9-11-2018

Charting The Financial Crisis: U.S. Strategy and Outcomes

The Brookings Institution

Yale University: School of Management: Yale Program on Financial Stability (YPFS)

CHARTING THE FINANCIAL CRISIS

U.S. Strategy and Outcomes

Hutchins Center
on Fiscal & Monetary Policy
at BROOKINGS

Yale SCHOOL OF MANAGEMENT
Program on Financial Stability

Introduction

The global financial crisis of 2007-2009 and subsequent Great Recession 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 toolkit 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.

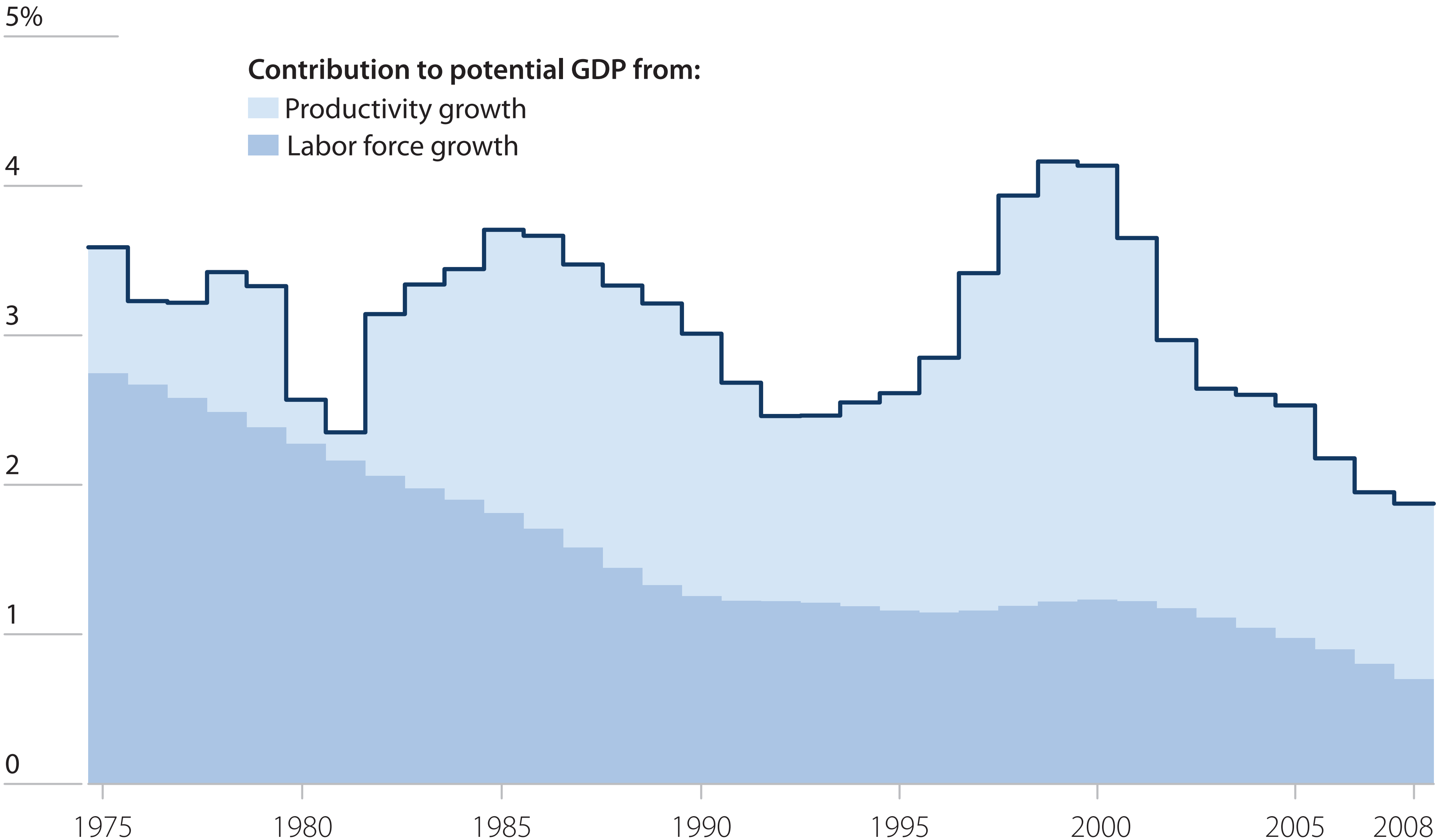
No collection of charts, even as extensive as this, can convey all the complexities and details of the crisis and the government's interventions. But these figures capture the essential features of one of the worst episodes in American economic history and the ultimately successful, even if politically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

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

Average growth in real potential GDP (August 2018 estimate)

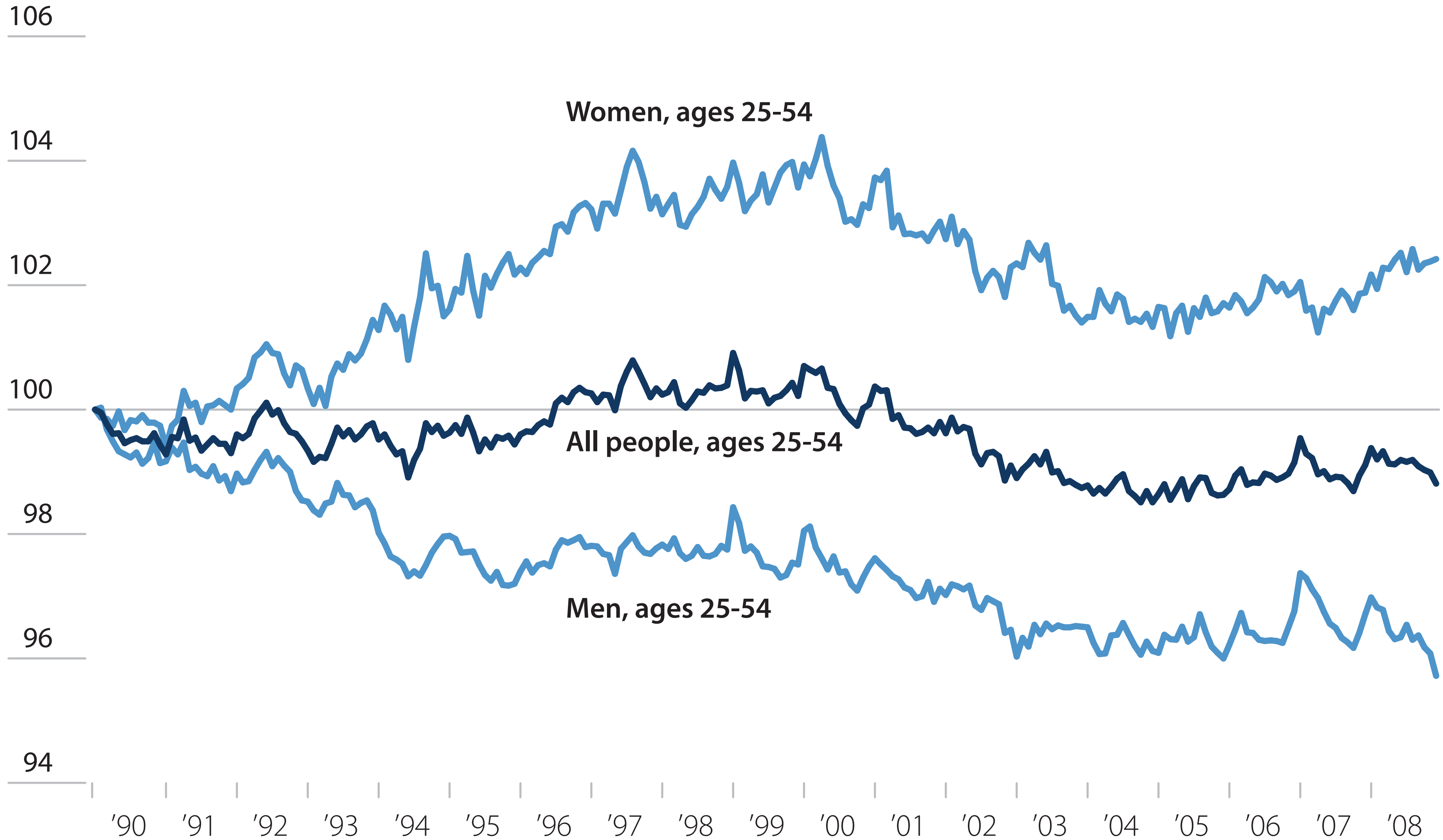


Sources: Congressional Budget Office, "An Update to the Economic Outlook: 2018 to 2028"; internal calculations

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.

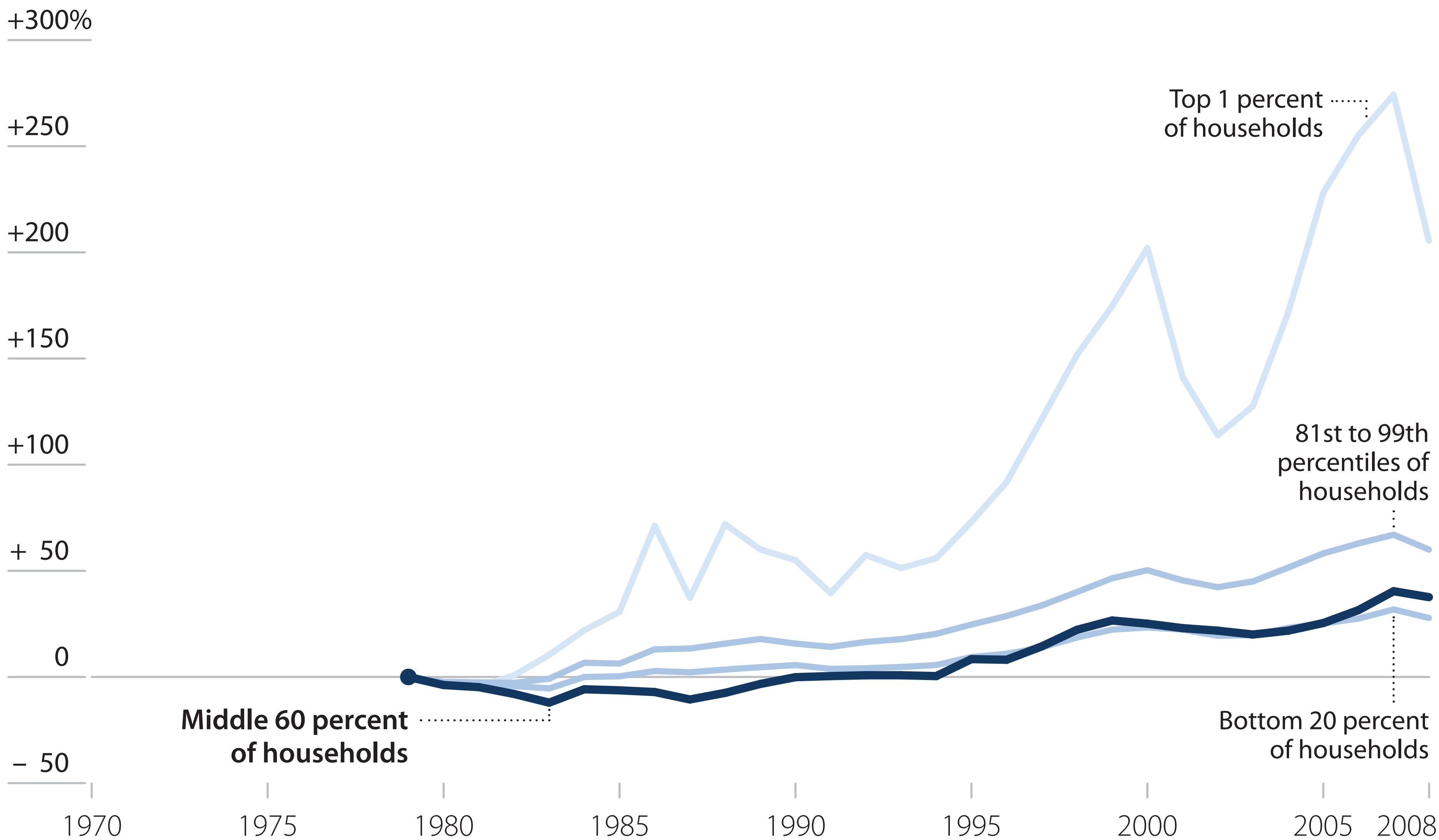
Civilian labor force participation rates for people ages 25-54, indexed to January 1990=100



