CHARTING THE FINANCIAL CRISIS

U.S. Strategy and Outcomes

January 2020
Introduction

The global financial crisis and great recession of 2007–2009 constituted the worst shocks to the United States economy in generations. Books have been and will be written about the housing bubble and bust, the financial panic that followed, the economic devastation that resulted, and the steps that various arms of the U.S. and foreign governments took to prevent the Great Depression 2.0. But the story can also be told graphically, as these charts aim to do.

What comes quickly into focus is that as the crisis intensified, so did the government’s response. Although the seeds of the harrowing events of 2007–2009 were sown over decades, and the U.S. government was initially slow to act, the combined efforts of the Federal Reserve, Treasury Department, and other agencies were ultimately forceful, flexible, and effective. Federal regulators greatly expanded their crisis management tool kit as the damage unfolded, moving from traditional and domestic measures to actions that were innovative and sometimes even international in reach. As panic spread, so too did their efforts broaden to quell it. In the end, the government was able to stabilize the system, re-start key financial markets, and limit the extent of the harm to the economy.

No collection of charts, even as extensive as this, can convey all the complexities and details of the crisis and the government’s interventions. But these figures capture the essential features of one of the worst episodes in American economic history and the ultimately successful, even if politically unpopular, government response.
Antecedents of the Crisis

In the years leading up to the crisis, the underlying performance of the U.S. economy had eroded in important ways.
ANTECEDENTS

Because the growth of productivity and the labor force had slowed in the decade before the crisis, the potential economic growth rate was falling.

Growth in real potential GDP

Sources: Congressional Budget Office, “An Update to the Economic Outlook: 2018 to 2028”; authors’ calculations
ANTECEDENTS
Overall prime-age participation in the labor force had been falling, as the participation of women slowed and men’s continued a decades-long decline.

Civilian labor force participation rates for people ages 25–54, indexed to January 1990=100

Source: Bureau of Labor Statistics via Haver Analytics
ANTECEDENTS

Income growth for the top 1 percent had risen sharply, driving income inequality to levels not seen since the 1920s.

Cumulative growth in average income since 1979, before transfers and taxes, by income group

Source: Congressional Budget Office, “The Distribution of Household Income, 2014”
Meanwhile, the financial system was becoming increasingly fragile.
ANTECEDENTS

A “quiet period” of relatively low bank losses had extended for nearly 70 years and created a false sense of strength.

Two-year historical loan-loss rates for commercial banks

Sources: Federal Deposit Insurance Corp.; Federal Reserve Board; International Monetary Fund
ANTECEDENTS

The “Great Moderation”—two decades of more stable economic outcomes with shorter, shallower recessions and lower inflation—had added to complacency.

Quarterly real GDP growth, percent change from preceding period

Source: Bureau of Economic Analysis via Federal Reserve Economic Data (FRED)
ANTECEDENTS

Long-term interest rates had been falling for decades, reflecting decreasing inflation, an aging workforce, and a rise in global savings.

Benchmark interest rates, monthly

Sources: Federal Reserve Board and Freddie Mac Primary Mortgage Market Survey® via Federal Reserve Economic Data (FRED)
ANTECEDENTS

Home prices across the country had been rising rapidly for nearly a decade.

Real home price index, percentage change from 1890

Home prices had increased modestly through several boom-and-bust cycles since the 1970s, but started a much more dramatic rise in the late 1990s.

Source: U.S. Home Price and Related Data, Robert J. Shiller, "Irrational Exuberance"
ANTECEDENTS

Household debt as a share of income had risen to alarming heights.

Aggregate household debt as a share of disposable personal income

Source: Federal Reserve Board Financial Accounts of the United States, based on Ahn et al. (2018)
ANTECEDENTS

Credit and risk had migrated outside the regulated banking system.

Credit market debt outstanding, by holder, as a share of nominal GDP

Notes: GSE: government-sponsored enterprise (including Fannie Mae and Freddie Mac); ABS: asset-backed securities issuers; MMFs: money market funds
Source: Federal Reserve Board Financial Accounts of the United States
ANTECEDENTS

The amount of financial assets financed with short-term liabilities had also risen sharply, increasing the vulnerability of the financial system to runs.

Net repo funding to banks and broker-dealers

$2.00 trillion

Source: Federal Reserve Board Financial Accounts of the United States
The Arc of the Crisis
Two widely accepted indicators of financial sector stress are credit default swap (CDS) spreads, which measure the cost of insuring a firm’s debt, and the Libor-OIS spread, which is a common measure of banks’ counterparty credit risk.

Notes: Credit default swap spreads are equal-weighted averages of JPMorgan Chase, Citigroup, Wells Fargo, Bank of America, Morgan Stanley, and Goldman Sachs. Libor-OIS spread used throughout is the spread between the 3-month London Interbank Offered Rate and the 3-month USD overnight indexed swap rate.

Sources: Libor-OIS: Bloomberg Finance L.P.; bank CDS spreads: Bloomberg Finance L.P., IHS Markit
ARC OF THE CRISIS

Home prices peaked nationally in the summer of 2006, then fell rapidly—eight major cities had declines of more than 20 percent by March 2008.

Change in S&P CoreLogic Case-Shiller Home Price Indexes for 20 cities and U.S., from U.S. peak in July 2006, not seasonally adjusted

Sources: S&P CoreLogic Case-Shiller Home Price Indexes for 20 individual cities and National Home Price Index via Federal Reserve Economic Data (FRED)
ARC OF THE CRISIS

Stress in the financial system built up gradually over late 2007 and early 2008, as mortgage troubles and recession fears increased.

