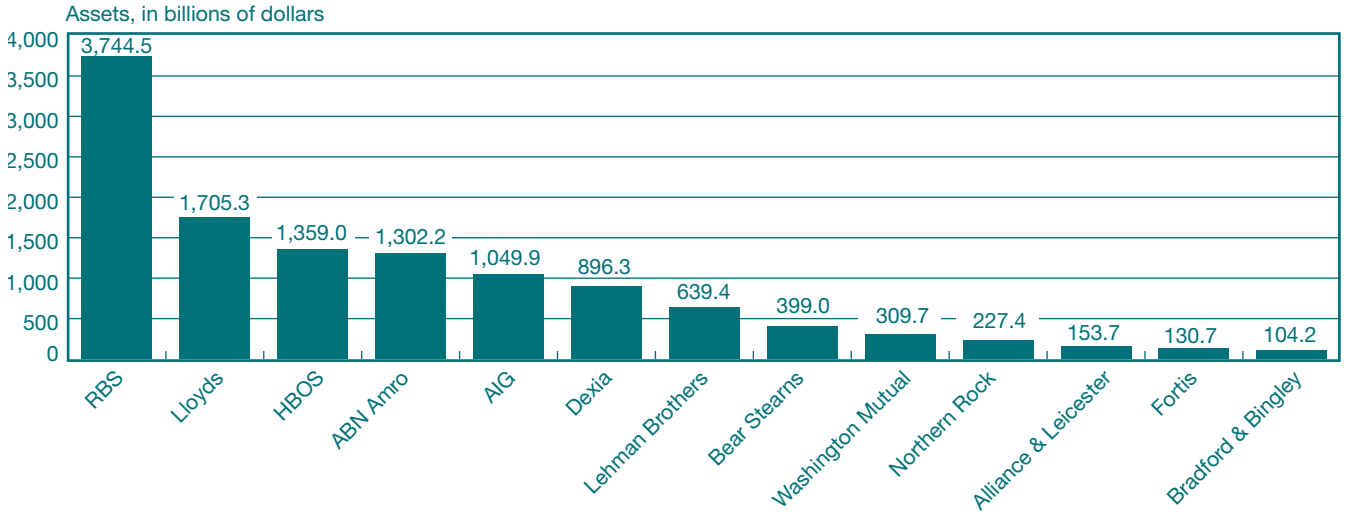
Chart 1

Some of the Largest Institutions that Failed and/or Received Government Intervention during the Recent Crisis



Source: Public filings as of period before resolution.

authorities, since many countries lacked an efficient framework for resolving large and systemically important financial institutions (SIFIs).

In the United States, prior to the passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act, insolvent nondeposit-taking institutions were dealt with under the Bankruptcy Code, as opposed to the special resolution regime administered by the Federal Deposit Insurance Corporation (FDIC). Chart 2 shows the largest corporate bankruptcies in U.S. history; Lehman Brothers was by far the greatest. In the absence of an orderly resolution regime, the failure of Lehman led to unprecedented disruptions in financial systems globally. While many counterparties to Lehman suffered direct losses, others experienced distress owing to information contagion and fire-sale externalities from a sell-off in assets.

One of the most significant effects was on the money market mutual fund industry, where the Reserve Primary Fund, the oldest money market fund, "broke the buck" because of its exposure to Lehman Brothers debt securities and had to be liquidated, marking only the second such episode in history. This event led to a run on the money market mutual fund industry, a development that adversely affected the shadow banking industry.[2] Regulators attempted to contain the disruptions in financial markets with extraordinary interventions including capital injections, debt guarantee programs, and many lending facilities.

Financial intermediaries and banks perform important roles for the efficient functioning of the economy, such as channeling funds from savers to investors and providing payment services, and their liquid liabilities can act as money. As a result, failure of these institutions can pose significant disruptions, and corporate bankruptcy may not be the

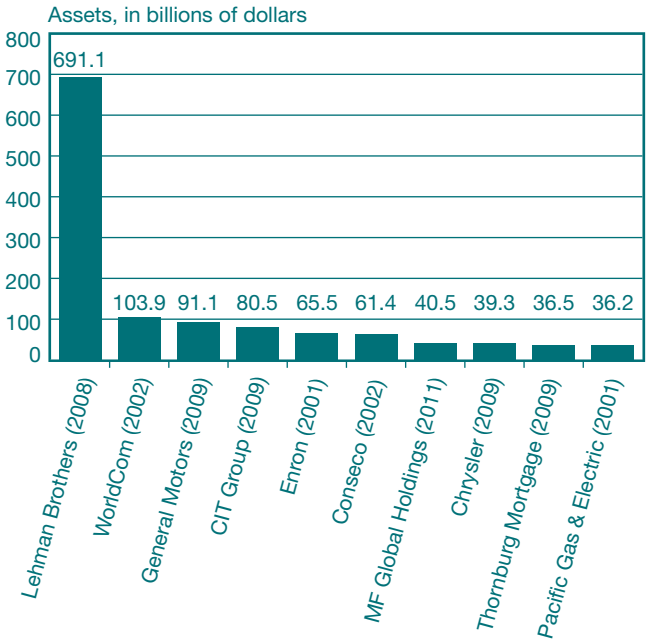
[2] On September 19, 2008, the Federal Reserve announced the institution of the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF). The AMLF provided nonrecourse loans to commercial banks to purchase eligible asset-backed commercial paper from money market mutual funds (MMFs). The U.S. Treasury also provided a temporary guarantee on the share price of MMFs through the Temporary Guarantee Program for Money Market Funds and the Federal Reserve announced another lending program, the Money Market Investor Funding Facility (MMIFF), as a complement to the AMLF intended to provide nonrecourse loans to money market funds. However, no loans were made under the MMIFF. The facility was closed on October 30, 2009.

Table 1

Major Interventions and Resolutions during the Recent Financial Crisis

Institution	Date	Resolution Method/Support
ABN Amro	October 2007	The private acquisition by a consortium consisting of the Royal Bank of Scotland (RBS), Banco Santander, and Fortis marked the largest worldwide acquisition of a bank and the second largest European cross-border transaction. When Fortis and RBS ran into trouble, their holdings of ABN Amro's assets were nationalized by the Dutch and U.K. governments, respectively.
ING Group	October 2008	Received a €10 billion capital injection from the Dutch government in exchange for securities and veto rights on major operational changes and investments. The injection was also conditional on ING divesting certain operations.
Fortis	September 2008 to May 2009	The Netherlands, Belgium, and Luxembourg provided a capital injection of €11.2 billion on September 28, 2008, each taking a 49 percent stake in Fortis's banking operations in their respective countries. Fortis was sold in parts, with a majority stake sold to BNP Paribas on May 13, 2009.
Dexia	September 2008	Dexia was recapitalized by the French and Belgian governments through a capital injection of €3 billion, and it received a state guarantee in order to regain access to wholesale funding markets.
Northern Rock	September 2007 to February 2008	In September 2007, the Bank of England provided a liquidity support facility and government guarantee of certain liabilities. In February 2008, the bank was nationalized by the British government.
Alliance & Leicester	July 2008	Private acquisition by Banco Santander for £1.26 billion
Bradford & Bingley	September 2008	The U.K. government nationalized the institution on September 29, 2009, selling the savings unit and branches to Banco Santander.
HBOS	September 2008 to January 2009	The terms of a takeover by Lloyds TSB were agreed to in September 2008. In October 2008, the U.K. Treasury injected new capital amounting to £17 billion, or a 43 percent equity stake in the combined Lloyds TSB and HBOS. In January 2009, HBOS was acquired by Lloyds TSB.
UBS	December 2007 to October 2008	In December 2007, the bank received a capital injection from the Government of Singapore Investment Corporation. In October 2008, UBS sold CHF 60 billion of its troubled assets to a special purpose vehicle acting as a "bad bank" entity, a transaction that was funded by a CHF 6 billion capital injection from the Swiss government and a CHF 54 billion loan from the Swiss National Bank.
Anglo Irish Bank	January 2009	Nationalized when the Irish government determined that recapitalization would not be enough to save the bank.
Allied Irish Bank	February 2009	Received capital injection of €3.5 billion
Bank of Ireland	February 2009	Received capital injection of €3.5 billion
Bankia SA	May 2012	Bank was partly nationalized through a €19 billion recapitalization by Spain.
Bear Stearns	March 2008	The bank was sold to JPMorgan Chase with assistance from the Federal Reserve in the form of a nonrecourse loan of $29 billion.
Lehman Brothers	September 2008	Lehman filed for chapter 11 bankruptcy. It was the largest bankruptcy filing in U.S. history.
AIG	September to November 2008	On September 16, 2008, the Federal Reserve extended a credit facility of $85 billion, secured by stock in the form of warrants for a 79.9 percent equity stake. The loan was restructured in November in coordination with the U.S. Treasury, which extended the facility and lowered its rate. AIG also received $40 billion in a capital injection under the Troubled Asset Relief Program (TARP).
Washington Mutual	September 2008	On September 25, 2008, Washington Mutual was seized by the Office of Thrift Supervision and placed in receivership with the Federal Deposit Insurance Corporation. The banking subsidiaries were sold through purchase and assumption to JPMorgan Chase, while the holding company filed for chapter 11 bankruptcy.
Citigroup Incorporated	October 2008 to January 2009	Received two capital injections through TARP: $25 billion in October 2008 and an additional $20 billion in January 2009. Also in January 2009, Citigroup separated its core and noncore assets in a good bank–bad bank split (Citicorp and Citi Holdings).
Wells Fargo & Company	October 2008	Received $25 billion capital injection under TARP
State Street Corporation	October 2008	Received $2 billion capital injection under TARP
Bank of America Corporation	October 2008 to January 2009	Received two capital injections through TARP: $25 billion in October 2008 and an additional $20 billion in January 2009
JPMorgan Chase & Company	October 2008	Received a $25 billion capital injection under TARP
Morgan Stanley	October 2008	Received $10 billion capital injection under TARP
Goldman Sachs Group	October 2008	Received $10 billion capital injection under TARP
Bank of New York Mellon	October 2008	Received $3 billion capital injection under TARP
Wachovia	September 2008	The Federal Reserve provided Citigroup with liquidity to aid in purchase of Wachovia. Ultimately, the bank was acquired by Wells Fargo.