Source: Bureau of Labor Statistics via Haver Analytics

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

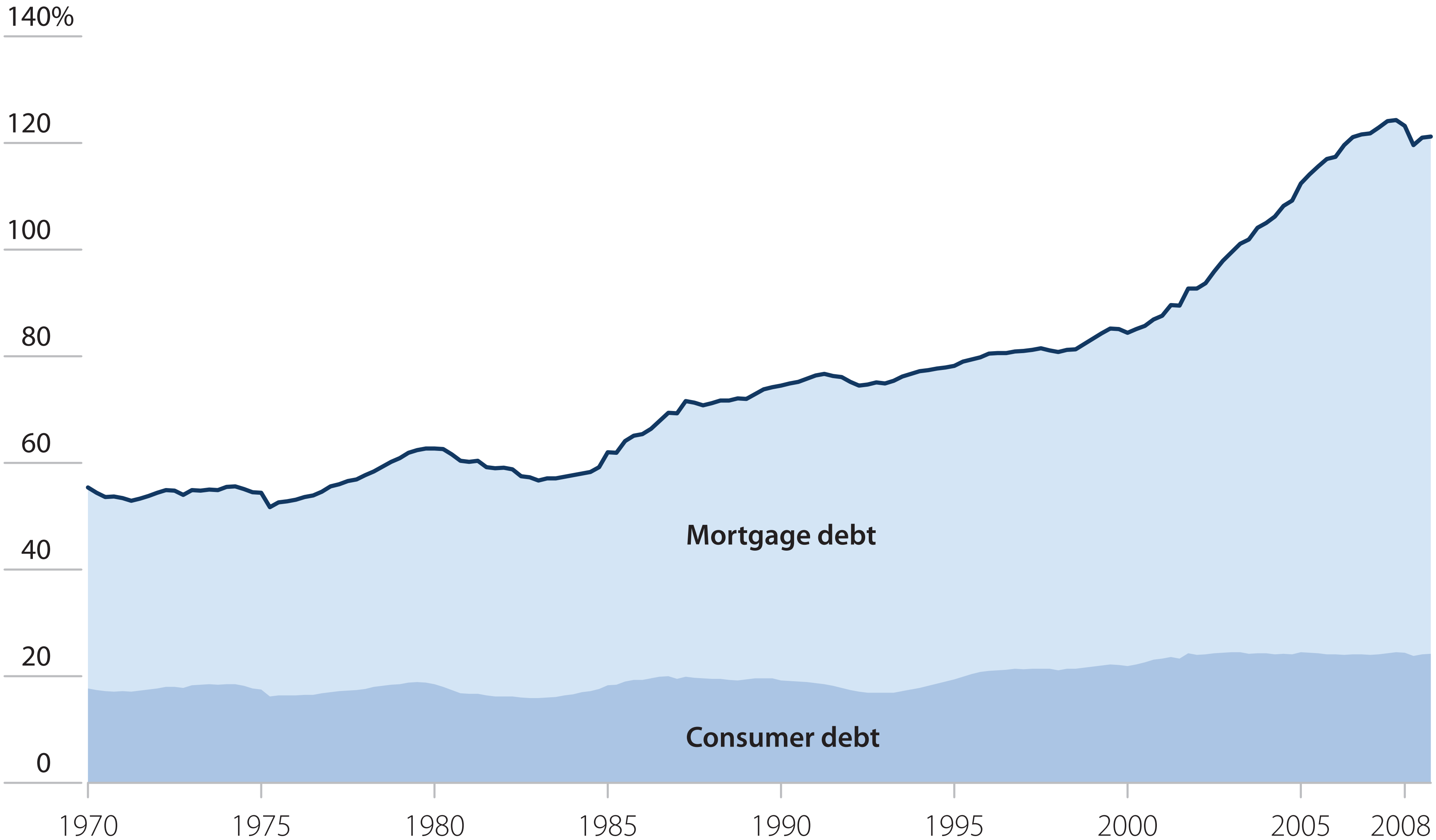
Cumulative growth in average income since 1979, before transfers and taxes, by income group



Source: Congressional Budget Office, "The Distribution of Household Income, 2014"

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

Aggregate household debt as a share of disposable personal income (after taxes)

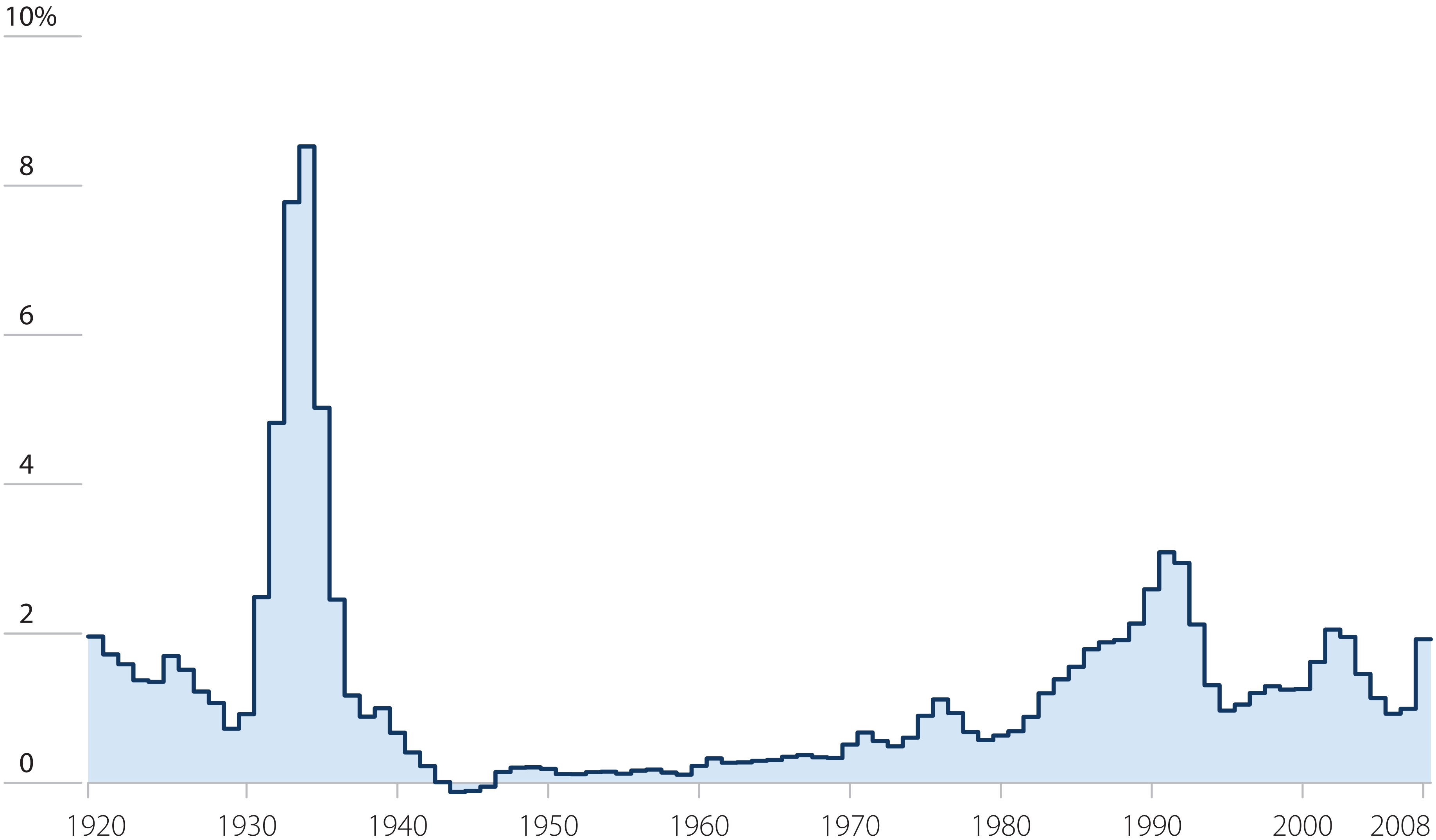


Sources: Federal Reserve Board Financial Accounts of the United States; Federal Reserve Board, "Household Debt-to-Income Ratios in the Enhanced Financial Accounts"

Meanwhile, the financial system was becoming increasingly fragile.