Libor-OIS spread

400 basis points

- Bank of America announces intent to buy Countrywide Financial, a troubled mortgage lender, Jan. 11, 2008
- Banks and GSEs start reporting billions in losses in Nov. 2007, and warn of dividend cuts and a need for more capital; stocks fall
- Bank of England provides emergency credit to Northern Rock, a troubled mortgage lender, Sept. 14, 2007
- JPMorgan Chase rescues Bear Stearns with emergency support from Federal Reserve, March 14, 2008
- Stock markets plunge Jan. 21, 2008, amid recession fears
- BNP Paribas freezes three funds on Aug. 9, 2007, amid fragile ABS markets

Note: GSE: government-sponsored enterprise
Source: Bloomberg Finance L.P.
Investors were fearful that the mortgage giants Fannie Mae and Freddie Mac might collapse and cause severe damage to the housing market.

Fannie Mae and Freddie Mac collectively owned or guaranteed more than $5 trillion in mortgage-related assets.

As the housing market deteriorated, deepening losses at both GSEs sparked investor concerns of insolvency, driving their share prices lower.

Source: The Center for Research in Security Prices at Chicago Booth via Wharton Research Data Services (WRDS)
As panic spread, the nation’s largest banks and investment banks looked increasingly vulnerable to failure.

S&P 500 Financials index level, and average of six big banks’ CDS spreads in basis points

Note: Credit default swap spread is an equal-weighted average of JPMorgan Chase, Citigroup, Wells Fargo, Bank of America, Morgan Stanley, and Goldman Sachs.

The rise in losses, the fear of further losses, and the liquidity pressures on the system pushed the price of financial assets down and added to concerns about the solvency of the financial system.
ARC OF THE CRISIS

Yet the economic forecasts suggested a modest and manageable slowdown in economic growth. The forecasters were wrong.

Real GDP, percent change from preceding quarter, SAAR, and Philadelphia Fed surveys of professional forecasters

Sources: Bureau of Economic Analysis via Federal Reserve Economic Data (FRED) (data update of Aug. 29, 2018); Philadelphia Federal Reserve Survey of Professional Forecasters, Q3 2007 and Q1 and Q3 2008
The U.S. Strategy
Among the key elements of the U.S. policy response were:

**Use of the Fed’s lender-of-last-resort authorities** beyond the banking system, for investment banks and funding markets.

**An expansive use of guarantees** to prevent runs on money market funds and a broad array of financial institutions.

**An aggressive recapitalization of the financial system**, in two stages, backed by expanded FDIC guarantees.

**A powerful use of monetary and fiscal policy** to limit the severity of the recession and restore economic growth.

**A broad mix of housing policies** to prevent the failure of the GSEs, slow the fall of home values, lower mortgage rates, and aid in refinancings.

**An extension of dollar liquidity** to the global financial system, combined with international cooperation and Keynesian stimulus.
The U.S. government’s initial response to the crisis was gradual, and the tools were limited and antiquated because they were designed for traditional banks.

<table>
<thead>
<tr>
<th>TOOLS AVAILABLE</th>
<th>NO AUTHORITY</th>
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<tbody>
<tr>
<td>FDIC</td>
<td>To intervene to manage the failure of or nationalize nonbanks</td>
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<td>Resolution authority for banks,</td>
<td>To guarantee the broader liabilities of the financial system</td>
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<tr>
<td>with a systemic risk exception to</td>
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<td>allow for the provision of broader</td>
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<tr>
<td>guarantees</td>
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<td>Deposit insurance for banks</td>
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<td>Federal Reserve</td>
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<td>Discount window lending for banks</td>
<td>To inject capital into the financial system</td>
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<td>and in extremis for other</td>
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<td>institutions</td>
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<td>Swap lines for foreign central</td>
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<td>banks</td>
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*Agencies are debt securities issued or guaranteed by U.S. federal agencies or GSEs; agency MBS are mortgage-backed securities issued or guaranteed by U.S. federal agencies or GSEs.
But the response became more forceful and comprehensive as the crisis intensified and Congress provided new emergency authority.

Libor-OIS spread

400 basis points

Increasing Stress
- TAF (Fed)
- TSLF (Fed)
- Bear Stearns rescue (Fed)
- PDCF (Fed)

Early Escalation
- AIG stabilization (Fed, Treasury)
- MMF guarantees (Treasury)
- AMLF (Fed)
- CPFF (Fed)
- TLGP, deposit insurance (FDIC)
- CPP (Treasury)
- TALF (Fed, Treasury)
- Stress tests (Fed, Treasury)
- PPIP (Treasury)

Panic and Resolution
- Fed funds interest rate cuts (Fed)
- Quantitative easing (Fed)
- Recovery Act (Obama)
- Stimulus Act (Bush)
- Fannie, Freddie conservatorship (FHFA)
- Agency MBS Purchase Program (Treasury)
- Auto industry support (Treasury)
- HAMP (Treasury)
- HARP (FHFA)
- Central bank swap lines
- Swap line extension (Fed)

Source: Libor-OIS: Bloomberg Finance L.P. Note: Start dates for programs reflect the date of their announcement. The Federal Reserve administered the bank stress tests under the SCAP while the Treasury established a capital backstop under the CAP.
The U.S. government deployed a mix of systemic policies to stabilize financial institutions and markets:

**Liquidity programs** to keep financial institutions operating and credit flowing to consumers and businesses.

**Guarantee programs** to support critical funding markets for financial institutions.

**Capitalization strategies** with private and government capital to prevent the failure of systemic institutions and resolve uncertainty about the financial system.
U.S. STRATEGY

As the crisis intensified, the U.S. government’s liquidity programs expanded along several dimensions:

- Domestic $\rightarrow$ International
- Traditional $\rightarrow$ Novel
- Institutions $\rightarrow$ Markets
U.S. STRATEGY

The Federal Reserve initially deployed its traditional lender-of-last-resort tools to provide liquidity to the banking system.

Federal Reserve discount window usage

Term Auction Facility (TAF) usage

Source: Federal Reserve Board, based on English and Mosser (2020). Transaction-level data on discount window lending during the crisis were released under Freedom of Information Act court decisions (see: https://www.federalreserve.gov/foia/servicecenter.htm)
U.S. STRATEGY

And then the Fed expanded its tools to support dealers and funding markets.