Chart 2
Largest Public Company Bankruptcy Filings
1980–Present



Source: BankruptcyData.com.

appropriate resolution regime.[3] Hence, authorities use various methods to resolve failed banks, ranging from full or partial private-sector resolution methods, such as the sale of a bank to a healthy bank via merger and acquisition (M&A), the transfer or sale of all or parts of the assets and liabilities to another bank via purchase and assumption (P&A), or government intervention using public funds to recapitalize banks.

This paper provides a discussion of the costs associated with different resolution methods. Furthermore, we provide a simple framework to analyze the optimality of resolution methods. We show that private resolution methods, such as M&A and P&A, are preferred options since they minimize the costs associated with bank failures and their resolution.

The availability of resolution options depends on the characteristics of the failed bank. For example, when the losses in the failed bank are large, there may not be a ready buyer for the bank without assistance. Furthermore, if the failed bank is large and complex or if failure occurs during a systemic crisis that causes many banks to experience distress, it may not be feasible to find a healthy bank to acquire the failed bank, and the regulators may need to employ alternative resolution methods such as liquidation or recapitalization. In this case, resolution is more challenging since it entails trade-offs between disruptions arising from a disorderly liquidation and the fiscal costs and moral hazard resulting from using public funds for recapitalization. Hence, regulators need to employ a "state-contingent" resolution policy that depends on whether failure occurs in an idiosyncratic failure state or in a systemic-crisis state.

Empirical evidence on the timing of bank failures suggests that failures are not uniformly distributed over time; instead, they are clustered. So when banks fail, they tend to fail together around the same time. Charts 3 and 4 show the number of failed banks in the United States and the size of their assets and deposits, respectively.

The pattern of bank-failure clustering in systemic crises makes the resolution of failed banks more challenging for authorities, since in such states of the world, the availability of preferred resolution options is limited, which is the primary theme of the article.

The article is organized as follows: Section 2 discusses the corporate bankruptcy regimes in the United States and the costs associated with bank failures and their resolution. Section 3 examines the resolution methods used by authorities. Section 4 discusses the trade-offs associated with resolution of failed banks and provides an analytical framework to develop an optimal resolution regime, which would depend not only on the failed institution itself, but also on its macro environment. Section 5 reviews recent steps taken by authorities to improve resolution regimes, and section 6 presents concluding remarks.

2. Bankruptcy Regimes and Costs of Bank Failures

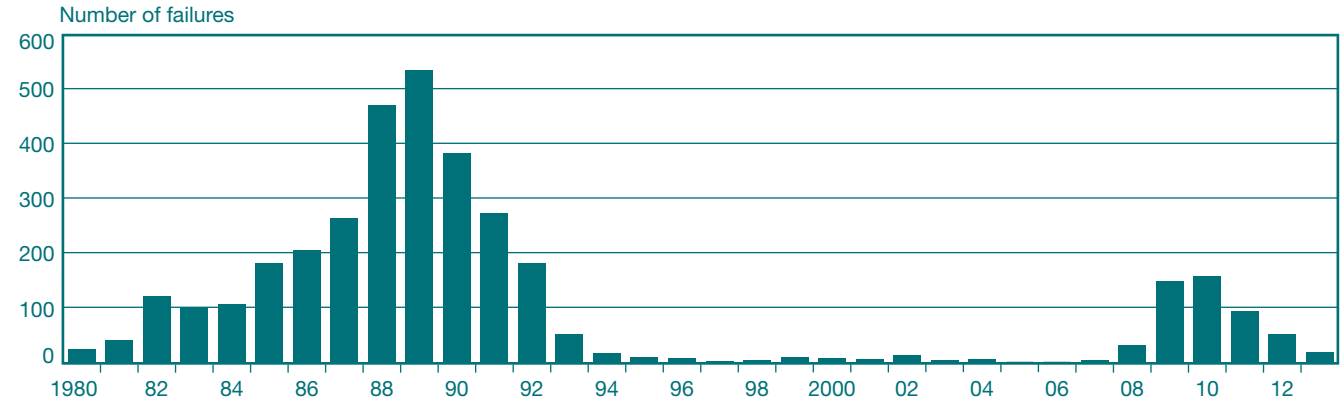
In this section, we provide a brief summary of the corporate bankruptcy regime in the United States. Many aspects of corporate insolvency proceedings have proved problematic in the case of a bank failure, which we address in the subsequent discussion of costs.

Bankruptcy can be initiated voluntarily by the debtor or involuntarily by the petitions of creditors whose claims are in default. The initiation of the process automatically prevents (or "stays") creditors from collecting on their claims, therefore providing the bankruptcy court with time for review. Importantly, all creditors have "standing" to be

[3] Section 3 provides a discussion of the resolution methods used by authorities. DeYoung, Kowalik, and Reidhill (2013) highlight the importance of resolution technologies showing that the limited set of failed bank resolution technologies can leave regulators with little choice but to bail out systemically important banks.

Chart 3

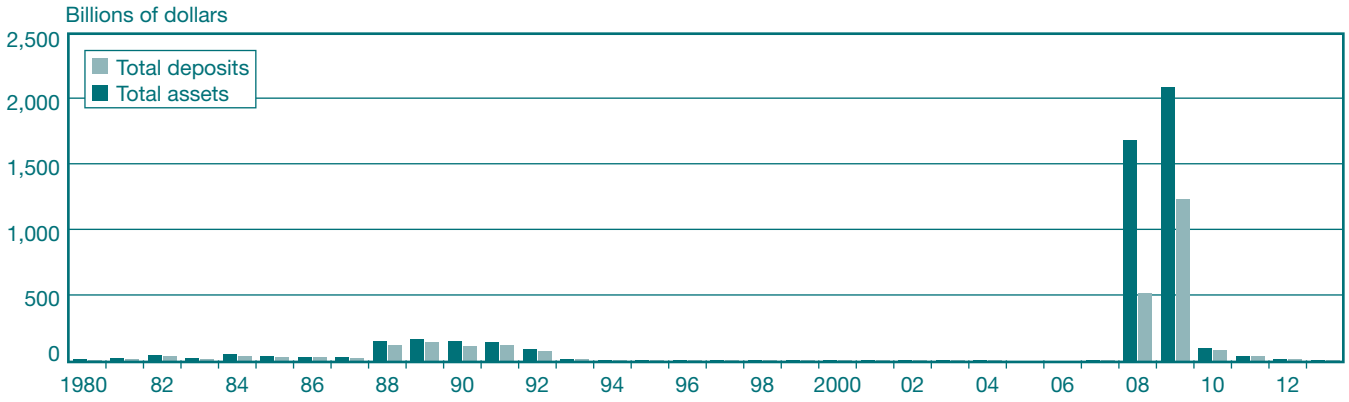
Number of Bank Failures in the United States



Source: Federal Deposit Insurance Corporation.

Chart 4

Assets of Failed Banks in the United States



Source: Federal Deposit Insurance Corporation.

represented in the proceedings, and often their consent is required in a number of areas.