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

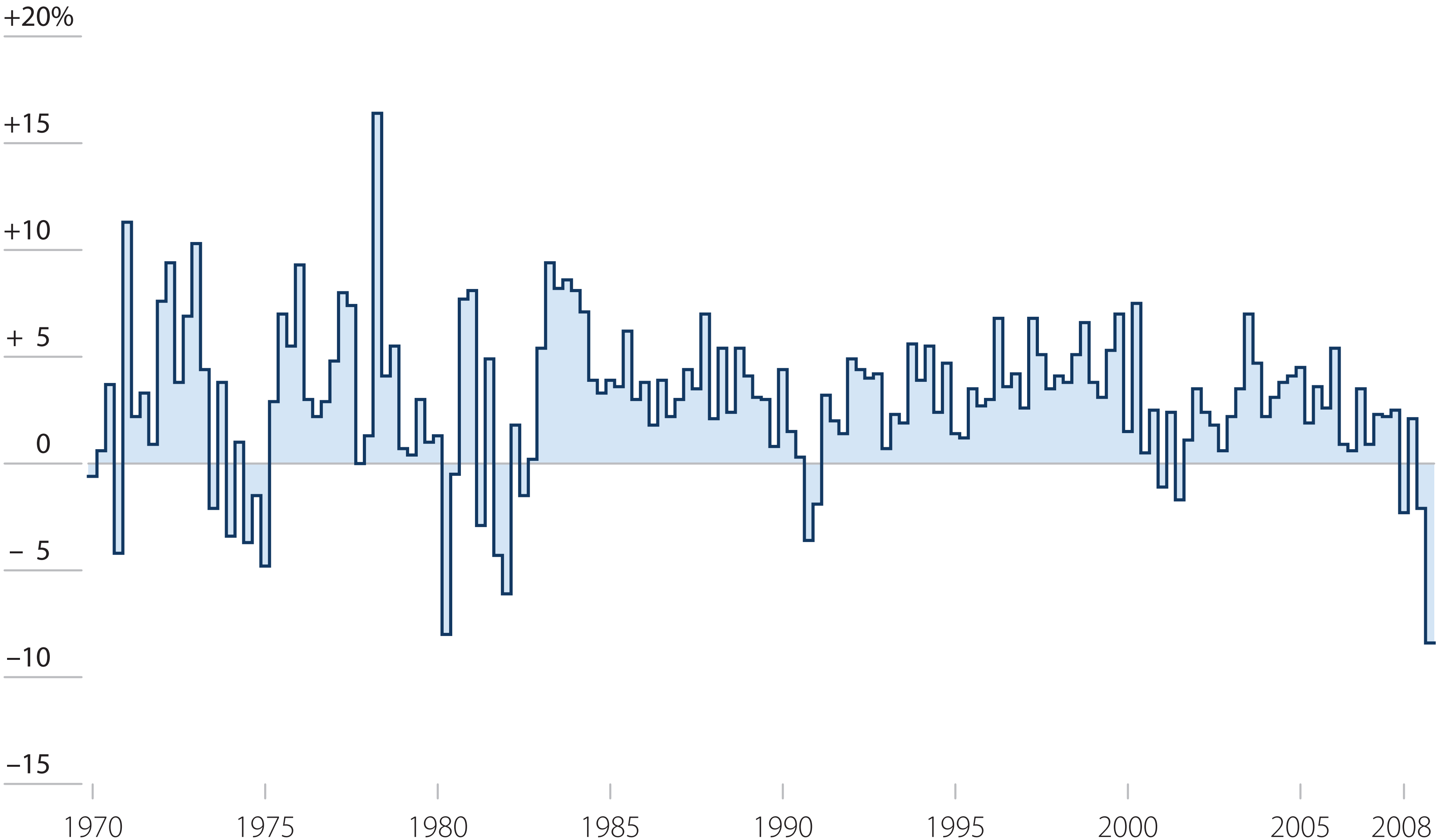
Two-year historical loan-loss rates



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

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



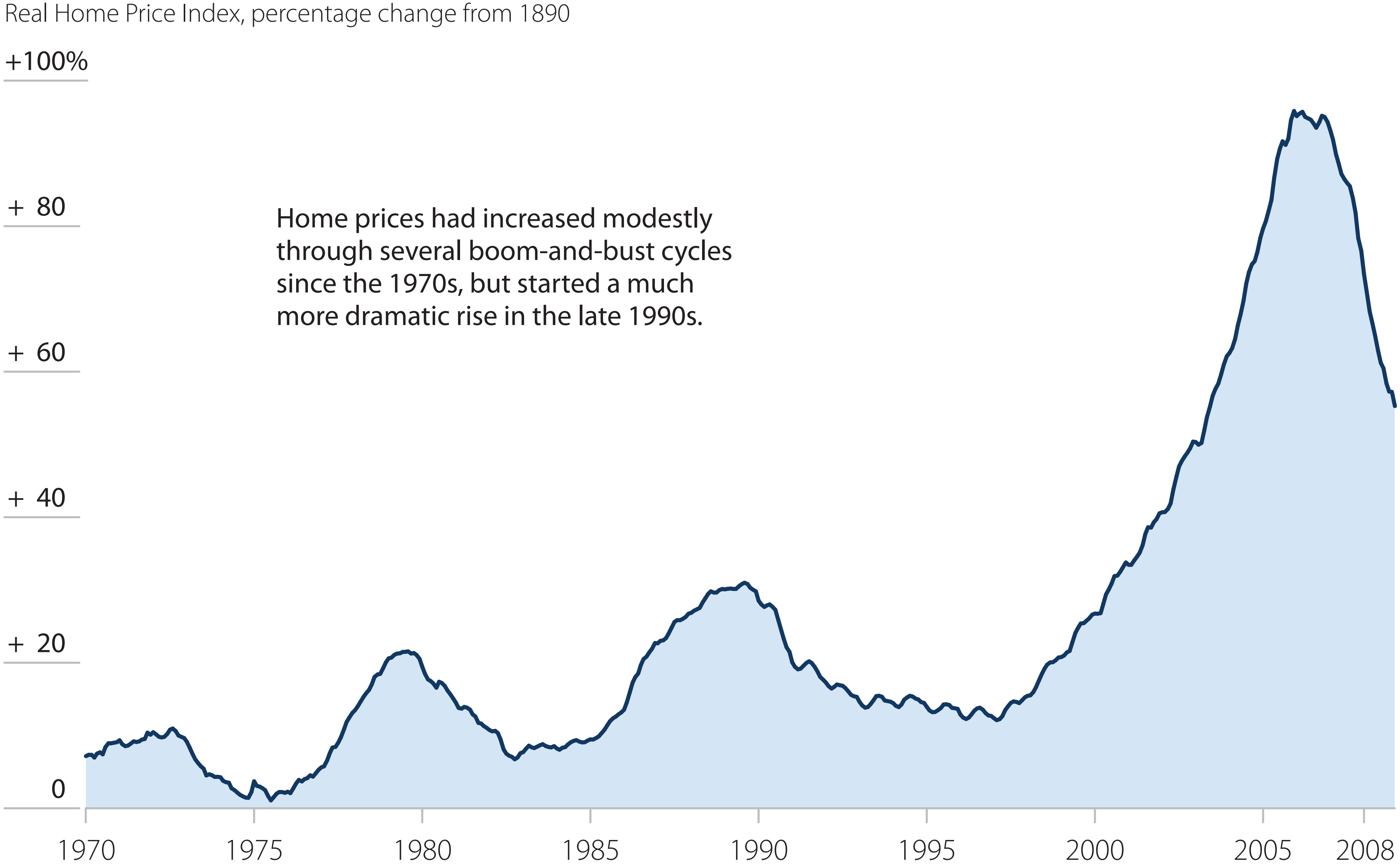
Source: Bureau of Economic Analysis via Federal Reserve Economic Data

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

Benchmark interest rates, monthly

Sources: Federal Reserve Board and Freddie Mac via Federal Reserve Economic Data

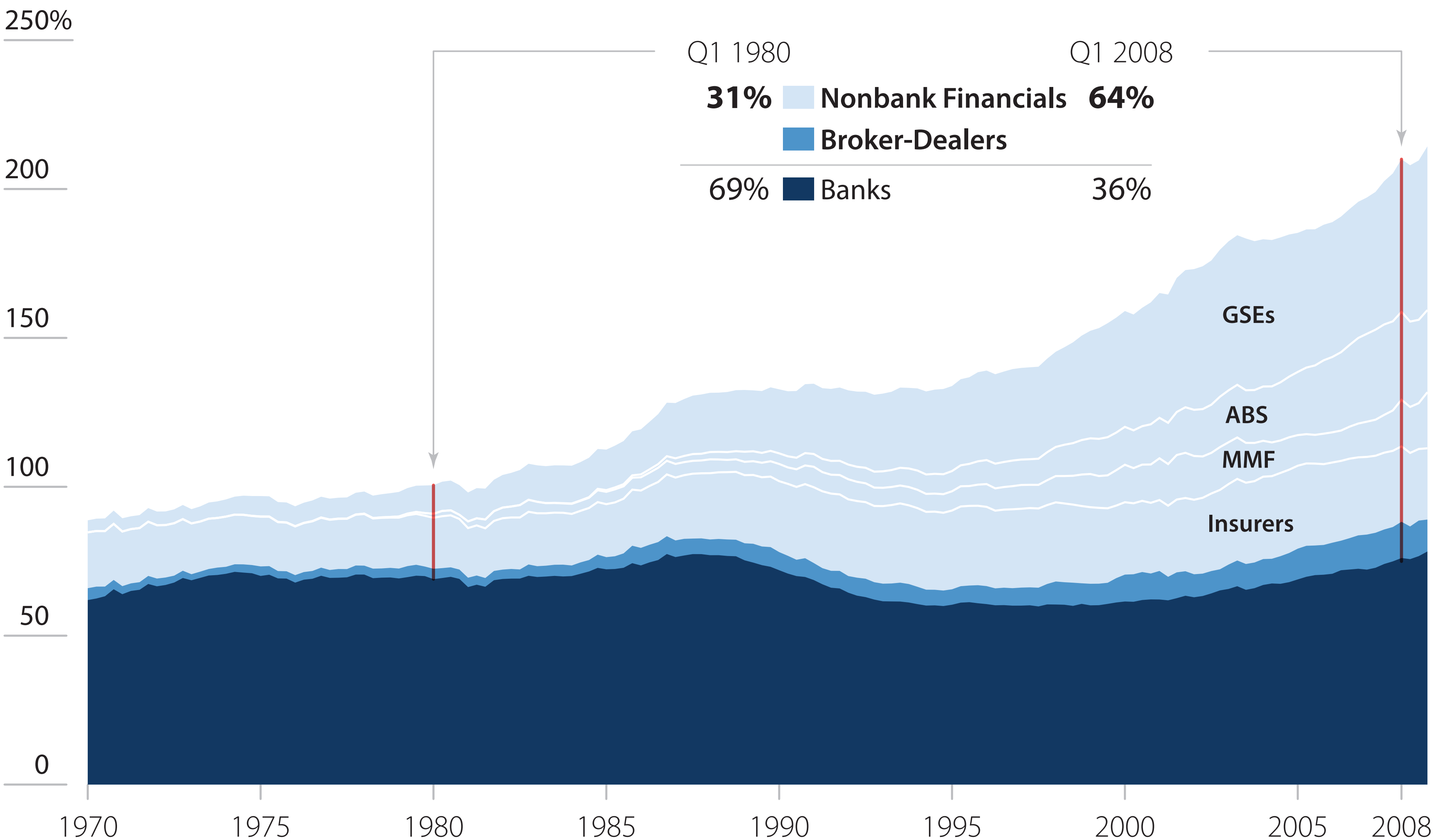
Home prices across the country had been rising rapidly for nearly a decade.



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

Credit and risk had migrated outside the regulated banking system.

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

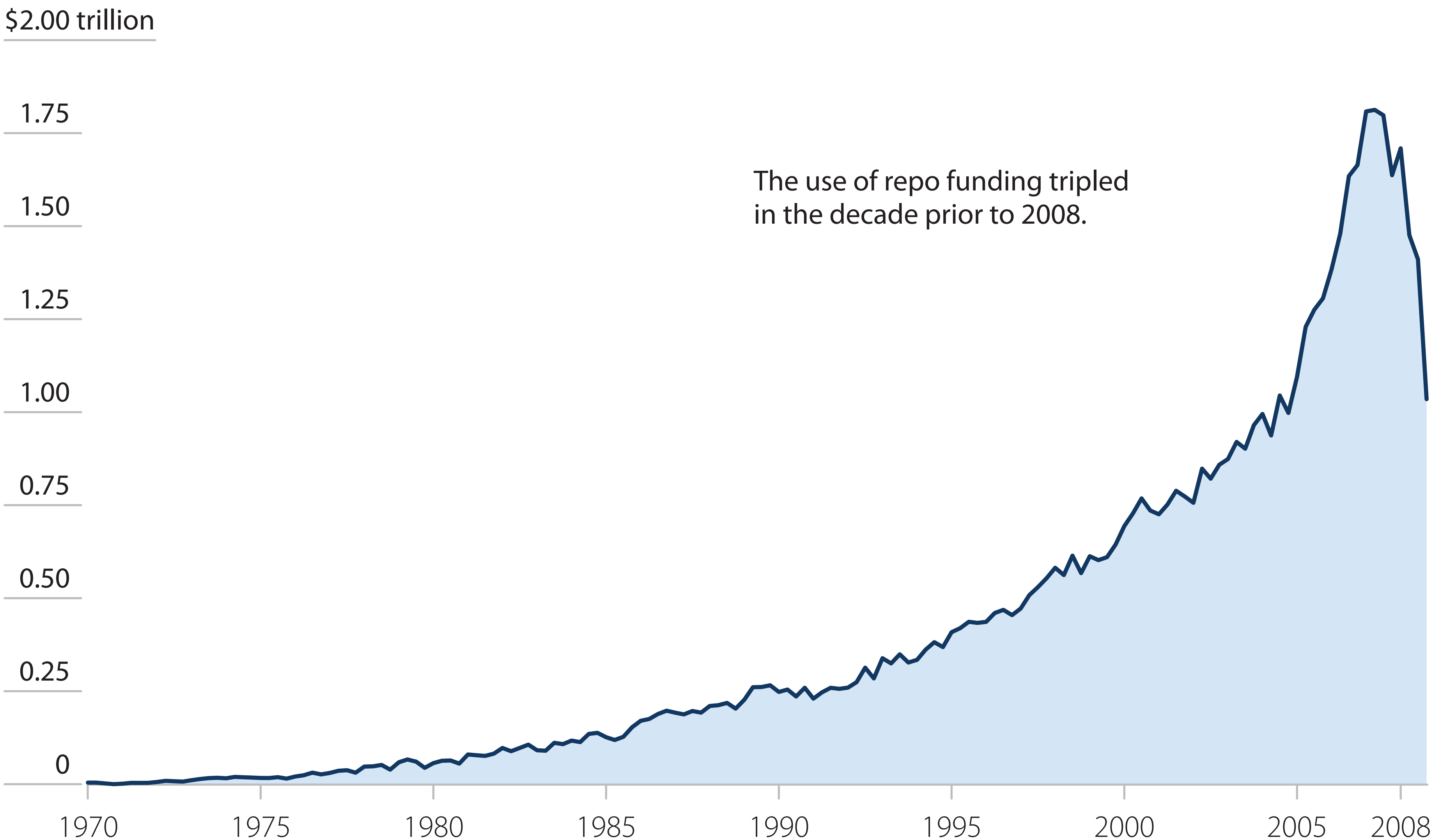


Source: Federal Reserve Financial Accounts of the United States Notes: GSE: government-sponsored enterprise (including Fannie Mae and Freddie Mac); ABS: asset-backed securities; MMF: money market funds