Securities lent to dealers: Term Securities Lending Facility

$600 billion

Term Securities Lending Facility

The Fed established the TSLF to promote liquidity in U.S. Treasury bonds and other important collateral markets ...

Primary Dealer Credit Facility (PDCF) loans

$600 billion

Primary Dealer Credit Facility

... and then created the PDCF to provide emergency liquidity to investment banks, which did not have access to the discount window.

Note: PDCF includes loans extended to select other broker-dealers.
Source: Federal Reserve Board via Federal Reserve Economic Data (FRED)
U.S. STRATEGY

The Fed and Treasury introduced programs to address fragility in the commercial paper market, a key source of funding to financial institutions and businesses.

Overnight issuance as a share of outstanding commercial paper

After the bankruptcy of Lehman Brothers, anxious investors demanded ultra-short terms for commercial paper, exposing issuers to significant rollover risk amid the continued retreat of market liquidity.

AMLF and money market guarantees Sept. 19, 2008
Fed establishes ABCP Money Market Mutual Fund Liquidity Facility; Treasury announces temporary guarantee program for money market mutual funds, a major buyer of commercial paper


Lehman bankruptcy Sept. 15, 2008

BNP Paribas freezes three funds on Aug. 9, 2007, amid fragile ABS markets

Master Liquidity Enhancement Conduit (MLEC) On Oct. 15, 2007, Treasury facilitates plan for private banks to support the ABCP market; it is never implemented

Source: Federal Reserve Bank of New York based on data from the Federal Reserve Board of Governors, “Commercial Paper Rates and Outstanding Summary,” derived from data supplied by the Depository Trust & Clearing Corporation
U.S. STRATEGY

The Fed and Treasury also helped restart the asset-backed securitization market, a vital source of funding for credit cards, auto loans, and mortgage lending.

Asset-backed securities issuance (eligible classes) and amount pledged to TALF

The U.S. government put in place a mix of guarantees to backstop critical parts of the financial system.
U.S. STRATEGY

Treasury agreed to guarantee about $3.2 trillion of money market fund assets to stop the run on prime money market funds.

Daily U.S. money market fund flows

$90 billion

Sources: iMoneyNet; authors’ calculations based on Schmidt et al. (2016)
Increased coverage gave consumers and businesses more confidence that their money was safe.

The FDIC expanded its deposit insurance coverage limits on consumer and business accounts in an effort to prevent bank runs.

Share of total deposits FDIC insured

- 2007: 48%
- 2008: 52%
- 2009: 53%
- 2010: 59%
- 2011: 50%

Note: Does not include non-interest-bearing transaction account amounts insured by Dodd-Frank through the end of 2012.

Source: U.S. Treasury, “Reforming Wall Street, Protecting Main Street”
By agreeing to guarantee new financial debt, the FDIC helped institutions obtain more stable funding.

Debt outstanding under the TLGP (DGP)*

U.S. STRATEGY

*Debt Guarantee Program covered debt issued by both the parent company and its affiliates.

Sources: Debt issuance: Federal Deposit Insurance Corp., authors’ calculations; CDS spreads: Bloomberg Finance L.P., IHS Markit
The U.S. government moved to strengthen the capital in the financial system as the crisis intensified by:

Encouraging the biggest institutions to raise private capital early in the crisis.

Injecting substantial government capital into the banking system when the crisis worsened and Congress provided emergency authority.

Stabilizing the most troubled banks with additional capital and ring-fence guarantees.

Conducting stress tests to complete the recapitalization of the financial system.
U.S. STRATEGY

As losses worsened early in the crisis, U.S. policymakers urged financial institutions to raise private capital.

Private capital raised between Jan. 1, 2007, and Oct. 13, 2008, for the nine banks receiving initial government investments

<table>
<thead>
<tr>
<th>BANKS</th>
<th>Common equity</th>
<th>Preferred equity</th>
<th>Other Tier 1</th>
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<tr>
<td>Citigroup</td>
<td>$43.2</td>
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<td>Bank of America</td>
<td>33.5</td>
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<tr>
<td>JPMorgan Chase</td>
<td>25.9</td>
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<tr>
<td>Wells Fargo</td>
<td>8.5</td>
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<th>INVESTMENT BANKS</th>
<th>Common equity</th>
<th>Preferred equity</th>
<th>Other Tier 1</th>
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<tr>
<td>Goldman Sachs</td>
<td>$13.0</td>
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<td>Morgan Stanley</td>
<td>15.4</td>
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<tr>
<td>Merrill Lynch</td>
<td>28.7</td>
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<tr>
<th>TRUST AND PROCESSING BANKS</th>
<th>Common equity</th>
<th>Preferred equity</th>
<th>Other Tier 1</th>
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<tr>
<td>BNY Mellon</td>
<td>$0</td>
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<tr>
<td>State Street</td>
<td>4.1</td>
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Private capital raised before government investments

Source: Goldman Sachs
Then, as panic followed the collapse of Lehman Brothers, Treasury made large capital investments in the biggest banks using new authority from Congress ...

Government and other capital raised between Oct. 14, 2008, and May 6, 2009, the day before stress test results were released

<table>
<thead>
<tr>
<th>BANKS</th>
<th>Capital raised, in billions</th>
<th>Governmentpreferred equity*</th>
<th>Government Targeted Investment Program capital</th>
<th>Other preferred equity</th>
<th>Other Tier 1</th>
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<tr>
<td>Citigroup**</td>
<td>$59.1</td>
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<td>Bank of America</td>
<td>35.0</td>
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<td>JPMorgan Chase</td>
<td>25.0</td>
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<td>Wells Fargo</td>
<td>37.7</td>
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<th>Government Targeted Investment Program capital</th>
<th>Other preferred equity</th>
<th>Other Tier 1</th>
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<tr>
<td>Goldman Sachs</td>
<td>$15.8</td>
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<td>Morgan Stanley</td>
<td>10.0</td>
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<td>Merrill Lynch</td>
<td>10.0</td>
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<tr>
<td>BNY Mellon</td>
<td>$3.0</td>
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<tr>
<td>State Street</td>
<td>2.0</td>
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*Includes capital injections made under the Capital Purchase Program (CPP).