In the United States, two common forms of bankruptcy are Chapter 7 liquidation and Chapter 11 reorganization. In Chapter 7 liquidation, the firm is taken over by a receiver who liquidates the assets and distributes the proceeds to the creditors. Alternatively, in Chapter 11 reorganization, the firm's management typically acts as trustee and leads the creation of the reorganization plan, which must ultimately be approved by the creditors; otherwise, the parties can seek an alternative plan under a newly appointed trustee. The creditors are typically paid in securities of the reorganized firm. Furthermore, during the reorganization proceedings, the firm can arrange for debtor-in-possession (DIP) financing to continue operations.

In Chapter 7 liquidation, bankruptcy courts usually adhere to the priority schedule of claims, with secured creditors experiencing higher recovery rates on their claims than unsecured creditors. The priority of claims is more likely to be renegotiated, however, in the case of Chapter 11 reorganization.

Resolving a failed bank through general insolvency proceedings is difficult for a number of reasons. First, banks are characterized by significant financial fragility owing to their unique structure. Their liabilities are primarily composed of liquid deposits, redeemable at par, whereas their assets are usually long-term loans which are often illiquid. Bank assets are also typically less transparent, which would make DIP financing expensive or unattainable. Furthermore, as banks perform essential roles in the

functioning of financial markets and the economy, their failures can have considerable costs and externalities. Thus, the primary objective of a resolution regime should be to minimize these costs.[4] Prompt action, as opposed to the delayed and lengthy administrative bankruptcy process, is important for resolving these institutions effectively while maintaining public confidence.

Next, we explore in detail the costs associated with bank failures and their resolution. We put these costs into four broad categories: disruptions to the customers of the bank, disruptions to other financial institutions through contagion, fiscal costs associated with the resolution of failed banks, and distorted incentives and moral hazard.

2.1 Disruptions to the Failed Bank's Customers

On the asset side, banks have loans through which they channel funds from savers to the firms that invest in profitable projects. Firms that use bank financing and have an established relationship with their bank may find it difficult and costly to find other sources of financing when their bank fails.[5] On the liability side, banks have liquid liabilities that act as money. Therefore, a bank's failure can disrupt payment services for the depositors and creditors, resulting in significant welfare losses (Kahn and Santos 2005; Gorton and Huang 2004, 2006).

2.2 Contagion

The failure of a bank can have adverse effects on other banks and financial institutions. This contagion can arise through various channels such as direct exposures through interlinkages, information contagion, and fire-sale externalities, to list a few.

Banks and financial institutions in general have direct exposure to each other through borrowing and lending. When a bank fails, other institutions can experience direct losses (Allen and Gale 2000).[6] Furthermore, these losses can create distress for the affected institutions and may lead to their failure, resulting in knock-on effects and further rounds of failures and potential system-wide distress.

Another important channel through which a financial institution's difficulties can affect other institutions is created by information contagion, which occurs when creditors of other banks perceive the institution's difficulties as a negative signal about the health of their own bank (Chen 1999; Acharya and Yorulmazer 2008). While such actions can be a rational response of creditors, they can lead to "wrong runs" where even healthy institutions can experience a creditor run.[7] Such runs are more likely when financial institutions are opaque and when creditors do not have detailed information about the health of their financial institution.

As more prominently observed during the recent crisis, contagion can also arise through fire-sale externalities, where the sales of assets of the institution in distress can depress asset prices (Shleifer and Vishny 1992; Allen and Gale 1994, 1998) and the value of the assets of other institutions, thereby possibly triggering additional asset sales leading to a fire-sale spiral.[8]

2.3 Fiscal Costs

Resolution of failed banks is usually associated with fiscal costs that can arise from payments through a deposit

[4] For more discussion on costs associated with bank failures, see Bliss and Kaufman (2006) and Hüpkes (2004). On the resolution of failed banks, see Santomero and Hoffman (1998), Basel Committee on Banking Supervision (2002), Hoggarth, Reidhill, and Sinclair (2004), and Beck (2011), to cite a few.

[5] For a discussion of relationship banking, see Boot (2000) and the references therein.

[6] See also Leitner (2005). Rochet and Tirole (1996) provide a model where banks monitor each other (peer monitoring) through cross-holdings. A series of papers, Sheldon and Maurer (1998) for Switzerland, Furfine (1999) for the United States, Upper and Worms (2002) for Germany, Wells (2002) for the United Kingdom, and Elsinger, Lehar, and Summer (2006) for Austria, to cite only a few, provide empirical analyses of contagion through interlinkages. Nier et al. (2007) provide a theoretical model and simulation results to analyze contagion through interlinkages.

[7] Saunders and Wilson (1996) examine deposit flows in 163 failed and 229 surviving banks over the Depression era of 1929-33 in the United States. For the years 1929 and 1933, they find evidence of "flight to quality" where withdrawals from failed banks were associated with deposit increases in surviving banks. However, they observe a decrease in deposits in both failed and surviving banks for the period 1930-32. One possible explanation for these events is that the depositors may not have had accurate information about each bank and may have based their decisions on publicly available information, such as the overall state of the economy or even the number of recent bank failures. Therefore, imperfect information can lead to runs on healthy banks.

[8] Cifuentes, Ferrucci, and Shin (2005) simulate a model where banks are interconnected through cross-holdings and sales by distressed institutions depress the market price of assets. An initial shock may force some banks to liquidate some of their illiquid assets to satisfy the regulatory solvency constraints. Marking to market of the asset book can induce more asset sales, depressing prices further and inducing even more sales. Therefore, contagious failures can result from small shocks through asset prices.

insurance fund when available cash in the fund has been exhausted, from recapitalization of distressed banks, and from administrative costs associated with restructuring or liquidating the failed bank. These costs are exacerbated when governments need to intervene and come up with funds quickly; that is, immediacy can entail further costs.

The fiscal costs of providing funds with immediacy can be linked to a variety of sources, most notably: 1) the distortionary effects of tax increases and 2) the likely effect of government deficits on the country's exchange rate, manifested in the fact that banking crises and currency crises have often occurred in tandem in many countries (especially in emerging market countries). Ultimately, immediacy can result in further fiscal costs: Government expenditures and inflows during the regular course of events are smooth, relative to the potentially rapid growth of off-balance-sheet contingent liabilities, such as deposit insurance funds and the costs of bank bailouts.[9]

2.4 Incentives

During times of systemic crises regulators may feel compelled to provide assistance to banks that experience difficulties. This assistance may be in the form of access to lender-of-last-resort facilities, guarantees for the bank's debt, and capital injections. This safety net provided by regulators may create incentives for banks to take excessive risk, leading to moral hazard. Hence, during any regulatory intervention, the potential costs of moral hazard should be taken into account.

An important issue is that regulatory actions may entail time inconsistency, where ex ante regulators would like to be tough to prevent incentives for excessive risk-taking. However, during a systemic crisis, the costs associated with not assisting (such as the costs of liquidation) can be so high that regulators may feel compelled to provide help (Mailath and Mester 1994; Acharya and Yorulmazer 2007, 2008).

[9] See, for example, the discussion on fiscal costs associated with banking collapses and bailouts in Calomiris (1998). Hoggarth, Reidhill, and Sinclair (2004) find that the cumulative output losses have amounted to an astounding 15 to 20 percent of annual GDP in the banking crises of the past twenty-five years. Caprio and Klingebiel (1996) argue that the bailout of the thrift industry cost $180 billion (3.2 percent of GDP) in the United States in the late 1980s. They also document that the estimated cost of bailouts, as a share of GDP, were 16.8 percent for Spain, 6.4 percent for Sweden, and 8 percent for Finland. Honohan and Klingebiel (2000) find that countries spent 12.8 percent of their GDP to clean up their banking systems whereas Claessens, Djankov, and Klingebiel (1999) set the cost at 15 to 50 percent of GDP.

3. Resolution Methods

When a bank experiences difficulties or eventually fails, regulators use various resolution methods. A brief description of the widely used methods follows, with Table 1 providing examples of the various resolution methods used in the most recent crisis.