ANTECEDENTS

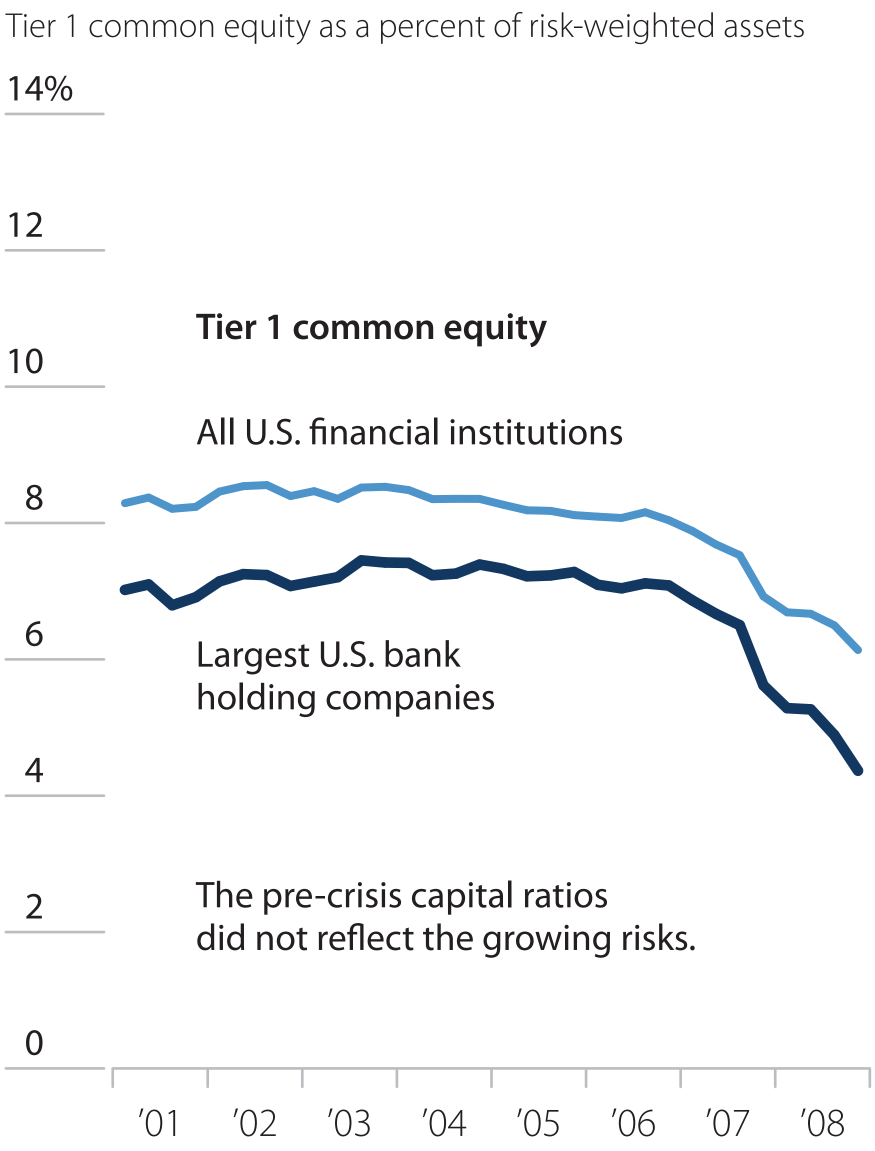
The amount of financial assets financed with short-term liabilities had also risen sharply, increasing the vulnerability of the financial system to runs.

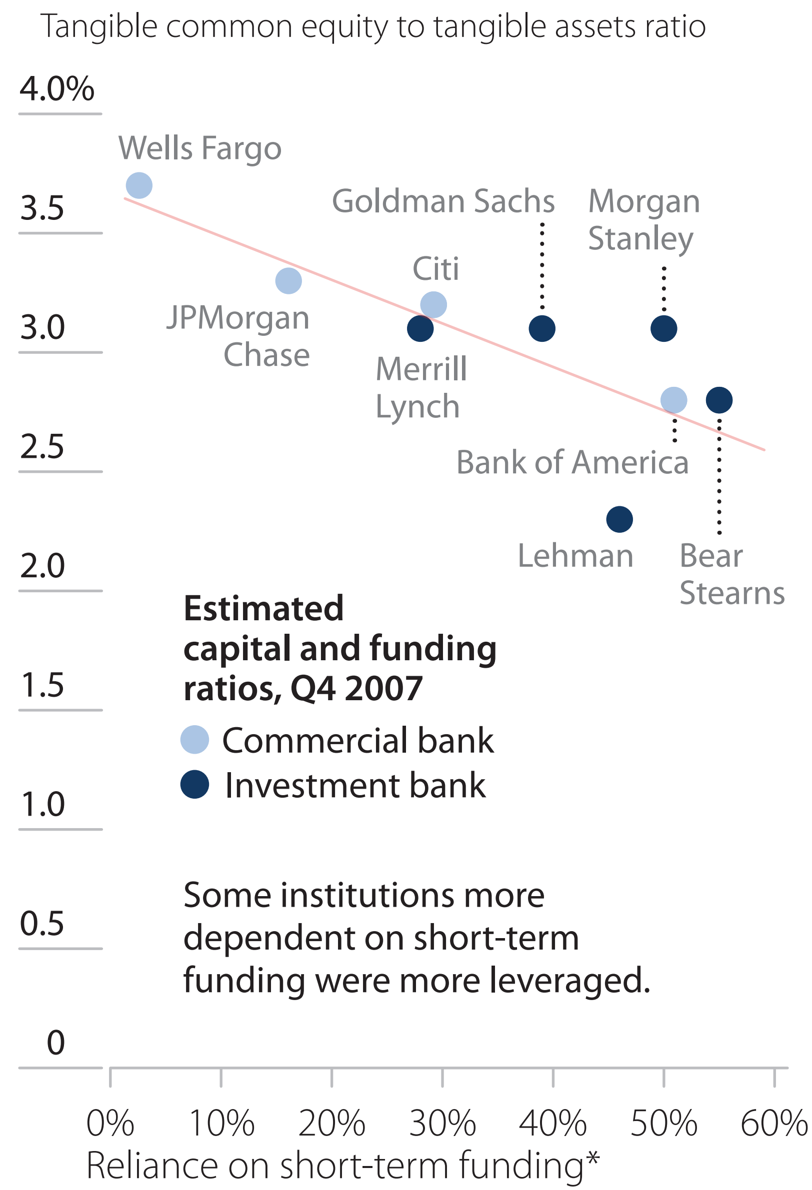
Net repo funding to banks and broker-dealers



Source: Federal Reserve Board Financial Accounts of the United States

The regulatory capital regime for the U.S. financial system was inadequate.





Sources: Capital ratios: Federal Reserve Bank of New York's Research and Statistics Group; tangible common equity to tangible assets: company reports

*Determined by share of financial assets pledged

The Arc of the Crisis

ARC OF THE CRISIS

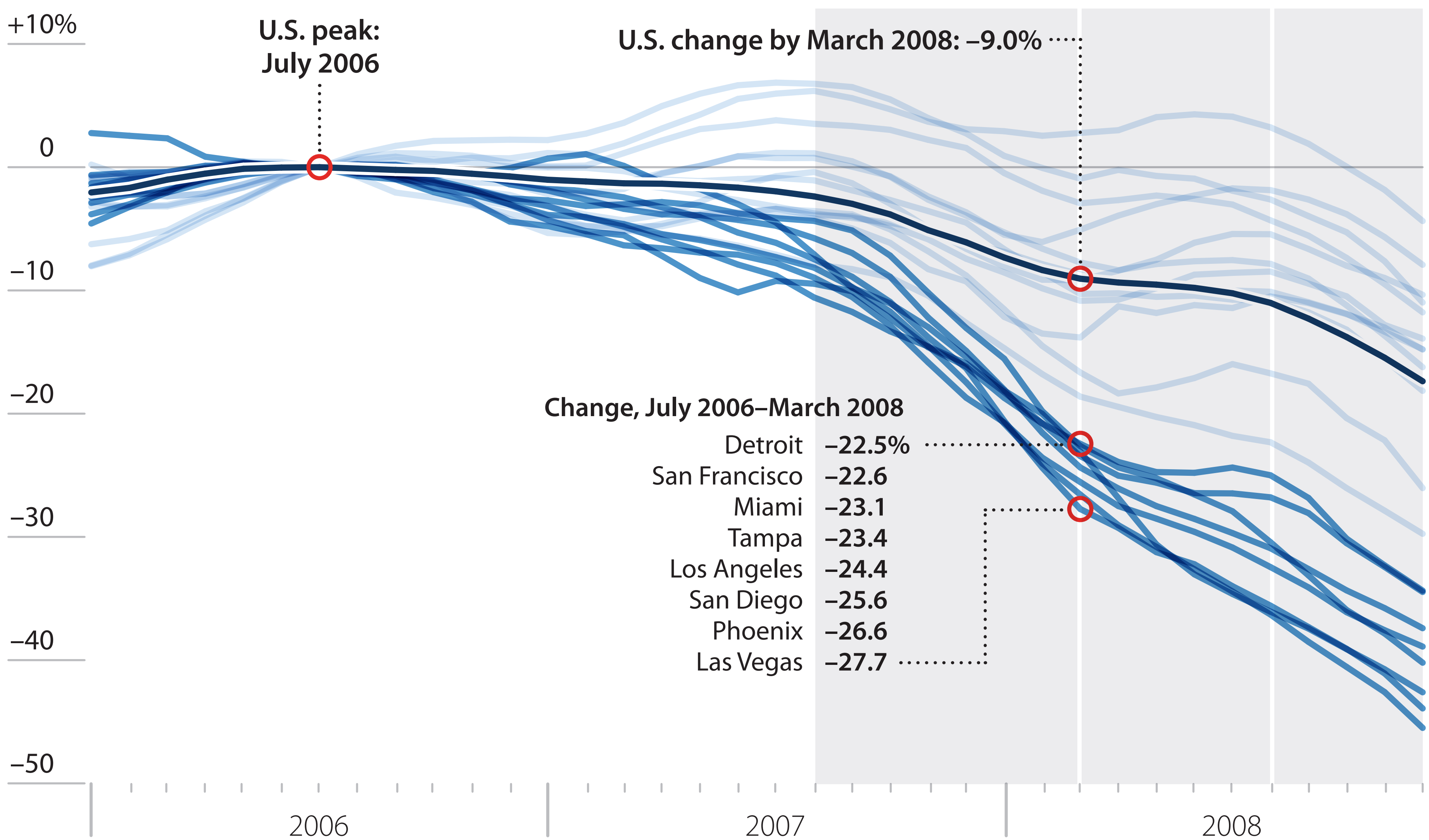
The financial crisis unfolded in several phases.