**Citigroup later converted approximately $58 billion of preferred stock and other securities into common equity.

Source: Goldman Sachs
By the end of 2008, more than 200 banks had received funds under the Capital Purchase Program. Overall, $205 billion would be distributed to 707 banks.

An additional $40 billion was split between Citigroup and Bank of America under the Targeted Investment Program.

Sources: Timeline of funds outstanding: TARP Tracker; banks receiving funds, by asset size: U.S. Treasury, "Troubled Asset Relief Program: Two Year Retrospective," SNL Financial; banks receiving funds, by state: authors' calculations based on TARP Investment Program transaction reports, Aug. 8, 2018
In addition to capital injections, the government expanded its tools with asset guarantees for the most troubled banks, Citigroup and Bank of America.

Asset Guarantee Program (AGP), Citigroup assets, and “ring-fence” loss responsibility structure
(Asset guarantees for Bank of America were drawn up but never implemented.)

Pool of Citigroup assets: $301 billion

1st Loss: Citigroup $39.5 bil., Treasury $5.0 bil.
2nd Loss: Citigroup $0.6 bil., FDIC $10.0 bil.
3rd Loss: Citigroup $1.1 bil., FRBNY* $220.4 bil.
Tail Loss: Citigroup $24.5 bil.

Citigroup AGP announced Nov. 23, 2008
Citigroup AGP asset pool finalized Nov. 17, 2009
Citigroup exits AGP and repays TARP funds Dec. 23, 2009

*The Federal Reserve Bank of New York's loss position was structured in the form of a nonrecourse loan.

The government provided emergency loans, capital, and guarantees to AIG to prevent a disorderly failure that would have disrupted the financial system.

Outstanding commitment to AIG

$200 billion

Fed establishes $85 billion credit facility Sept. 16, 2008, taking a 79.9 percent equity stake in AIG

Fed commits additional $37.8 billion Oct. 8, 2008

Treasury commits $30 billion more; Fed restructures its commitment, including a $25 billion credit facility cut in exchange for preferred stakes in AIG's foreign life insurance subsidiaries AIA and ALICO

$40 billion TARP investment from Treasury; Fed authorizes Maiden Lane II and III to purchase AIG's mortgage-related assets, Nov. 10, 2008

Recapitalization closes, Jan. 14, 2011: Fed loans are paid off and remaining interests transferred to Treasury which receives 92% of AIG common stock; (Maiden Lane II and III remain with Fed)


In a series of stock sales, Treasury cuts its AIG stake to 22% March–Sept. 2012

Final securities sold from Maiden Lane II Feb. 28, 2012

Final securities sold from Maiden Lane III Aug. 2012

Note: Repayments occurred over the lifetime of the commitment. Any reduction in the commitment, however, is not reflected until the January 2011 recapitalization transaction.

Source: U.S. Treasury
As confidence in banks further eroded, government “stress tests” increased transparency, helping regulators and investors make credible loss projections ...

Two-year historical loan-loss rates for commercial banks

9.1%

At 9.1% of outstanding loans, the Fed’s loss estimates for the stress test were higher than peak losses during the Great Depression.

Note: The $74.6 billion in required capital is after earnings and capital measures in the first quarter of 2009. Citigroup’s requirement, for example, fell from $92.6 billion to $5.5 billion after adjusting for capital actions and earnings in the first quarter of 2009 and its plan to convert approximately $58 billion of preferred stock into common equity.

Sources: Federal Deposit Insurance Corp.; Federal Reserve Board; International Monetary Fund
... and accelerated the return of private capital.

Private capital raised, May 7, 2009, through Dec. 31, 2010

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<th>Other Tier 1</th>
<th>Preferred equity</th>
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<tr>
<td>Citigroup</td>
<td>$22.7</td>
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<td>Bank of America</td>
<td>32.8</td>
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<td>JPMorgan Chase</td>
<td>9.8</td>
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<td>Wells Fargo</td>
<td>20.9</td>
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<th>INVESTMENT BANKS</th>
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<td>Goldman Sachs</td>
<td>$0</td>
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<td>Morgan Stanley</td>
<td>6.9</td>
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<td>Merrill Lynch</td>
<td>Acquired by Bank of America</td>
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<td>BNY Mellon</td>
<td>$2.8</td>
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<td>State Street</td>
<td>2.3</td>
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Note: In April 2009, before the release of stress test results, Goldman Sachs raised $5.8 billion in capital for the repayment of TARP funds.

Source: Goldman Sachs
Indeed, the U.S. recapitalized its banking system more quickly and aggressively than Europe.

Capital raised each year

$120 billion

U.S. banks
~90% of 2008–2016 capital was raised 2008–2010

European banks
~50% of 2008–2016 capital was raised 2008–2010

Note: Authors’ estimates based on figures from Goldman Sachs.
Source: Goldman Sachs
Alongside programs designed to address the systemic problems in the financial system, the Fed and Treasury put in place a forceful mix of monetary policy and fiscal stimulus.
U.S. STRATEGY

As the Fed funds rate neared zero, the Fed made large-scale asset purchases to drive down long-term interest rates—a policy known as quantitative easing.

Fed funds target rate or range and 10-year Treasury rate

Gross asset purchases, monthly

Sources: Target rate: Federal Reserve Board; 10-year Treasury: Federal Reserve Board via Federal Reserve Economic Data (FRED); monthly asset purchases: Federal Reserve Bank of New York, Haver Analytics
U.S. STRATEGY

The U.S. passed the first fiscal stimulus very early in the crisis. But at $168 billion, it was relatively small and needed time to take effect.