- *Mergers and acquisitions:* A bank that experiences difficulties can be acquired by a healthy bank. Even though the distressed bank may be approaching insolvency, it may still be an attractive target for other banks due to its franchise value, which derives from its customer base and established relationships. This private-sector resolution technique does not require any public-sector intervention or administration.
- *Purchase and assumption*: The failing institution enters receivership and its charter is terminated. In a P&A transaction, all or part of the bank's assets and liabilities are transferred to another institution. In the United States, the FDIC pays to the successor the gap in value between assets and liabilities transferred, and the receivership liquidates any assets not transferred. For example, Washington Mutual, after being placed in FDIC receivership, was sold through P&A to JPMorgan Chase in 2008 without government assistance.[10] While P&A is still a private-sector resolution, it may require the use of some public funds as we explain below.
- *P&A with assistance*: In an assisted P&A transaction, authorities provide guarantees, including loss-sharing agreements or put options to sell the assets back to the authority. An early and large transaction of this type in the United States took place in 1991, when the FDIC's resolution of Southeast Banking Corporation included a provision to reimburse acquirers for 85 percent of net losses on the acquired assets. More recently, the acquisition of Bear Stearns by JPMorgan Chase was facilitated by assistance from the Federal Reserve.
- *Bridge bank*: A new bank, called the bridge bank, is set up in order to maintain banking operations until a permanent solution can be implemented. Typically, only a portion of the assets would be transferred to the bridge bank, while the remaining assets would be passed to the receiver for liquidation. The ultimate aim is to sell the bridge bank through a P&A transaction. An example of this method was seen in the resolution of Bank of New England in 1991, when the FDIC created a bridge bank for each of Bank of New England's three subsidiary banks, all of which were ultimately sold to Fleet/Norstar Financial Group.

[10] While the Washington Mutual transaction was regarded as a private resolution, it has been argued that it would not have been successful without the receivership powers of the FDIC.

• *Good bank–bad bank separation*: The bank in distress is split in two: a "good bank" that retains the performing assets, and a "bad bank" that receives the remaining assets that would be restructured or liquidated. Often a trust or asset management company structure is used. This is a more general method that could also be used in conjunction with a restructuring and recapitalization. A good example is the resolution of banks during the Swedish Financial Crisis, which is discussed as a case study (see box).

• *Liquidation and deposit payoff*: In liquidation, the institution is closed and the assets are placed in a liquidating receivership. The liquidation value of the assets is used to repay creditors. In the United States, the FDIC pays insured depositors either directly or through an acquiring institution serving as a paying agent. An insured deposit payoff was used in the failure of Penn Square Bank, N.A., in 1982.[11] More than half of the bank's deposits were uninsured, including significant funds of other banks, which led to serious adverse effects on the banking industry.

• *Recapitalization*: The institution is kept open through public assistance. This can be done in a number of ways, including a restructuring, a "bail-in" that forces creditors to write off some of their claims, an outright nationalization in which shareholders are wiped out and management is replaced, or a capital injection in which shareholders are diluted but remain and management does not change.[12] Table 1 lists many examples of recapitalizations and capital injections from the recent crisis.

Each of the resolution options discussed comes with certain trade-offs and imposes, to varying degrees, some or all of the costs outlined previously. Furthermore, the availability and the relative costs of the resolution methods depend on the state of the world we are in (whether facing an idiosyncratic bank failure or a systemic crisis), and on factors such as the size, complexity, and interconnectedness of the institution in distress. In the next section, we provide a framework to analyze the feasibility and optimality of the resolution methods and the trade-offs that may arise.

4. Feasibility and Trade-Offs

So far, we have discussed the costs associated with the failure and resolution of banks and the methods authorities use to resolve failed banks. In this section, we analyze the costs associated with different resolution methods and try to formalize an optimal resolution policy.

A private-sector resolution, through which the failed bank is acquired by a healthy bank, imposes the least cost, since the franchise value is preserved, there is no disruption to the bank's customers or the payment system itself, and there are no fiscal costs.[13] However, the feasibility of such an option depends on the size and complexity of the failed bank, as well as the state of the world. When a private-sector resolution is not feasible, the authorities resort to methods such as assisted sales, liquidation, and recapitalization, each of which entails certain trade-offs and higher costs. Next, we provide a simple analytical framework to analyze these issues formally.

4.1 An Analytical Framework

Suppose we have the following framework involving two banks that are identical to start. The banks have the following balance sheet:

Assets	Liabilities
Risky assets (a)	Insured deposits (id)
	Uninsured debt (d)
	Equity (e)

The bank finances itself with insured deposits (insurance is provided by the FDIC), uninsured debt, and equity capital, where $id + d + e = 1$. The bank has one unit of the risky investment ($a = 1$), which has a random return with the high return $R > 1$ and the low return $r < id$. So, when the return is high, the bank is solvent and does not require any intervention. However, when the return is low, the bank's capital is wiped out, so the bank becomes insolvent and needs to be resolved.

To keep the framework simple, we first focus on the following resolution methods: 1) whole-bank purchase and assumption, 2) liquidation, and 3) recapitalization. Next, we analyze the costs associated with different resolution methods and the optimal choice in different states of the world.

Along the lines of our earlier discussion, we assume that the bank's assets are specific so that sale of the assets to another bank (via P&A) and liquidation can result in

[11] *Managing the Crisis: The FDIC and RTC Experience*, Part II, Chapter 2, in FDIC (1998).

[12] See Philippon and Schnabl (2013) for an analysis of efficient recapitalization of banks.

[13] In evaluating the costs of resolution methods, we should take into account the potential effects on size and complexity of the institutions resulting from a private transaction. For example, these institutions may become larger and more complex and therefore more difficult to resolve in the case of future distress.

A Good Example: Lessons from the Resolution of the Swedish Financial Crisis

Sweden experienced a twin crisis in the early 1990s, which marked the first systemic crisis in industrialized countries since the 1930s. It is usually argued that this episode can be regarded as a good example of a swift, effective, and low-cost resolution of banking crisis. However, the Swedish experience has some unique features that may be difficult to replicate in all crises.[a]

Crisis and intervention: After deregulation of the credit markets in 1985, low interest rates, lax supervision, and the credit expansion contributed to an overheating property market.[b] Finance companies were less regulated compared to banks and were financed by a new type of commercial paper called "marknadsbevis" guaranteed by banks. When one of these companies folded in September 1990, the market for these securities dried up and banks had to keep funding the companies since they were closely linked.

In the early stages, no comprehensive framework existed and the government tackled problems case by case. By the fall of 1991, two of the six largest financial institutions, Forsta Sparbanken and Nordbanken, had inadequate capital. The state guaranteed a loan for Forsta and took over Nordbanken injecting capital to own 77 percent of its shares and split Nordbanken by transferring nonperforming loans to an asset management company (AMC) called Securum. Within a year, Gota Bank experienced difficulties and was also taken over by the government and split into a good bank and an AMC, called Retrieva.[c]

While there were no significant banks runs, the banks' foreign creditors started to cut their credit lines, and the Swedish authorities needed to restore confidence. In December 1992, Sweden guaranteed all bank deposits and creditors of the nation's 114 banks, but not the shareholders. The parliament passed the Bank Support Act authorizing the government to provide support in the form of loan guarantees, capital contributions, and other appropriate measures.[d] Overall, to resolve the crisis, Swedish authorities forced banks to write down their losses, used methods such as capital injections (both private and public), and separated troubled institutions into "good banks" and "bad banks," employing AMCs to restructure and divest the assets of the bad banks. Banks were told to write down their losses promptly. Bank owners were invited to inject capital, or let the Swedish authorities intervene, which implied wiping out shareholders.

Exit: Exit from the guarantees and the divesting of assets was smooth with low cost. In 1996, Sweden rescinded the guarantees, replacing them with a bank-financed depositor-protection scheme. Securum sold its real estate assets in 1995 and 1996, when the market had started to recover, and was dissolved at the end of 1997 much faster than originally envisaged.[e]

Sweden shelled out 4 percent of its GDP to rescue its financial system. After the recovery from asset sales, the cost ended up being less than 2 percent. It is argued that factors such as political consensus, decisiveness, and transparency surrounding the management of the crisis contributed to restoring confidence and to the eventual success of the resolution. As well as the right policies, various other factors that may not be present in all crises have an influence on this favorable outcome.

Complexity of financial instruments: The assets that were resolved mostly involved those related to real estate and were not very complex, factors that made the resolution easier and less costly. However, over time, the financial industry and financial contracts became much more complex. An important feature of the recent crisis was the difficulty of assessing complex financial instruments and structures, as well as off-balance sheet commitments and bank-related vehicles such as structured investment vehicles and conduits. These complex instruments, valuation issues, and institutional arrangements make it more difficult for analysts and counterparties to understand a bank's financial position, adding to the difficulties of the resolution.

Macroeconomic factors helped recovery in Sweden: Sweden had a fixed exchange rate before the crisis. Once the krona peg had been abandoned and the currency depreciated, Swedish goods regained competitiveness in export markets. Furthermore, a quick rebound in the Swedish economy stemmed from an increase in economic growth in Europe. The strong international recovery helped push up real estate values in Sweden and improved the balance sheet of banks, which played an important role in the recovery process. While Sweden is a small economy compared to the rest of the world, slowdowns in big industrial countries such as the United States and those in Europe can themselves drag the global economy down and such an export-led recovery may not be feasible, especially when countries are in a currency union, such as in Europe.