Bank credit default swap spreads and Libor-OIS

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

ARC OF THE CRISIS

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



Sources: S&P CoreLogic Case-Shiller Home Price Indexes for 20 individual cities and National Home Price Index via Federal Reserve Economic Data

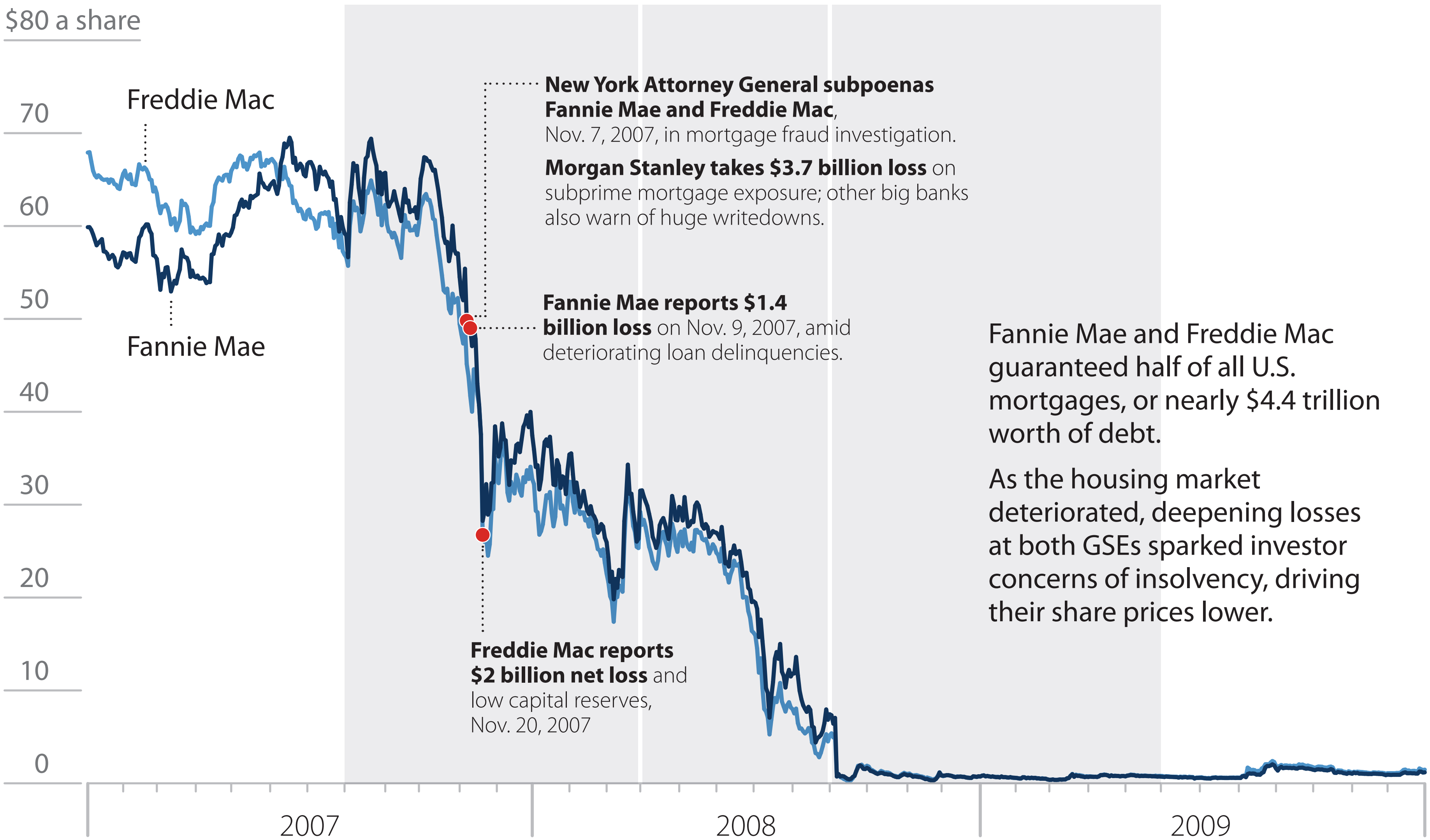
ARC OF THE CRISIS

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

Source: Bloomberg Note: GSE: government-sponsored enterprise

Investors were fearful that Fannie Mae and Freddie Mac might soon be swamped by losses …

Stock price of Fannie Mae and Freddie Mac



Fannie Mae and Freddie Mac guaranteed half of all U.S. mortgages, or nearly $4.4 trillion worth of debt.

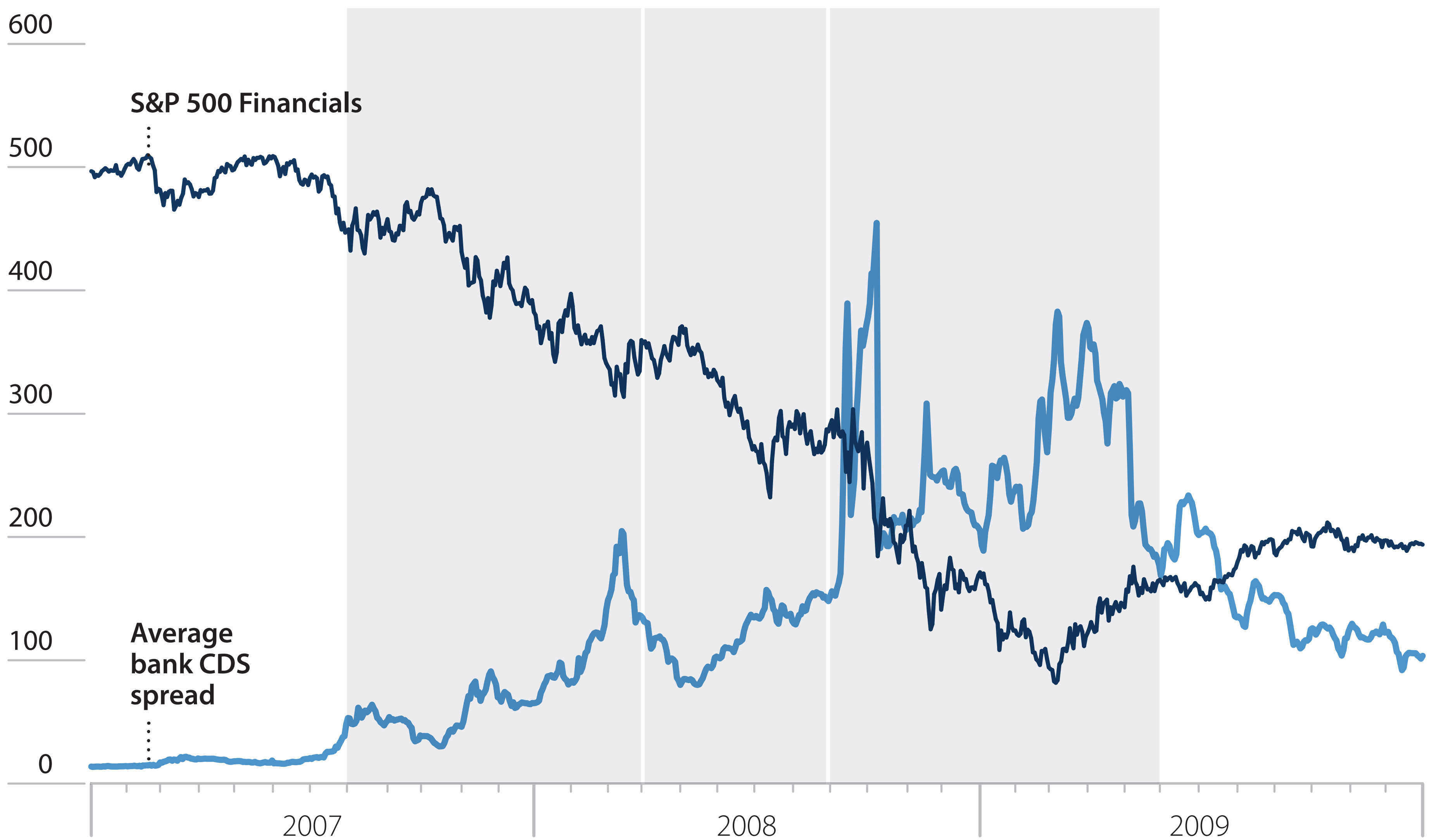
As the housing market deteriorated, deepening losses at both GSEs sparked investor concerns of insolvency, driving their share prices lower.

Source: The Center for Research in Security Prices via Wharton Research Data Services

ARC OF THE CRISIS

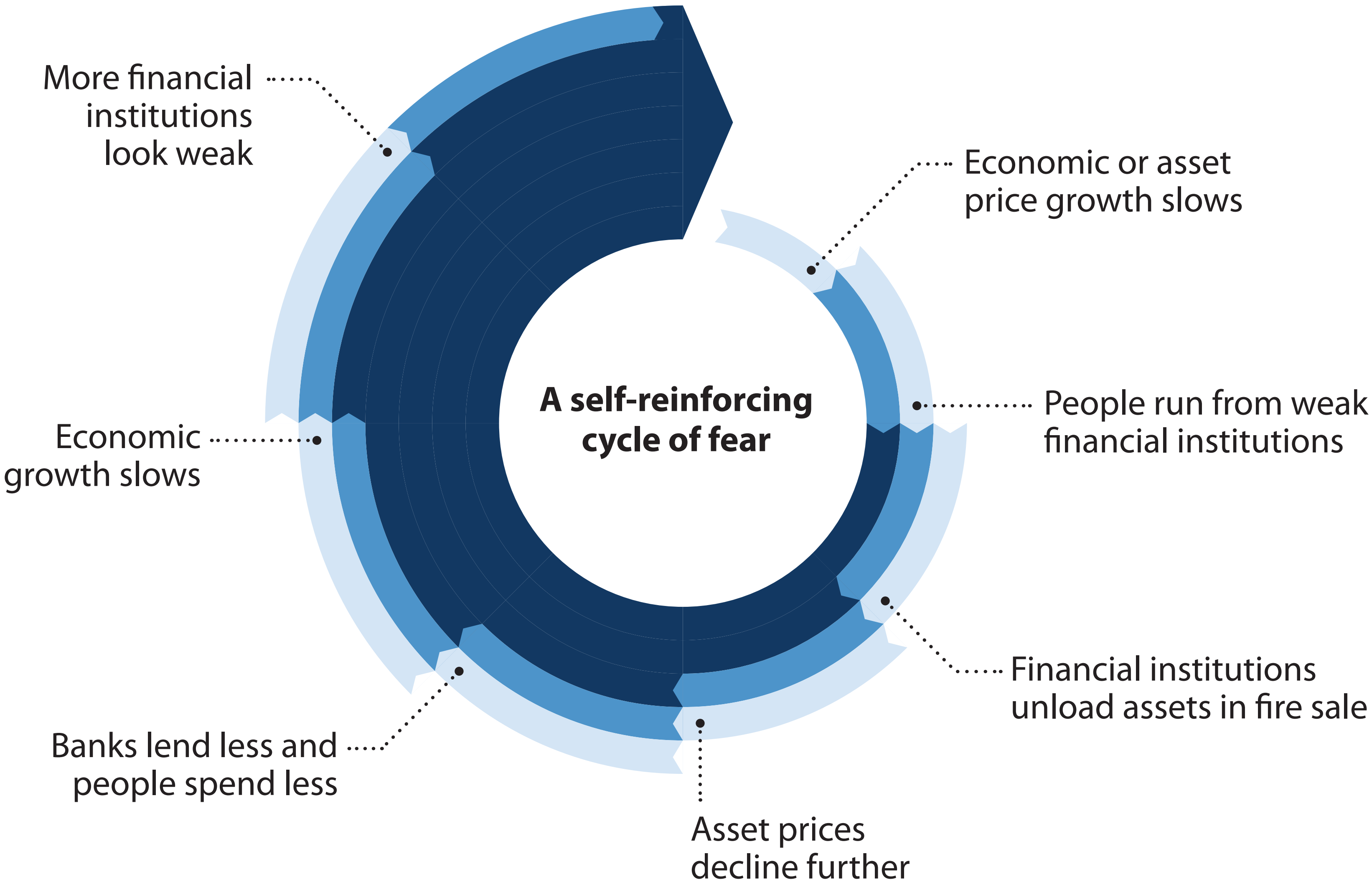
…and raised similar concerns about the nation's largest banks and investment banks.