Quarterly effect of fiscal stimulus measures on GDP

Note: $168 billion represents the combined stimulus from pre–Recovery Act measures through 2012.

Sources: Council of Economic Advisers; Congressional Budget Office; Bureau of Economic Analysis; calculations by Jason Furman
The Recovery Act of 2009 provided a larger mix—$712 billion—of temporary tax cuts and spending increases, offsetting some but not all of the fall in GDP.

Quarterly effect of fiscal stimulus measures on GDP

Estimated impact on GDP from fiscal legislation

- Pre–Recovery Act
- Recovery Act
- Post–Recovery Act

American Recovery and Reinvestment Act of 2009
Feb. 17, 2009

Note: $712 billion represents the stimulus from the Recovery Act through 2012.

Sources: Council of Economic Advisers; Congressional Budget Office; Bureau of Economic Analysis; calculations by Jason Furman
A further $657 billion from a series of smaller post–Recovery Act measures added to the level of economic support ...

Note: $657 billion represents the combined stimulus from post–Recovery Act measures through 2012.

Sources: Council of Economic Advisers; Congressional Budget Office; Bureau of Economic Analysis; calculations by Jason Furman
...but even as the federal government ramped up stimulus, state and local cutbacks worked against the effort.

Real state and local government purchases during recoveries, 1960–2015, indexed to quarterly level at end of recession

During the recovery from the financial crisis, however, state and local governments cut spending sharply, working against federal efforts.

In past recessions, state and local governments increased spending during recoveries.

Average across recessionary periods from 1960–2007

Note: Average does not include the 1980 recession owing to overlap with the 1981–82 recession.

Sources: Bureau of Economic Analysis via Haver Analytics; authors’ calculations
U.S. STRATEGY

The government put in place a series of housing programs to:

- Lower mortgage rates and ensure the availability of credit
- Reduce mortgage foreclosures
- Help struggling borrowers refinance mortgages to take advantage of lower rates
U.S. STRATEGY

The government’s housing programs brought down mortgage rates and reduced foreclosures but were not powerful enough to contain the damage.

30-year fixed mortgage rate

Foreclosure completions, annual rate distributed evenly across four quarters

Sources: Mortgage rates: Freddie Mac Primary Mortgage Market Survey® via Federal Reserve Economic Data (FRED); foreclosure completions: CoreLogic
Government support of Fannie Mae and Freddie Mac kept mortgage credit flowing and stabilized the housing market after private issuers pulled back.

Mortgage-backed securities issuance

Sources: MBS issuance: Securities Industry and Financial Markets Association; agency MBS spread: Bloomberg Finance L.P., authors' calculations
Loan modification programs, including HAMP, helped millions of struggling home owners with their mortgages.

Mortgages modified or receiving loss mitigation aid, April 1, 2009, through Nov. 30, 2016


Revised HAMP rules, March 2010, to encourage some principal write-downs to combat negative equity and to offer some unemployed borrowers principal forbearance for up to three months

HAMP Tier 2 becomes effective, June 2012, facilitating modifications for non-GSE borrowers

Streamline HAMP announced, July 2015, allowing modifications for seriously delinquent borrowers with documentation limitations

FHA loss mitigation

HAMP permanent modifications

Private sector modifications

Foreclosure completions

Note: Modifications through Nov. 2016; other program results through 2016. Foreclosure completions are plotted using an annual rate distributed evenly across four quarters.

Sources: FHA loss mitigation: Dept. of Housing and Urban Development; HAMP modifications: U.S. Treasury; private sector modifications: HOPE NOW; foreclosure completions: CoreLogic
**U.S. STRATEGY**

**The Home Affordable Refinance Program** lowered mortgage rates, encouraged refinancings, and helped “underwater” home owners avoid foreclosure.

Loans refinanced through the Home Affordable Refinance Program

Note: Foreclosure completions are plotted using an annual rate distributed evenly across four quarters.

Sources: Refinances: Federal Housing Finance Agency; foreclosure completions: CoreLogic
The government’s programs helped millions of home owners, but were slow to take effect and reached a limited number of people threatened by foreclosure.

<table>
<thead>
<tr>
<th>12 million</th>
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<tbody>
<tr>
<td>Special refinancings 9.5 million</td>
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<tr>
<td>Loan modifications 8.2 million</td>
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<td>Other borrower assistance 5.3 million</td>
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**PROGRAMS**

<table>
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<tr>
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<tbody>
<tr>
<td><strong>HARP</strong> Completed refinances</td>
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<td><strong>FHFA</strong> Streamline refinances</td>
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<td><strong>FHA</strong> Streamline refinances</td>
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<td><strong>Through 2017</strong></td>
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<td><strong>Through 2017</strong></td>
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<tr>
<td><strong>GSE</strong> Standard and streamlined modifications</td>
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<tr>
<td><strong>HOPE NOW</strong> Proprietary modifications</td>
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<tr>
<td><strong>FHA MODIFICATIONS</strong> Additional loss mitigation</td>
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<td><strong>Through 2012</strong></td>
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<td><strong>Through 2017</strong></td>
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<tr>
<td><strong>Through 2017</strong></td>
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<td><strong>Through 2017</strong></td>
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Source: Barr et al. (2020)
Even though the crisis started in the United States, its impact reverberated around the world—and the response required U.S. policymakers to work closely with their global counterparts to:

- Establish central bank swap lines to address dollar funding shortages
- Coordinate monetary policy to send a powerful message to the markets
- Arrange for IMF support for emerging markets countries affected by the crisis
**U.S. STRATEGY**

The Federal Reserve established swap lines with more than a dozen foreign central banks to ease funding pressures arising from a shortage of dollars.