[a] This discussion of Sweden's experience builds on Yorulmazer (2009).

[b] From 1987 to 1990, credit rose from 90 to 140 percent of GDP and prices of commercial real estate doubled.

[c] During 1993, Nordbanken and Gota bank were merged, retaining the name Nordbanken, and becoming Sweden's fourth largest bank. The bank was operationally restructured and partially sold to the private sector. Their respective AMCs—Securum and Retrieva—were merged in December 1995.

[d] The parliament gave the Bank Supervisory Authority the power to decide and manage support operations.

[e] Several factors contributed to the AMCs' success. AMCs could rely on an efficient judicial system, which allowed them to force most of their debtors into bankruptcy when their operations did not prove economically viable. The restructuring of the assets was also facilitated by the fact that most of the assets transferred were related to real estate and were not like the complex assets seen in the most recent crisis.

Table 2
Costs Associated with Different Resolution Methods

	Cost to FDIC[a]	Fiscal Cost	Moral Hazard
Purchase and assumption (P&A)	$id - (r - \Delta_{PA})$	N/A	N/A
P&A plus liquidation	$id - (r - (\alpha\Delta_{PA} + (1 - \alpha)\Delta_L))$	N/A	N/A
Assisted P&A	$id - (r - \Delta'_{PA}) + \beta$	N/A	N/A
Liquidation	$id - (r - \Delta_L)$	N/A	N/A
Recapitalization	$id - r$	$f(d)$	m

[a] The cost to the Federal Deposit Insurance Corporation (FDIC) incorporates customer and market disruptions.

misallocation costs. However, we assume that this cost is lower under P&A compared with liquidation since the assets stay with the banking system, which helps preserve their value. In particular, we assume that when the assets are sold to another bank, they generate a value of $r - \Delta_{PA}$, whereas when the assets are liquidated they generate a value of $r - \Delta_L$ with $0 \leq \Delta_{PA} < \Delta_L$.

Let p be the price at which the assets are sold by the FDIC. Suppose that the assets can be sold at their fair value so that $p = r - \Delta_{PA}$ under P&A and $p = r - \Delta_L$ under liquidation. Note that the difference between the value of insured deposits and the value of the asset recovery needs to be covered by the FDIC. Hence, the cost to the FDIC is $c = id - p$, with the cost to the FDIC under liquidation being higher than the cost under P&A. Therefore, the FDIC prefers P&A to liquidation. Note that in both P&A and liquidation, shareholders are wiped out so moral hazard is not a concern.

The other alternative is to recapitalize the failed bank. While there can be many variations of a recapitalization in terms of which stakeholders receive how much (discussed below), here we focus on the case where insured depositors and debt holders are paid in full, but the shareholders are wiped out. The recapitalization will result in fiscal costs but help keep the bank open and preserve its going-concern value so that the assets generate a return of r. In this case, in addition to the shortfall $(id - r)$ that will come from the FDIC, the government needs to come up with d to pay debt holders. This would result in a cost of $f(d)$. Hence, the additional costs beyond the loss of the FDIC in this case would be $f(d) + m$, where m represents the costs associated with adverse incentives arising from recapitalization. (In this case, the adverse incentives refer to those of debt holders since shareholders are wiped out.) We assume that $\Delta_{PA} < f(d) + m$ so that the aggregate resolution cost under P&A is lower than the cost of recapitalization.

Within this framework, P&A results in the lowest resolution cost and is the preferred option, where the comparison between liquidation and recapitalization depends on the relative costs of Δ_L and $f(d) + m$, respectively. Table 2 summarizes the costs associated with different resolution methods.

Next, we focus on different states of the world and the feasibility of each option. In an "idiosyncratic" failure state, only one bank fails, while the other stays healthy. In an "aggregate" failure state, both banks fail, resulting in a systemic crisis. P&A would be available only in an idiosyncratic failure state, where there are available buyers. Hence, in an aggregate failure state, the regulators face the trade-off between a disorderly liquidation with the cost of Δ_L and recapitalization with the cost of $f(d) + m$.

The framework is kept simple on purpose to illustrate the primary trade-offs regulators face, particularly during systemic crises. However, it can easily be extended to analyze a wider range of resolution options discussed earlier. For example, when we analyzed P&A above, we assumed that all the assets were being sold to the healthy bank. However, in practice, only a fraction of the assets can be transferred while the rest is liquidated. Let α be the fraction of assets sold under P&A and $(1 - \alpha)$ be the remaining fraction that is liquidated. In that case, the cost would be $\alpha\Delta_{PA} + (1 - \alpha)\Delta_L$. Note that the cost is decreasing in the fraction of assets that have been sold through P&A.

While passing a greater amount of assets in P&A typically lowers the cost to the FDIC, large and complex assets held by the failed institution may lead to lower bids by potential successors, who incorporate large discounts to compensate for the uncertain asset value. This, in turn, increases the loss in value by Δ_{PA}. In this case, rather than accepting a high cost to the FDIC associated with the low bids, or the alternative option of passing only the most transparent assets and

liquidating the rest, the resolution authority may face a lower cost by assisting the P&A through a loss-sharing agreement.

Suppose that with this type of assistance, an acquirer will purchase all assets instead at a cost of $\Delta'_{PA} < \Delta_{PA}$, since the loss-sharing agreement provides insurance for the acquirer. However, assistance can increase the cost to the FDIC since the FDIC may have to absorb a portion of the acquirer's losses.[14] Let β be the expected cost of the assistance. While the assistance (such as in the form of guarantees) can weaken the incentives of the acquirer to exert effort to generate the full return from the acquired assets—in turn, increasing β—an assisted P&A can still be a better option than liquidation if the cost of a disorderly liquidation is significant (high Δ_L) and/or the expected cost of the assistance is not very high.

Another important issue is that during a recapitalization, different stakeholders can suffer varying levels of costs. In the benchmark case above, we assumed that uninsured debt holders are paid in full. However, uninsured debt holders can suffer some losses as well, resulting in a bail-in of the bank (discussed later in detail). In general, the uninsured debt holders can be paid an amount $x \in [0, d]$. In that case, the fiscal cost of the recapitalization would be $f(x)$. Since debt holders suffer some losses, they would have incentives to monitor the banks properly so that the cost of moral hazard m would decrease to $m' < m$. In other versions of recapitalization, it is also possible that the shareholders are not wiped out completely. In this case, the fiscal cost as well as the cost of moral hazard would increase.

Various other factors such as size and complexity affect the cost of resolution and the feasibility of resolution options. One would expect that, as the assets get more complex, they would be harder for the acquirers to value and even manage, regardless of whether it is a P&A agreement or liquidation. Hence, as assets become more complex, Δ_{PA} and Δ_L would increase.

The size of the failed institution would also have an important effect on the resolution. In our simple framework, suppose that one bank is large, whereas the other is relatively small. If the small bank fails, the large bank, if healthy, can acquire the small bank. However, if the large bank fails, the small bank may not have the means to acquire the large bank and may not have the expertise to run the assets of the large bank efficiently, especially since, in most cases, size and complexity go hand in hand. Hence, when a large bank fails, the result would be a systemic crisis even though the small bank is healthy, and the private resolution options such as P&A may not be available. Hence, bank size can lead to a systemic crisis on its own.

[14] In the United States, loss sharing typically provides for the FDIC to cover up to 80 percent of losses on specific assets, while offering even greater loss protection "in the event of financial catastrophe."

Our simple framework can easily be extended to model a wide range of resolution options, such as the use of a bridge bank or an asset management company (AMC). In certain cases, when immediate P&A would be too disorderly and entail high costs, regulators may resort to methods that would allow them to restructure the failed institution and increase the feasibility of a P&A agreement in the future—for example, the creation of a bridge bank. While the bridge bank can create administrative costs, setting one up can provide other institutions with time to conduct due diligence and evaluate asset values without inhibiting operations or disrupting payment systems and loan creation. The authorities should compare the premium over market value that could be expected from the eventual sale with the additional administrative costs arising from the bridge bank. Hence, a bridge bank is a preferable option if it leads to a profitable P&A down the road net of any administrative costs. Furthermore, the bridge bank can facilitate the resolution of multiple failures at once, where the failed banks merge into the bridge bank.