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



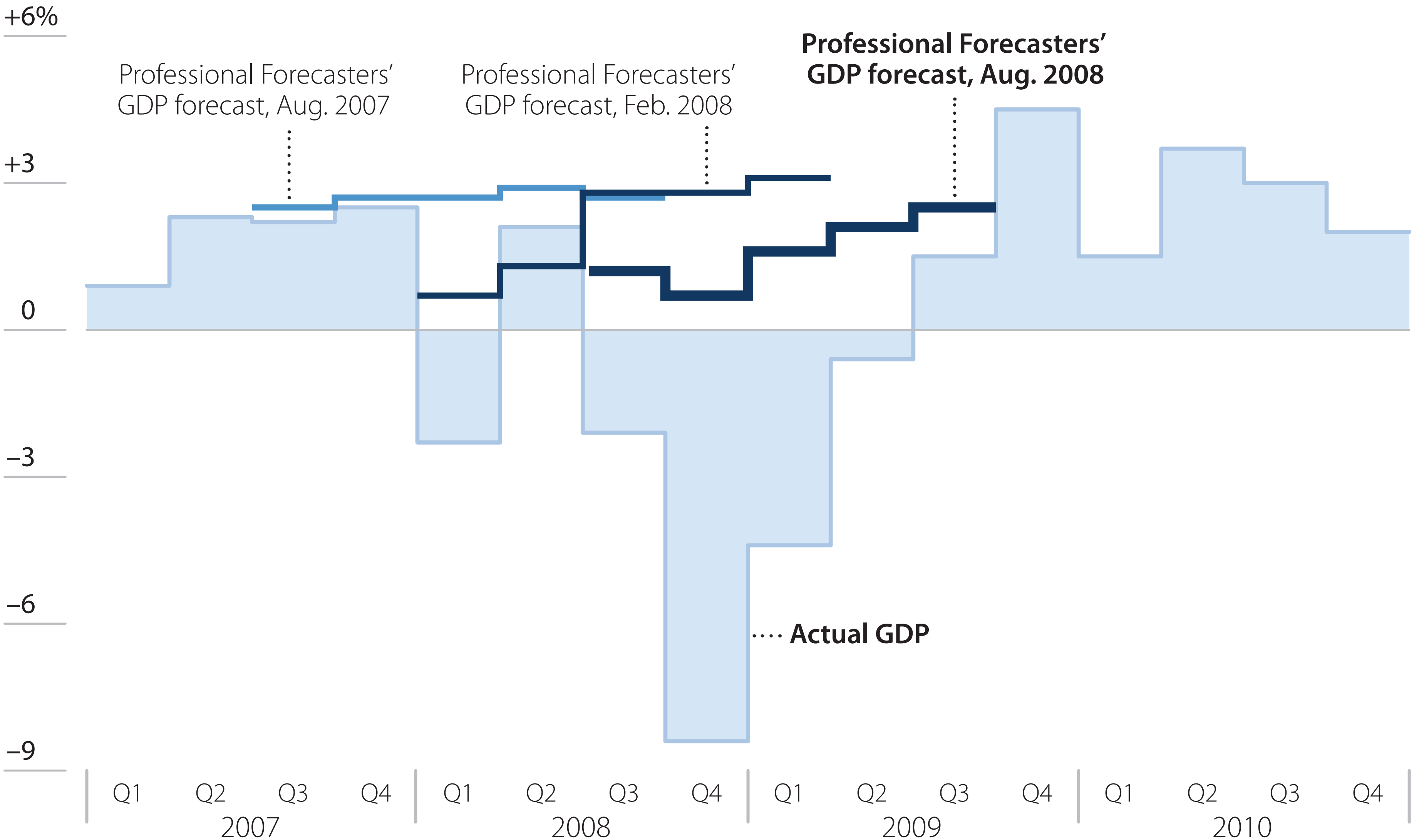
Source: Bloomberg. Note: Credit default swap spreads are equal-weighted averages of JPMorgan Chase, Citigroup, Wells Fargo, Bank of America, Morgan Stanley, and Goldman Sachs.

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.



Yet the economic forecasts suggested a modest and manageable slowdown in economic growth. The reality was far worse.

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 (data update of August 29, 2018); Philadelphia Federal Reserve Survey of Professional Forecasters, 3Q 2007 and 1Q and 3Q 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 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 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.

TOOLS AVAILABLE

FDIC

- Resolution authority for banks, with systemic risk exemption to allow FDIC to provide broader guarantees.
- Deposit insurance for banks.

Federal Reserve

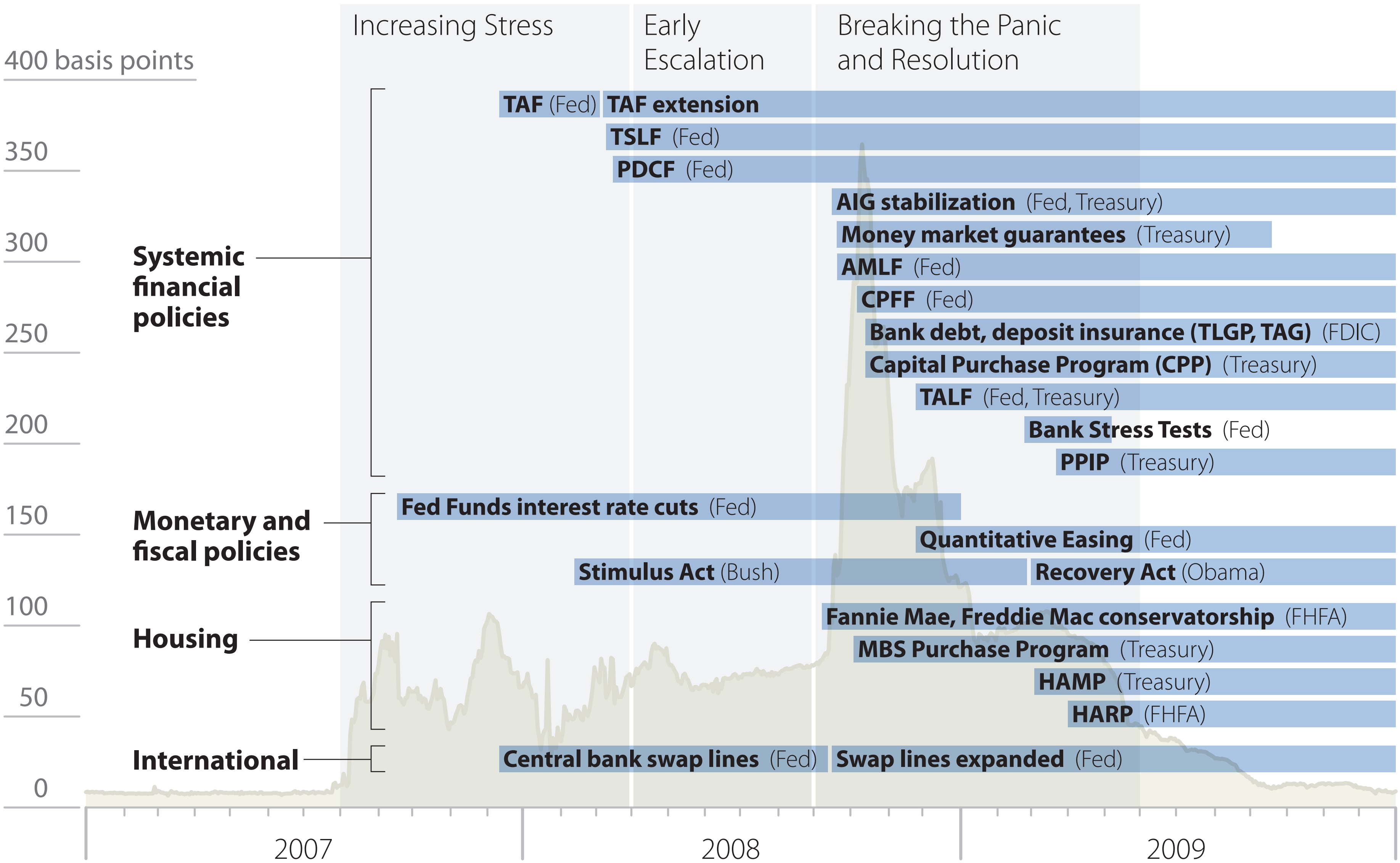
- Discount window lending for banks, and in extremis for other institutions.
- Swap lines for foreign central banks.

NO AUTHORITY

- **To intervene to manage the failure or nationalize nonbanks.**
- **To guarantee the broader liabilities of the financial system.**
- **To inject capital into the financial system.**
- **For the Fed to purchase assets other than Treasuries, Agencies and Agency MBS.**
- **To inject capital or guarantee the GSEs.**

U.S. STRATEGY

But the response became more forceful and comprehensive as the crisis intensified and Congress provided new emergency authority.



Source: Libor-OIS: Bloomberg

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.

Government interventions to prevent the failure of systemic institutions.