Central bank liquidity swaps

$600 billion  Swap line amounts outstanding

- **500 billion**
  - Brazil, Mexico, New Zealand, South Korea, Singapore added Oct. 28–29, 2008

- **400 billion**
  - Australia, Denmark, Norway, Sweden added Sept. 24, 2008

- **300 billion**

- **200 billion**
  - Fed establishes swap lines with the ECB and Switzerland Dec. 12, 2007

- **100 billion**
  -

- **0 billion**

**Swap line limits**

By Oct. 14, 2008, the Fed had expanded currency swap lines to essentially unlimited amounts with four central banks: ECB, Switzerland, and the Banks of England and Japan. Limited swap lines were arranged with 10 other central banks:

- **Canada** $30
- **Australia** $30
- **Sweden** $30
- **Brazil** $30
- **Mexico** $30
- **South Korea** $30
- **Singapore** $30
- **Denmark** $15
- **Norway** $15
- **New Zealand** $15

Sources: Amounts outstanding: Federal Reserve Board, authors' calculations; maximum commitments: Goldberg et al. (2010)
U.S. STRATEGY

The Federal Reserve and the world’s major central banks orchestrated a coordinated interest rate cut.

Central bank target interest rates for each country (month-end)


Source: Bloomberg Finance L.P.
U.S. STRATEGY

The IMF provided substantial aid to countries affected by the crisis, outpacing its response to the Asian financial crisis in 1997.

Increase in IMF lending commitments from start of Asian and global financial crises

$175 billion

- Flexible credit lines
- Standby and extended arrangements

- Standby and extended arrangements

Proposal to expand New Arrangements to Borrow resources of the IMF by up to $500 billion, April 2009

Note: Start date for new IMF lending for the Asian financial crisis (AFC) is July 1997 and for the global financial crisis (GFC) is Sept. 2008. SDR data were converted to U.S. dollars at $1.355820 per SDR (the rate on July 31, 1997) for the AFC and $1.557220 per SDR (the rate on Sept. 30, 2008) for the GFC.

Sources: International Monetary Fund; authors’ calculations based on Lowery et al. (2020)
Outcomes
OUTCOMES

The severity of the stress of the 2008 financial crisis was, in some respects, worse than in the Great Depression.

Stock market prices from peak

Nominal house prices from peak

Decline in household wealth

Notes: Stock declines shown to financial crisis trough; house prices 3 years after peak; household wealth figures are based on the change between the nominal annual average of 1929 and of 1930, and the change in the nominal level from Q1 2008 to Q1 2009.

OUTCOMES

The U.S. government response ultimately stopped the panic and stabilized the financial system ...

Bank CDS spreads and Libor-OIS spread

Note: Credit default swap spreads are equal-weighted averages of JPMorgan Chase, Citigroup, Wells Fargo, Bank of America, Morgan Stanley, and Goldman Sachs.

Sources: Libor-OIS: Bloomberg Finance L.P.; CDS spreads: Bloomberg Finance L.P., IHS Markit
OUTCOMES

... and allowed the economy to slowly begin digging out of a deep recession.

Treasury, Federal Reserve, and FDIC exposures

Real GDP and employment growth, year-over-year percent change (monthly)

OUTCOMES

The response helped restart the credit markets and bank lending so that financing was once again cheaper and easier to obtain.

Consumer asset-backed security (ABS) spreads

Net percentage of banks tightening loan standards

Sources: ABS spreads: Federal Reserve Bank of New York based on data from JP Morgan and Bloomberg Finance L.P.; lending standards: Federal Reserve Board
OUTCOMES

The surge in housing foreclosures stabilized and began to decline, and home prices eventually began to recover.

Sources: Foreclosure inventory: Mortgage Bankers Association's National Delinquency Survey, Bloomberg Finance L.P.; home price index: S&P CoreLogic Case-Shiller U.S. National Home Price Index, not seasonally adjusted, via Federal Reserve Economic Data (FRED)
OUTCOMES

The pace of the recovery in the U.S. was slow, as is typical following a severe financial crisis ...

Percentage change in real GDP from peak

+50%

Source: Bureau of Economic Analysis via Federal Reserve Economic Data (FRED)
...although growth has been stronger than in many European countries.

Real GDP, percentage change from 4th quarter 2007

Source: Organisation for Economic Co-operation and Development
Financial crises are typically costly to economic output, but the U.S. strategy was able to limit the damage compared to other crises.

How bad was the drop in GDP? Decline in output peak to trough (real GDP per capita)

-9.6%  -5.25%

How long was the recession? Duration of recession

2.9 years  1.5 years

How fast was the recovery? Recovery of output to previous peak

7.3 years  5.5 years

Sources: Reinhart and Rogoff (2009); Bureau of Economic Analysis via Federal Reserve Economic Data (FRED); based on comparisons from Liang et al. (2020)
OUTCOMES

U.S. taxpayers made a profit on the financial rescue.

Income or cost of financial stability programs

<table>
<thead>
<tr>
<th>Capital Investments</th>
<th>In billions</th>
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<tbody>
<tr>
<td>GSEs</td>
<td>+$88.2</td>
</tr>
<tr>
<td>AIG</td>
<td>22.7</td>
</tr>
<tr>
<td>CPP</td>
<td>21.9</td>
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<tr>
<td>Citigroup</td>
<td>6.6</td>
</tr>
<tr>
<td>Bank of America</td>
<td>3.1</td>
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<tr>
<td>GMAC/Ally</td>
<td>2.4</td>
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<tr>
<td>CDCI</td>
<td>0.0</td>
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<tr>
<td>Chrysler Financial</td>
<td>0.0</td>
</tr>
<tr>
<td>Chrysler</td>
<td>−1.2</td>
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<tr>
<td>General Motors</td>
<td>−10.5</td>
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<table>
<thead>
<tr>
<th>Liquidity/ Credit Markets</th>
<th>In billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSE Debt Purchases</td>
<td>+$17.6</td>
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<tr>
<td>CPFF</td>
<td>6.1</td>
</tr>
<tr>
<td>TAF</td>
<td>4.1</td>
</tr>
<tr>
<td>PPIP</td>
<td>3.9</td>
</tr>
<tr>
<td>TALF</td>
<td>2.3</td>
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<tr>
<td>TSLF</td>
<td>0.8</td>
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<tr>
<td>Maiden Lane</td>
<td>0.8</td>
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<tr>
<td>PDCF</td>
<td>0.6</td>
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<tr>
<td>AMLF</td>
<td>0.5</td>
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<tr>
<td>SBA 7(a)</td>
<td>0.0</td>
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<thead>
<tr>
<th>FDIC Resolution</th>
<th>In billions</th>
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<tbody>
<tr>
<td>Cumulative Income, 2008–10</td>
<td>+$45.4</td>
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<tr>
<td>DIF Losses, 2008–10</td>
<td>−60.0</td>
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</tbody>
</table>