Regulators also use other methods such as a good bank–bad bank separation followed by the setting-up of an AMC. First, the bad assets of the bank are separated from the good assets so that confidence can be restored in the good and it can continue operation. Then, the AMC can focus on restructuring or liquidating the bad assets. This method can have various advantages over market-based solutions such as liquidations, including 1) economies of scale in administering workouts and in forming and selling portfolios of assets, 2) benefits from special powers to expedite loan resolution, 3) allowing the good bank to focus on normal banking business such as issuing loans, and 4) enabling the AMCs, which have longer horizons, to recover more compared with an immediate liquidation of assets. Table 3 summarizes the options for resolution and their relative costs, and Chart 5 illustrates the decision process taken by resolution authorities along the lines of our analytical framework.

4.2 Evidence from the FDIC

We have pointed out the many costs associated with certain resolution methods, although quantifying and comparing the magnitude of each component empirically across varying time horizons and failure periods is challenging. However, data provided by the FDIC's *Historical Statistics on Banking* (HSOB) allow us to compare various resolution methods

Table 3

A Summary of Options for Failure Resolution and Relative Costs

Option	Costs				
	Feasibility	Disruptions to Customers	Disruptions to System	Fiscal	Moral Hazard
Mergers and acqusitions	Not feasible when there are no willing, healthy buyers	None	None	None	None
Purchase and assumption (P&A)					
Without assistance	Not feasible when there are no willing, healthy buyers There may be willing buyers with assistance (next option)	The smaller the amount of assets and liabilities transferred to the acquirer, the greater the disruptions	The smaller the amount of assets transferred to the acquirer, the more assets need to be liquidated, leading to fire-sale externalities The smaller the amount of liabilities transferred to the acquirer, the greater the direct losses to the creditors	When recovery from the transfer or sale of assets is lower compared with transferred liabilities, the greater are the fiscal costs	Moral hazard introduced if uninsured deposits and any additional debt claims are transferred, requiring payment from public sources that is not recovered
With assistance	Not feasible when there are no willing, healthy buyers A bridge bank may help facilitate transaction (next option)	Assistance may facilitate the transfer of a greater portion of assets and liabilities, reducing disruptions	Assistance may facilitate the transfer of a greater portion of assets and liabilities, reducing disruptions	Higher potential costs due to guarantees But assistance may facilitate transfer of greater assets and liabilities reducing fiscal costs	If losses are not shared appropriately between acquirer and the authorities, guarantees can distort acquirer's incentives to maximize the value from the assets
Bridge bank	A bridge bank may facilitate a restructuring and P&A in the future Not a preferred option if the bridge bank will not increase asset value	The smaller the amount of assets and liabilities transferred to the bridge bank, the greater the disruptions	A bridge bank may prevent the disorderly liquidation of assets and provide time for an orderly restructuring	Setting up a bridge bank can increase administrative costs	Moral hazard introduced if creditor losses are covered using public funds
Liquidation	Not a preferred option if disruptions arising from liquidation are too great	Going-concern value and customer/bank relationships are destroyed Potential disruptions to payment services	Disorderly liquidation is likely to lead to fire-sale externalities, greater direct losses to the creditors, and loss of confidence	Fiscal costs may be high if low recovery from disorderly liquidation does not cover payout of insured deposit claims	Moral hazard is very low, as liquidation promotes market discipline
Recapitalization through private bail-in (shareholders wiped out)	Not a feasible option if creditors do not agree	Creditors suffer some losses but going concern and customer/bank relationships are preserved	This option prevents disorderly liquidation, although there are some direct losses to the creditors	Bail-in helps lower fiscal costs	Mitigates moral hazard since recapitalization is done through private rather than public funds
Recapitalization using public funds (shareholders wiped out)	Not a feasible (or preferred) option if government does not have funds to recapitalize	Mitigates disruptions as going-concern value and customer/bank relationships are preserved	Mitigates disruptions as direct losses are limited and fire-sale externalities are avoided	High fiscal costs	Moral hazard is created since creditors do not suffer losses
Recapitalization using public funds (shareholders diluted but retain some stake in firm)	Not a feasible (or preferred) option if government does not have funds to recapitalize or moral hazard would be too great	Mitigates disruptions as going-concern value and customer/bank relationships are preserved	Mitigates disruptions as direct losses are limited and fire-sale externalities are avoided	High fiscal costs	Moral hazard is highest since even shareholders' losses are limited

empirically in terms of the cost to the FDIC.[15] The estimated losses to the fund are available for most bank failures since 1986, although it is important to note that the processes used by the FDIC have evolved over time.[16] Generally, when a failing institution is taken into receivership, the FDIC solicits bids from acquirers to purchase all or part of the assets and assume all or part of the liabilities (P&A). However, prior to the passage of the Federal Deposit Insurance Corporation Improvement Act (FDICIA) in 1991, bids were accepted from potential acquirers for the assumption of all deposits only.

The passage of the FDICIA imposed a number of provisions, including requirements for prompt corrective action (PCA) and least-costly resolution methods. Under PCA, a conservator or receiver must be appointed within ninety days of an institution becoming critically undercapitalized; that is, its tangible equity falling to (or below) 2 percent of total assets. Further, while it has access to a number of resolution tools, the FDIC is required to perform a least-cost test when deciding how to resolve the institution. However, the "systemic risk exception" allows the FDIC to bypass the least-cost method if it would have serious adverse effects on financial stability.

It wasn't until after the FDICIA that bids were also accepted for insured deposits only. Table 4 shows that, on average, P&A transactions in which only insured deposits are transferred are less costly to the FDIC. If a bid is for all deposits, the premium offered by the acquirer—reflecting the value of relationships—has to be at least as much as the amount of uninsured deposits in order for the transaction to be less costly than an (insured) deposit payoff by the FDIC.

The authority for the FDIC to establish a bridge bank, chartered by the Office of the Comptroller of the Currency, was provided by the Competitive Equality Banking Act (CEBA) of 1987. Before a failed bank enters a bridge, the FDIC must apply the least-cost test, considering the premium over market value that could be expected from the eventual sale compared with an immediate liquidation of assets. The least-cost test is applied again at the final sale resolution of the bridge bank before a sale can be made.

As shown in Table 4, P&A transactions implemented after setting up a temporary bridge bank, have, on average, led to lower costs to the FDIC; over the period from 1987 to 2012, losses to the FDIC in an insured-deposits-only P&A transaction represented 14.8 percent of bank assets when a bridge bank was established, compared to 19.9 percent of assets without the use of a bridge bank. Note that losses were considerably higher if a bridge bank was set up and no effective P&A transaction was available.

[15] The data are available at http://www2.fdic.gov/hsob/.

[16] FDIC (1998) provides a history of bank failure resolutions from 1980-94.

Last, the data show that, when liquidation was used by the FDIC, it was very costly; however, liquidation was used when P&A was not feasible (or more costly) and the failure did not trigger the systemic risk exception to use open bank assistance. The costs associated with assisted transactions are slightly more difficult to evaluate, although on average, the FDIC recovered most of the funds, resulting in losses of only 8 percent of bank assets. The 115 assisted transactions included in the table all occurred prior to 1993, when an amendment to the Federal Deposit Insurance Act of 1950 prohibited "the use of insurance fund monies in any manner that benefits any shareholder of an institution that had failed or was in danger of failing." (Eighty of the 115 assisted transactions occurred in 1988.)

In interpreting these results, we find our analytical framework very helpful. One of the interesting empirical results from the FDIC data is the striking difference between the cost associated with liquidation and that of other resolution methods. As our framework shows, everything equal, liquidation is more costly than P&A, and would therefore only be used when options such as P&A are not available. To start with, the banks that were liquidated may have been in worse shape or may have failed in a systemic crisis if a ready buyer was not available. These two factors together help explain the high costs of liquidation shown in the data.