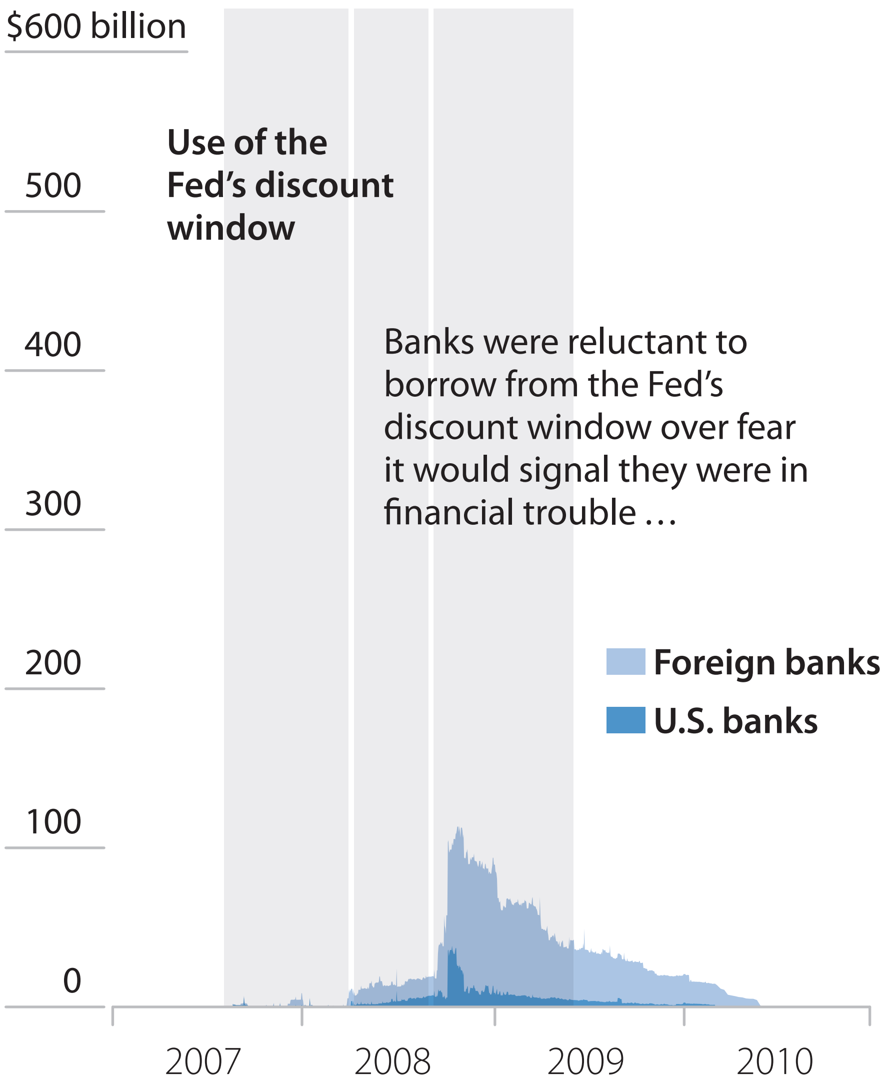
Recapitalization strategies to address the solvency questions hovering over the financial system.

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

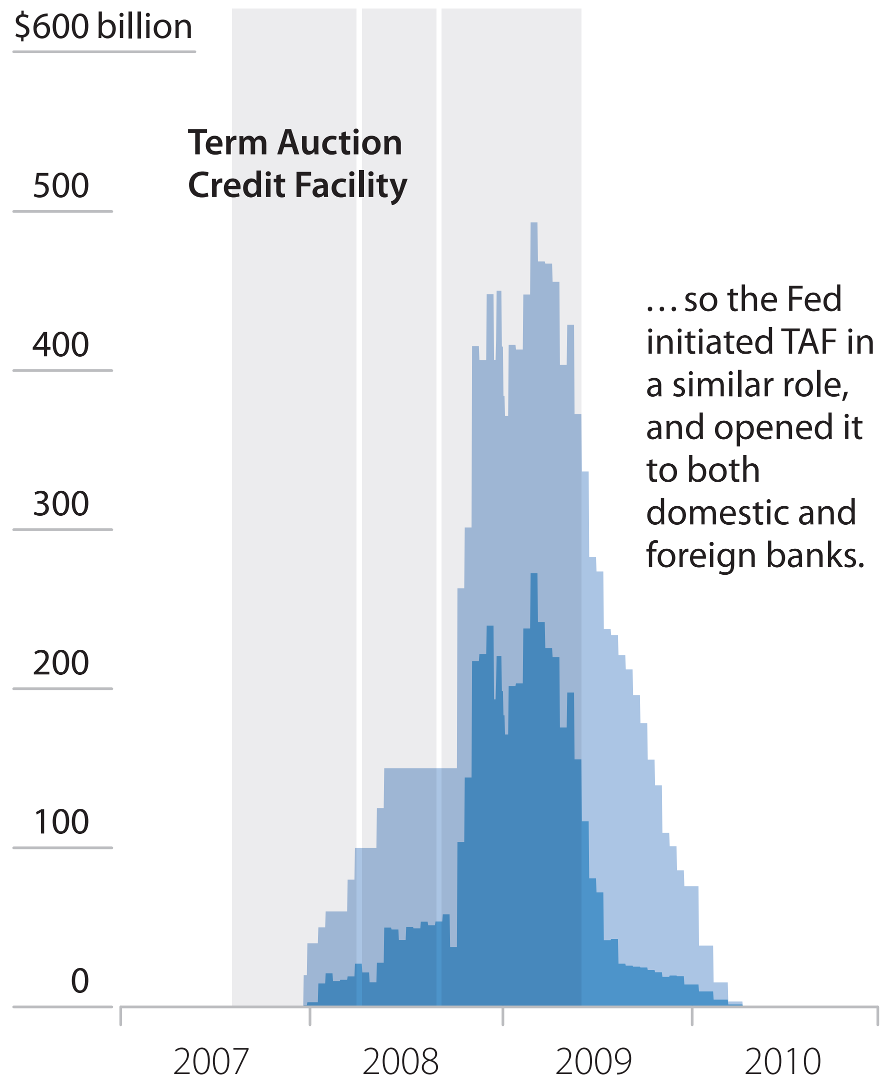
- **Domestic to International**
- **Traditional to Novel**
- **Institutions to Markets**

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

Federal Reserve discount window usage



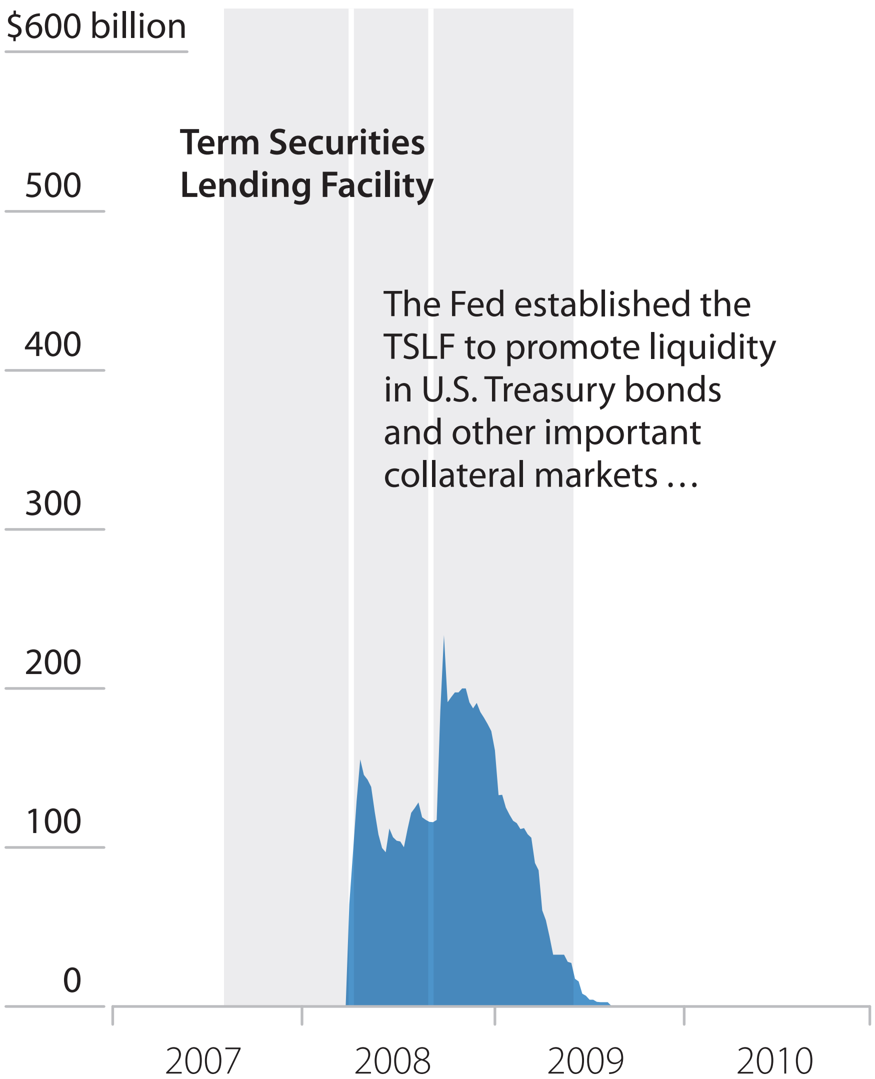
Term Auction Credit Facility (TAF) usage



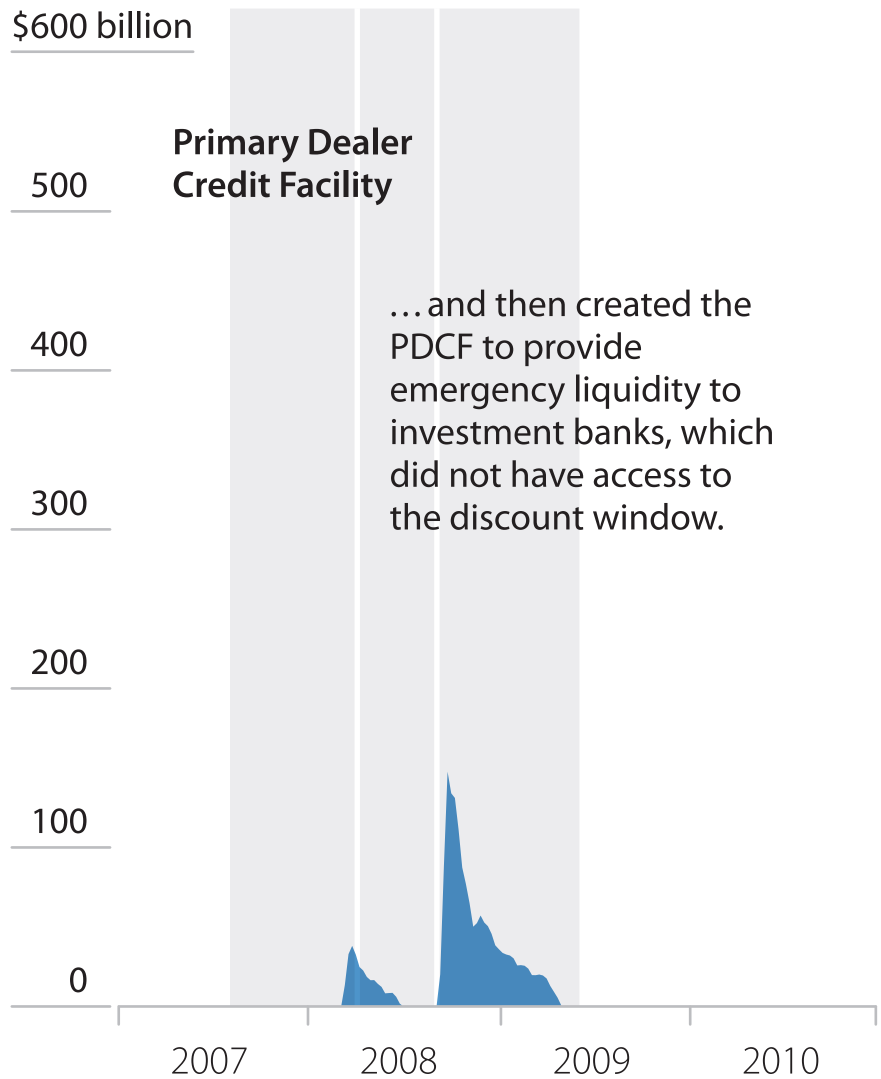
Sources: Federal Reserve Board; internal calculations

…and then expanded its tools to support dealers and funding markets.