<table>
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<tr>
<th>Guarantee Programs</th>
<th>In billions</th>
</tr>
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<tbody>
<tr>
<td>DGP</td>
<td>+$10.2</td>
</tr>
<tr>
<td>MMF Guarantee</td>
<td>1.2</td>
</tr>
<tr>
<td>TAGP</td>
<td>−0.3</td>
</tr>
</tbody>
</table>

Sources: Federal Deposit Insurance Corp.; Federal Housing Finance Agency; Federal Reserve Board; Webel and Labonte (2018); U.S. Treasury
Today the financial system has significantly more capital and would be better able to withstand losses in the event of a severe economic downturn.

CET1 and Tier 1 common equity as percent of risk-weighted assets

Bank capital levels

All institutions

Bank holding companies with more than $500 billion in assets

Long after the financial crisis, banks have continued to increase their capital, pushed in large part by more stringent regulatory requirements.

Note: Capital ratio is based on tier 1 common equity pre-2014 and common equity tier 1 (CET1) as of 2015, and is a combination of the two during 2014.
Source: Federal Reserve Bank of New York’s Research and Statistics Group
OUTCOMES

Stronger regulations on capital are applied to a much broader share of the U.S. financial system.

Q4 2007

41% of the financial system faced leverage restrictions

No leverage restrictions

$13.0 trillion Depository Institutions

$7.6 trillion Government-Sponsored Enterprises

$4.6 trillion Asset-Backed Securities

$4.7 trillion Broker-Dealers

$2.1 tn Finance Cos.

$32.1 trillion total financial assets

Q4 2017

92% of the financial system faced leverage restrictions

GSEs remain under government conservatorship

$18.8 trillion Depository Institutions

$8.9 trillion Government-Sponsored Enterprises

$3.2 trillion Broker-Dealers

$1.5 tn Fin. Cos.

$1.2 tn ABS

$33.6 trillion total financial assets

Source: Federal Reserve Board Financial Accounts of the United States
Nonetheless, the emergency authorities available in the U.S. are still too limited to allow an effective response to a severe crisis.

**PRE-CRISIS LIMITATIONS**

- Limited reach of prudential limits on leverage
- Limited deposit insurance coverage
- No resolution authority for largest bank holding companies and nonbanks
- No ability to inject capital into financial firms
- No authority to stabilize GSEs

**POST-CRISIS TOOLS**

- Stronger capital requirements
- Stronger liquidity and funding requirements
- Living wills, bankruptcy, and resolution authority

**POST-CRISIS LIMITATIONS**

- Limitations on Fed lender of last resort
- No money market fund guarantees or FDIC debt guarantees without congressional action
- No authority to inject capital

**ESSENTIAL CRISIS AUTHORITIES**

- Fed expanded lender of last resort
- Broader FDIC debt and money market fund guarantees
- GSE conservatorship
- Capital injections into financial firms
OUTCOMES
This was a terribly damaging crisis. It did not need to be so bad.

The damage illustrates the costs of running a financial system with weak oversight, and of going into a crisis without the essential tools for aggressive early action to prevent disaster.

The recovery was slow and fragile, made slower by the premature shift to tighter fiscal policy.

Even after repairing the immediate damage, the U.S. economy still faces a number of longer-term challenges, with causes that predated the crisis.
### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ABCP</td>
<td>asset-backed commercial paper</td>
</tr>
<tr>
<td>ABS</td>
<td>asset-backed securities</td>
</tr>
<tr>
<td>AMLF</td>
<td>Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility</td>
</tr>
<tr>
<td>CAP</td>
<td>Capital Assistance Program</td>
</tr>
<tr>
<td>CDCI</td>
<td>Community Development Capital Initiative</td>
</tr>
<tr>
<td>CDS</td>
<td>credit default swaps</td>
</tr>
<tr>
<td>CET1</td>
<td>Common Equity Tier 1</td>
</tr>
<tr>
<td>CPFF</td>
<td>Commercial Paper Funding Facility</td>
</tr>
<tr>
<td>CPP</td>
<td>Capital Purchase Program</td>
</tr>
<tr>
<td>DGP</td>
<td>Debt Guarantee Program</td>
</tr>
<tr>
<td>DIF</td>
<td>Deposit Insurance Fund</td>
</tr>
<tr>
<td>FDIC</td>
<td>Federal Deposit Insurance Corporation</td>
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<tr>
<td>FHA</td>
<td>Federal Housing Administration</td>
</tr>
<tr>
<td>FHFA</td>
<td>Federal Housing Finance Agency</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>GSEs</td>
<td>government-sponsored enterprises</td>
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<tr>
<td>HAMP</td>
<td>Home Affordable Modification Program</td>
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<tr>
<td>HARP</td>
<td>Home Affordable Refinance Program</td>
</tr>
<tr>
<td>HUD</td>
<td>U.S. Department of Housing and Urban Development</td>
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<tr>
<td>Libor-OIS</td>
<td>London Interbank Offered Rate–Overnight Indexed Swap rate</td>
</tr>
</tbody>
</table>
Acronyms