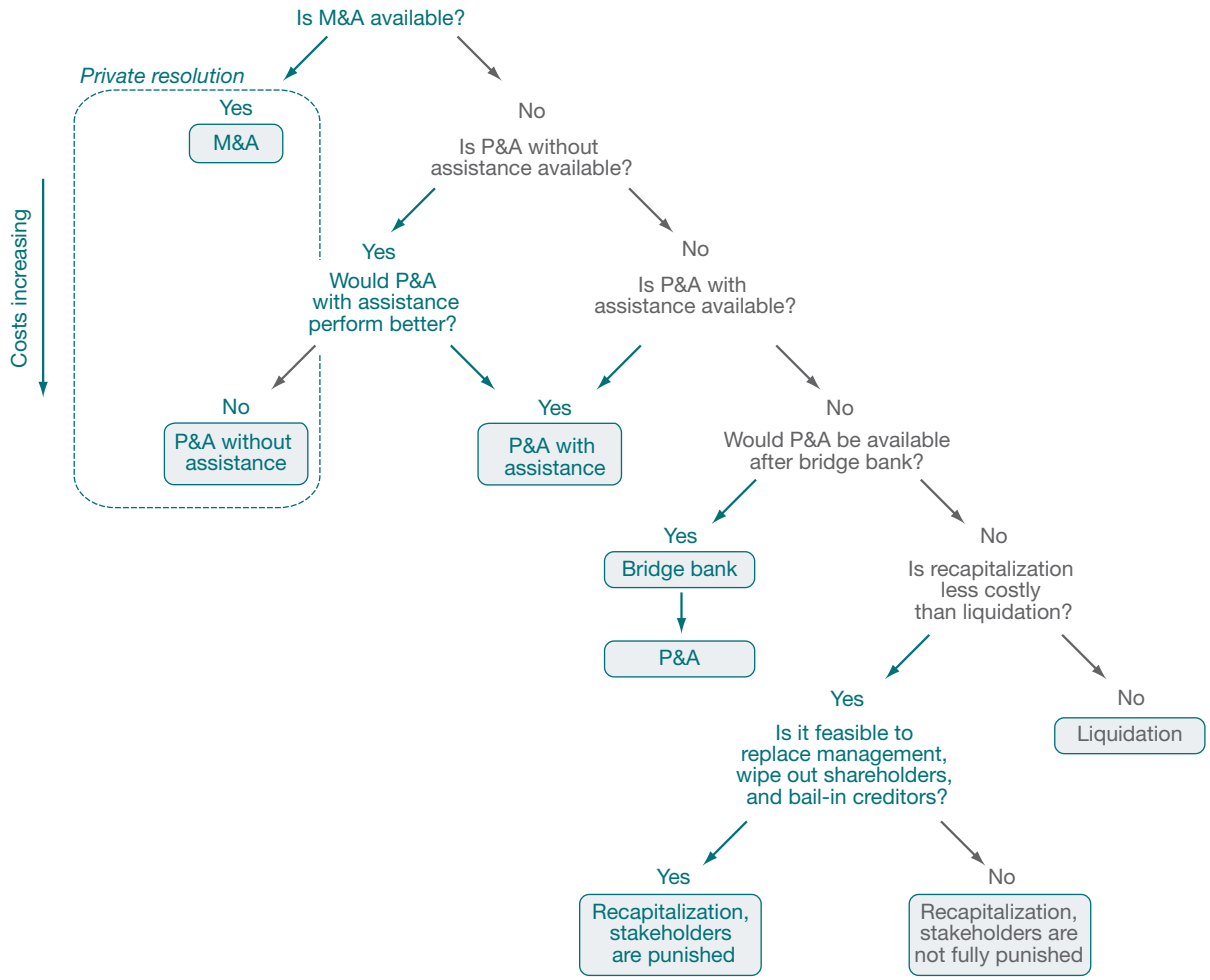
5. Recent Developments

During the recent crisis, we witnessed the failure or near failure of some of the most prominent financial institutions around the globe. Recent experience highlighted some of the shortcomings of the regulatory framework to resolve financial institutions and the need for a special resolution regime for systemically important institutions in cases where bankruptcy is not an effective option. The crisis led to a revision of the current regulatory framework to deal with distressed institutions. In this section, we review recent developments in the United States, the United Kingdom, and the European Union.

5.1 United States

In the United States, the FDIC possesses expansive powers to resolve failed federally insured depository institutions under the statutory objective to maximize the institution's

Chart 5
Resolution Decision Tree



return on assets and minimize costs to the insurance fund. In contrast with corporate bankruptcy proceedings, the FDIC, acting as receiver of a failed institution, is not subject to court supervision, and assumes the rights and powers of the institution's stockholders, directors, and parties with contractual rights. This authority includes the power to merge the institution with another insured depository institution without the need for consent.

The failure of a number of firms such as Lehman Brothers during the recent crisis proved that U.S. regulatory agencies did not have adequate tools for resolving systemically important nonbank institutions. Below we discuss two recent developments that resulted from Dodd-Frank: 1) the resolution and recovery plans of the act's Title I, and 2) the Orderly Liquidation Authority (OLA) of its Title II.

Living Wills

Title I of Dodd-Frank requires all bank holding companies with total consolidated assets greater than $50 billion and all nonbank financial companies designated as systemically important by the Financial Stability Oversight Council to submit resolution plans, or "living wills," to the Federal Reserve and the FDIC.[17] Each plan must provide a strategic analysis of the institution's rapid and orderly resolution in the event of material financial distress or failure, through a reorganization or liquidation under the Bankruptcy Code.

[17] The final rule was effective November 30, 2011. See "Resolution Plans Required," 76 *Federal Register* (November 1, 2011). The final rule also applies to a foreign bank or company treated as a bank holding company under the International Banking Act of 1978 that has total consolidated assets greater than $50 billion.

Table 4

Summary of Costs to the FDIC under Various Resolution Methods, 1986-2012

Resolution Method	Number of Institutions	Average Assets (Millions of U.S. dollars)	Average Cost-to-Assets Ratio (Percent)
Purchase and assumption (P&A)			
Insured deposits only	112	293.31	19.9
All-deposits transfer	1,263	587.00	23.7
Bridge bank[a]			
P&A-insured only	26	3,324.11	14.8
P&A-all-deposits	499	667.78	19.2
Liquidation	256	229.15	51.7
Assisted transactions[b]	115	165.52	8.4
Liquidation			
Insured deposit transfer	106	157.60	30.1
Deposit payoff (direct)	160	66.53	27.8

Source: Federal Deposit Insurance Corporation, *Historical Statistics on Banking*.

Notes: The table only includes resolutions for which estimated costs were available and excludes transactions where it was not determined if all deposits or insured deposits only were transferred in P&A. Additionally, the table excludes thirty-seven transactions where the Federal Savings and Loan Insurance Corporation took over management and generally provided assistance and one reprivatization transaction.

[a]Bridge banks also include thrift conservatorships.

[b]Assisted transactions include open bank assistance transactions and assisted whole-bank P&A transactions.

As firms conduct their strategic analyses of orderly resolution, the assumptions made concerning economic conditions at the time of failure are critical for determining the availability of tools and techniques, as we set forth in our framework. For their initial resolution plans, filers were provided with a set of baseline economic conditions to use in their analysis, although subsequent submissions will need to create a plan for resolution under "adverse" and "severely adverse" economic conditions.[18] Our framework shows that the availability of options for resolution depends not only on the institution in distress but also the health of other institutions. Hence, any resolution and recovery plan should have a macroprudential view and should not treat the institution in distress in isolation. At least the "adverse" and "severely adverse" scenarios should take into account the possibility of a systemic crisis in cases where many banks experience distress at the same time, huge fire-sale discounts are commonplace, and certain resolution options are not available.

[18] Conditions developed pursuant to Section 165(i)(1) of the Dodd-Frank Act may be referenced.

Orderly Liquidation Authority

The OLA, established in 2010 under Title II of Dodd-Frank, expands the FDIC's authority to resolve failing banks by including systemically important nonbank financial institutions (SIFIs), which previously would have been resolved through corporate bankruptcy.[19] Further, for banks that are consolidated under a bank holding company, Title II acts under a "single point of entry" framework to facilitate continuity of critical services and reduce costs.

In resolving a failed institution, the FDIC would assign losses to shareholders and unsecured creditors of the holding company and transfer sound subsidiaries to a new solvent entity. As receiver, the FDIC can raise funds (up to a limit) through a line of credit from the U.S. Treasury, but Title II includes a provision that prohibits the use of taxpayer funds to cover the cost of resolution; therefore, all funds must be recovered.

[19] See "Certain Orderly Liquidation Authority Provisions under Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act, Final Rule," 76 *Federal Register* (July 15, 2011). Additionally, in a speech to the U.S. House of Representatives' Committee on Financial Services, Osterman and Wigand (2013) explore the application of OLA in resolutions.

Before a firm can enter orderly liquidation proceedings, the Treasury secretary must receive a written recommendation based on a two-thirds vote from the Board of Governors of the Federal Reserve System and another regulator, and, in consultation with the U.S. president, determine that the financial institution is in danger of default and that failure would have "serious adverse effects on the financial stability of the United States." It must also be determined that there is no viable private sector alternative available.

While Title II takes steps towards outlining viable alternatives to the bailout of a private institution, it has been argued that the legislation can be further improved. Plosser (2013) contends that it affords significant discretion to regulators, and that the complicated procedure to invoke the OLA may take time, increasing costs and limiting options. Still, the expanded powers of the FDIC to take into receivership those SIFIs that otherwise would have relied on the bankruptcy process for resolution should significantly reduce the costs associated with failure that we have outlined in our framework.

5.2 United Kingdom

The failure of Northern Rock in 2007 was a wake-up call for regulators and since then there have been wide reforms of financial regulation in the United Kingdom. Prior to 2008, the British legal system did not distinguish between banks and other failing companies, and therefore authorities did not have the ability to take Northern Rock into receivership.[20] The Banking (Special Provisions) Act was passed in 2008 as a temporary measure, giving the U.K. Treasury powers to facilitate orderly resolution through directed transfers of property, rights, and claims of a failed depository institution.

The Banking Act of 2009 replaced the temporary regime and created a Special Resolution Regime (SRR) for failing banks, influenced by the U.S. approach. The Financial Services Authority (FSA), the regulator of financial firms at the time, was given the right to trigger the SRR. Under the SRR, the U.K. authorities have powers similar to the FDIC in resolving a failed institution, and the choice of method would also involve a cost test.[21]

However, the regime set up under the Banking Act of 2009 did not cover nondeposit-taking financial firms. To address this flaw and improve financial supervision generally, further reforms were implemented in April 2013. Under the new regulatory regime, the FSA ceased to exist, and the Prudential Regulation Authority (PRA) was formed as part of the Bank of England to regulate deposit-takers, insurers, and major investment firms. Firms will assist the PRA and the SRR in assessing resolvability and drawing up recovery and resolution plans. The PRA, in consultation with the Bank of England and the Treasury, makes the decision to initiate the SRR for a failing institution.

In addition, the publication of the *Report of the Independent Commission on Banking* led by John Vickers (known as the "Vickers Report") made formal recommendations for further reform in 2011.[22] The focus of the Vickers Report is the notion that banks should "ring-fence" retail and commercial banking operations by establishing a separate legal entity to carry out these activities. The purpose is to protect these operations from the riskier wholesale and investment banking services. The Vickers Report also recommends that large U.K. ring-fenced retail banks hold a greater amount of capital than what is proposed under Basel III in order to improve their "loss absorbency." Many of the recommendations outlined in the Vickers Report have been incorporated in the Banking Reform Act of 2013, which is being implemented in 2014. This legislation gives the new PRA power to enforce the full separation of banking activities.

5.3 European Union

More recently, in response to the financial crisis, European Union (EU) authorities have worked to improve the framework of banking regulation within the European Economic and Monetary Union. Prior to the crisis, many EU countries relied on insolvency (bankruptcy) proceedings to deal with bank failures, which is suboptimal for a number of reasons we have already outlined. The European Commission has taken steps under the Bank Recovery and Resolution Directive to establish a common set of rules for national authorities to follow when winding down failed banks.

In 2012, the European Central Bank (ECB) proposed the creation of a European Banking Union, which would involve the establishment of the Single Supervisory Mechanism (SSM), the Single Resolution Mechanism, and a common system of deposit protection. Under the SSM proposal, the ECB supervises banks in the euro area and other member states, and, when a bank is in severe stress, it informs the Single Resolution Board, which would oversee

[20] For a discussion of the Northern Rock episode, see Shin (2009) and Goldsmith-Pinkham and Yorulmazer (2010).

[21] See Brierley (2009).

[22] The report is available at http://bankingcommission.independent.gov.uk/.

the resolution.[23] The Single Resolution Authority (SRA) will have access to a privately funded European Resolution Fund, generated by levies on the private sector, replacing the national resolution funds of the euro area states. The fund will need to cover 0.8 percent of the total insured deposits in any given country. The SRA will be expected to choose the least-cost resolution method, as practiced by the FDIC, but it will require access to the European Stability Mechanism as a fiscal backstop in case a systemic crisis develops.

5.4 Bail-In Debt

The resolution directive proposed by the EU is focused on the idea that the shareholders and creditors must face losses before a failing bank can receive any taxpayer bailouts. It proposes that shareholders, unsecured creditors, and uninsured depositors (with deposits greater than 100,000 euros), in that order, would be forced to cover at least 8 percent of the institution's total liabilities before the resolution fund provides any support. Power to carry out bail-in within resolution is listed as one of the "key attributes" of effective resolution regimes for financial institutions by the Financial Stability Board (FSB 2011), which the Federal Reserve and the FDIC helped to develop and which G-20 leaders endorsed in 2011. In general, this method could include writing down and/or converting to equity any or all unsecured and uninsured creditor claims in a manner that respects the hierarchy of the claims. Importantly, it would provide a capital buffer for distressed firms that would otherwise have difficulty raising new equity.

In the United States and elsewhere, requirements for contingent convertible bonds (CoCos) and bail-in debt have been proposed.[24] CoCos are loss-absorbing instruments which are converted to equity if a predetermined trigger, based on regulatory capital levels, is hit. The United Kingdom is working to include bail-in measures in its resolution regime.[25] Meanwhile, Swiss authorities support bail-ins of a range of creditors, including shareholders, holders of CoCos, and other bondholders, especially for the country's largest banks, UBS and Credit Suisse.[26] In general, while a number of issues will need to be addressed, a bail-in resolution method may come with significant advantages relative to the costs we have outlined; it can provide capital during times of distress and reduce moral hazard and disruptions to customers and markets in the case of a systemic failure.

5.5 Cross-Border Issues in Resolution

Another important issue emerging from the recent crisis was the lack of a framework for resolving banks with cross-border operations. For example, the failure of Lehman Brothers had widespread repercussions given its operations across fifty countries. Indeed, the FSB's key attributes state that institution-specific cooperation agreements should be in place between the home and host authorities for all global SIFIs (G-SIFIs).

The United States has been one of the first countries to incorporate cross-border planning into its statutory regime as it is home country to eight of the twenty-eight global systemically important banks identified by the FSB.[27] OLA requires the FDIC to coordinate with the foreign regulatory authorities in resolving G-SIFIs. In addition to resolution planning, the United States has taken steps to improve the supervision of U.S. operations of foreign banks, and last year the Federal Reserve sought comment on its proposal to require large foreign banking organizations to organize their U.S. subsidiaries under an intermediate holding company, subject to the requirements of U.S. bank holding companies.

Owing to the connections between financial institutions in the United States and the United Kingdom, the bilateral relationship is perhaps the most significant with regard to the resolution of G-SIFIs, especially given the need to prevent disruptive forms of ring-fencing of the host country's operations of a failed firm. Working relationships will also be established with the European Union, Switzerland, and Japan, which also host a number of G-SIFIs. As resolution regimes are developed internationally to address cross-border issues explicitly, the feasibility of an orderly and timely resolution that minimizes disruptions and panic should improve, although there is still considerable work to be done in most jurisdictions.

[23] See European Commission (2013).

[24] For analysis of contingent capital, see Sundaresan and Wang (forthcoming), Bank of Canada (2010), Calomiris and Herring (2011), Flannery (2002, 2009), Glasserman and Nouri (2012) and Pennacchi (2010), to cite a few.

[25] Lloyds Banking Group was the first to issue CoCo bonds in 2009, which included the terms that the security would be converted to ordinary shares if the Tier I capital ratio fell below 5 percent.

[26] A recent CoCo deal issued by Credit Suisse included terms that holders of the security stood to lose the whole investment if the bank breached its 5 percent Tier I capital ratio.

[27] In a speech given in 2013, the Federal Reserve's Michael Gibson reviews the steps taken by the United States to formalize cross-border resolution planning. See Gibson (2013).

6. Conclusion

Bank failures entail costs for bank customers, for the financial sector, and the overall economy. Hence, efficient resolution of financial institutions in distress is an extremely important issue.

This article provides a discussion of the costs associated with bank failures and the methods authorities use to resolve banks. While regulators can employ various methods ranging from private-sector resolution in the form of M&A and P&A to government intervention and recapitalization of banks using public funds, we have shown that some of these methods may not be feasible in certain states of the world.

In particular, although private-sector resolution is a preferred option in terms of minimizing costs associated with bank failures, it may not be a feasible one when the failing institution is large and complex or when its failure occurs during a systemic crisis. When many banks experience distress simultaneously, there may not be a ready buyer for the failed bank. Hence, when the preferred option is not available, the authorities face certain trade-offs, as they choose from second-best options such as disorderly liquidation and the use of public funds to resolve banks. Thus, systemic crises always entail higher aggregate resolution costs and trade-offs.

The optimal design of regulation and a resolution regime needs to take into account the fact that certain preferred options may not be available during systemic crises. Further, it should aim to minimize the probability of systemic crises and the costs associated with resolving failures in those scenarios.

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