MBS  mortgage-backed securities
MLEC  Master Liquidity Enhancement Conduit
MMFs  money market funds
NBER  National Bureau of Economic Research
PDCF  Primary Dealer Credit Facility
PPIP  Public-Private Investment Program
QE  Quantitative Easing
SAAR  seasonally adjusted annual rate
SBA 7(a)  Small Business Association Section 7(a) Securities Purchase Program
SCAP  Supervisory Capital Assessment Program
SDR  special drawing right
SPSPAs  Senior Preferred Stock Purchase Agreements
TAF  Term Auction Facility
TAGP  Transaction Account Guarantee Program
TALF  Term Asset-Backed Securities Loan Facility
TARP  Troubled Assets Relief Program
TLGP  Temporary Liquidity Guarantee Program
TSLF  Term Securities Lending Facility
Acknowledgments

This chart book was produced as part of an effort led by Ben S. Bernanke, Timothy F. Geithner, and Henry M. Paulson, Jr., to examine the U.S. government’s interventions in the 2007–2009 financial crisis, a joint project of the Yale School of Management, Program on Financial Stability, and the Brookings Institution, Hutchins Center on Fiscal and Monetary Policy.

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Data Analyst: Aidan Lawson
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**Data sources**: Bloomberg Finance L.P.; the Center for Research in Security Prices at Chicago Booth; CoreLogic®, a property data and analytics company; Freddie Mac; Goldman Sachs; Haver Analytics; IHS Markit; iMoneyNet; Mortgage Bankers Association; Securities Industry and Financial Markets Association; SNL Financial; S&P Dow Jones Indices LLC; Standard & Poor’s; S&P® and S&P 500® are registered trademarks of Standard & Poor’s Financial Services LLC, and Dow Jones® is a registered trademark of Dow Jones Trademark Holdings LLC. © 2017 S&P Dow Jones Indices LLC, its affiliates and/or its licensors. All rights reserved; U.S. Dept. of Housing and Urban Development; Wharton Research Data Services (WRDS).
Acknowledgments

Additional data sources: Bureau of Economic Analysis; Bureau of Labor Statistics; Congressional Budget Office; Congressional Oversight Panel; Council of Economic Advisers; Federal Deposit Insurance Corp.; Federal Housing Finance Agency; Federal Reserve Bank of New York Financial Crisis Policy Response Timeline; Federal Reserve Bank of New York’s Research and Statistics Group; Federal Reserve Bank of Philadelphia; Federal Reserve Bank of St. Louis; Federal Reserve Bank of St. Louis Financial Crisis Policy Response Timeline; Federal Reserve Board; Federal Reserve Economic Data (FRED); International Monetary Fund; Macroeconomic Advisers®; Mishkin (1978); Organisation for Economic Co-operation and Development; U.S. Dept. of Treasury.
Notes

PAGE 5  Re-created with data underlying Figure 10, “The Distribution of Household Income, 2014,” Congressional Budget Office (2018), www.cbo.gov/publication/53597. See link for definitions of income and income groups.


Banks’ portion includes net liabilities from federal funds agreements.

Notes


PAGE 35 Commercial banks include depository institutions. Bank holding companies include bank holding companies, savings and loan holding companies, financial holding companies, and their funding affiliates. Nonbanks include nonbank entities and their affiliates, as well as bank holding companies with nonbank assets of nonbank subsidiaries comprising more than half of their total assets.


Notes

PAGE 53  Monthly mortgage-related securities issuance figures may not match annual figures reported by the Securities Industry and Financial Markets Association on its website owing to a methodological difference in the reporting of each series.


PAGE 56  Some home owners may have participated in more than one program; the sum of home owners helped across all categories does not necessarily reflect the number of unique borrowers helped.


PAGE 62  The stock market (NYSE/AMEX/NASDAQ/ARCA) is measured by total market value as reported by the Center for Research in Security Prices and is shown to financial crisis trough. House prices are shown to three years after peak. Household wealth is a comparison between the change in the annual average (in nominal terms) of household wealth from 1929 to 1930, and the change in the nominal level of household wealth from Q1 2008 to Q1 2009.
Notes


PAGE 64 Guarantees: Reflects the U.S. Treasury’s maximum commitments under the Temporary Guarantee Program for Money Market Funds and the FDIC’s maximum commitments under the two components of the Temporary Liquidity Guarantee Program, the Debt Guarantee Program, and the Transaction Account Guarantee Program.

Troubled Assets Relief Program (TARP): Reflects principal outstanding for TARP programs including bank support programs, credit market programs, auto industry support, assistance to American International Group, and housing programs.

Federal Reserve Liquidity Programs: Reflects loan amounts outstanding under credit and liquidity programs established the Federal Reserve Board. These include discount window lending (primary credit, secondary credit, and seasonal credit), term auction credit, the Primary Dealer Credit Facility, the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Term Asset-Backed Securities Loan Facility, the Commercial Paper Funding Facility, and central bank liquidity swaps. Also reflects the value of outstanding securities lent through the Term Securities Lending Facility.

Other Programs: Reflects the Federal Reserve, FDIC, and Treasury’s commitments under the Asset Guarantee Program; Federal Reserve Board assistance to Maiden Lane companies and support to American International Group; Treasury support for Fannie Mae and Freddie Mac through the senior preferred stock purchase agreements, as well as the face value of Treasury’s total mortgage-backed securities (MBS) portfolio at the end of each month, from October 2008-March 2012.

Exposures via Treasury’s Temporary Guarantee Program for Money Market Funds were taken from “Guarantees and Contingent Payments in TARP and Related Programs: Congressional Oversight Panel
Notes


All figures except otherwise noted are reported on a cash basis and as of Aug. 1, 2018. GSE debt purchases, DIF losses and cumulative income, and TAGP are as of Dec. 31, 2017; Maiden Lane is as of Jan. 31, 2018; and GSEs are as of Q2 2018.

PAGE 72 Depository institutions include U.S.-chartered depository institutions, foreign banking offices in the U.S., and credit unions.