Securities lent to dealers: Term Securities Lending Facility



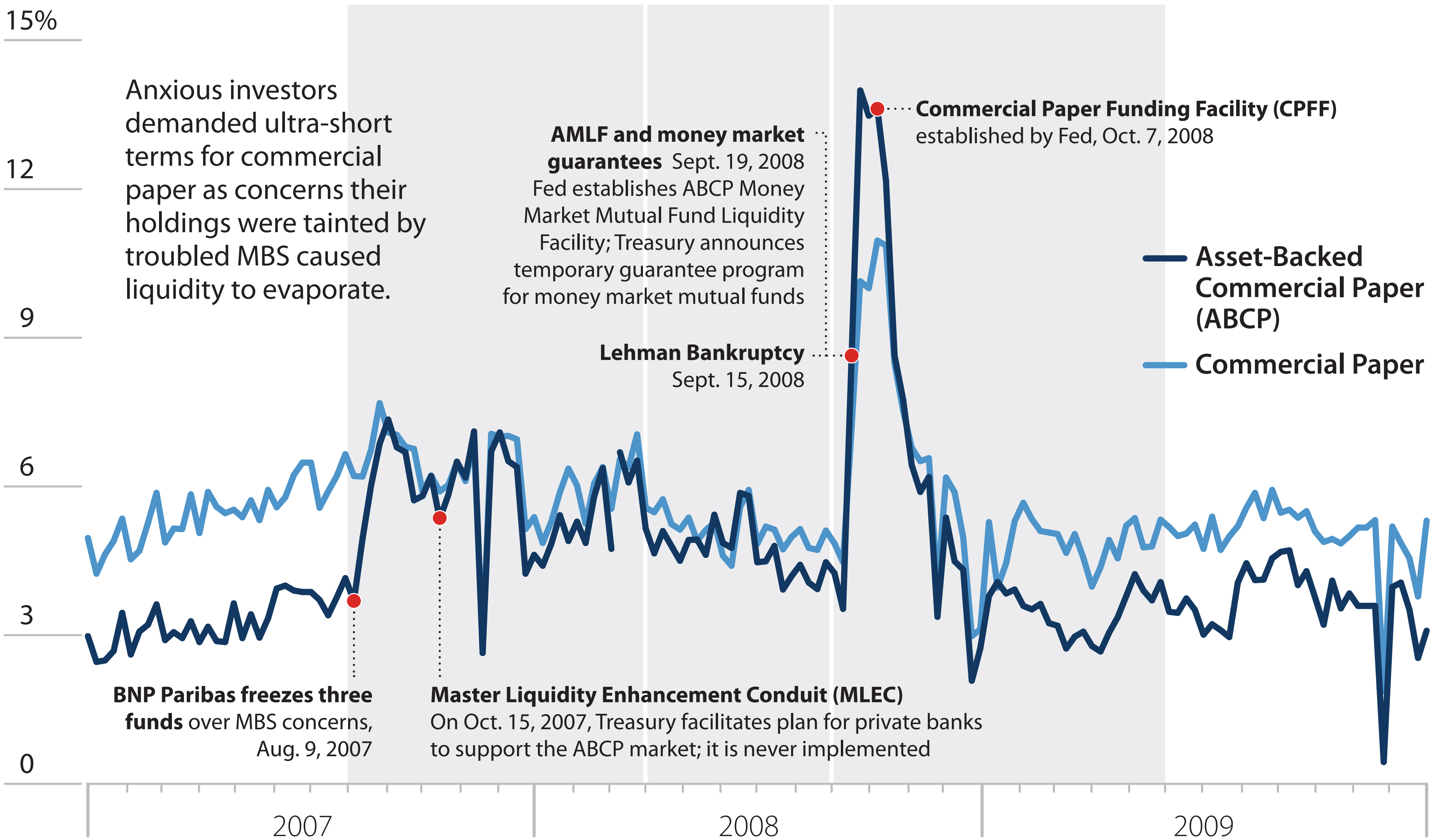
Primary Dealer Credit Facility (PDCF) loans



Source: Federal Reserve Board via Federal Reserve Economic Data Note: PDCF includes loans extended to select other broker-dealers.

The Fed and Treasury also introduced programs to support the commercial paper market, a key source of funding to financial institutions and businesses …

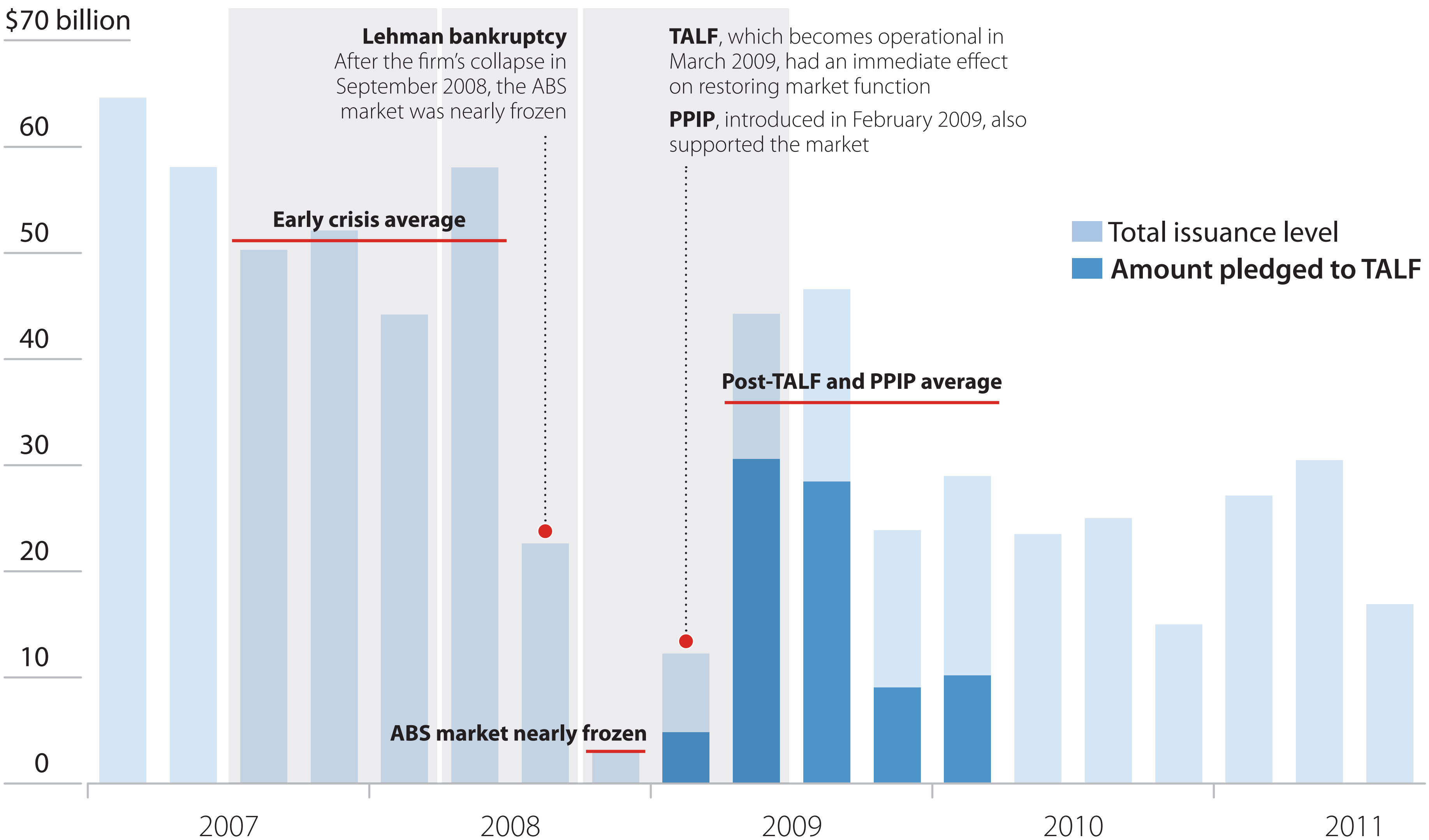
Overnight issuance as a share of outstanding commercial paper



Source: Federal Reserve

…and helped restart the asset-backed securitization market, an important source of funding for credit cards, auto loans, and mortgage lending.

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

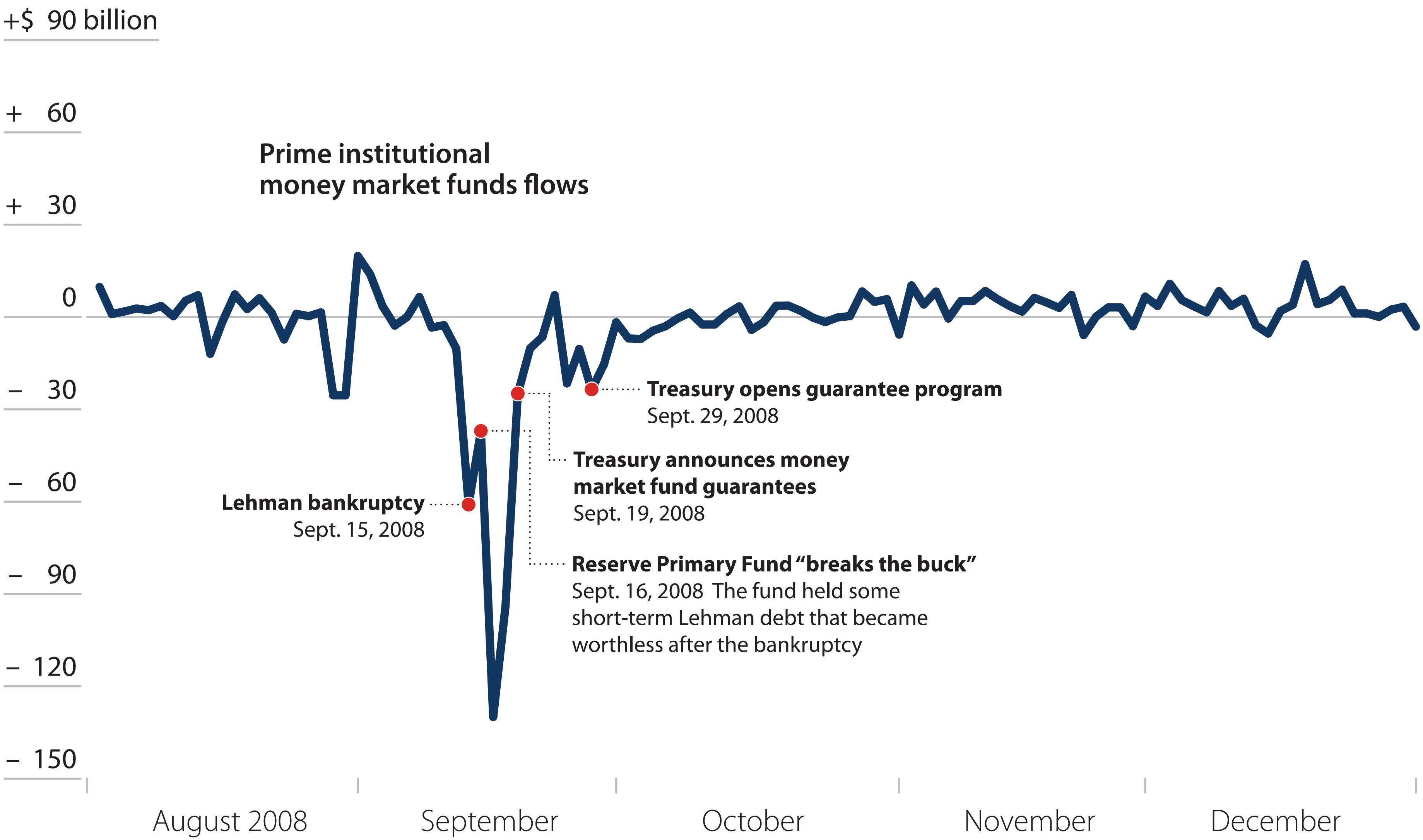


Sources: Total issuance level: Bloomberg; amount pledged to TALF: Federal Reserve Board

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

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

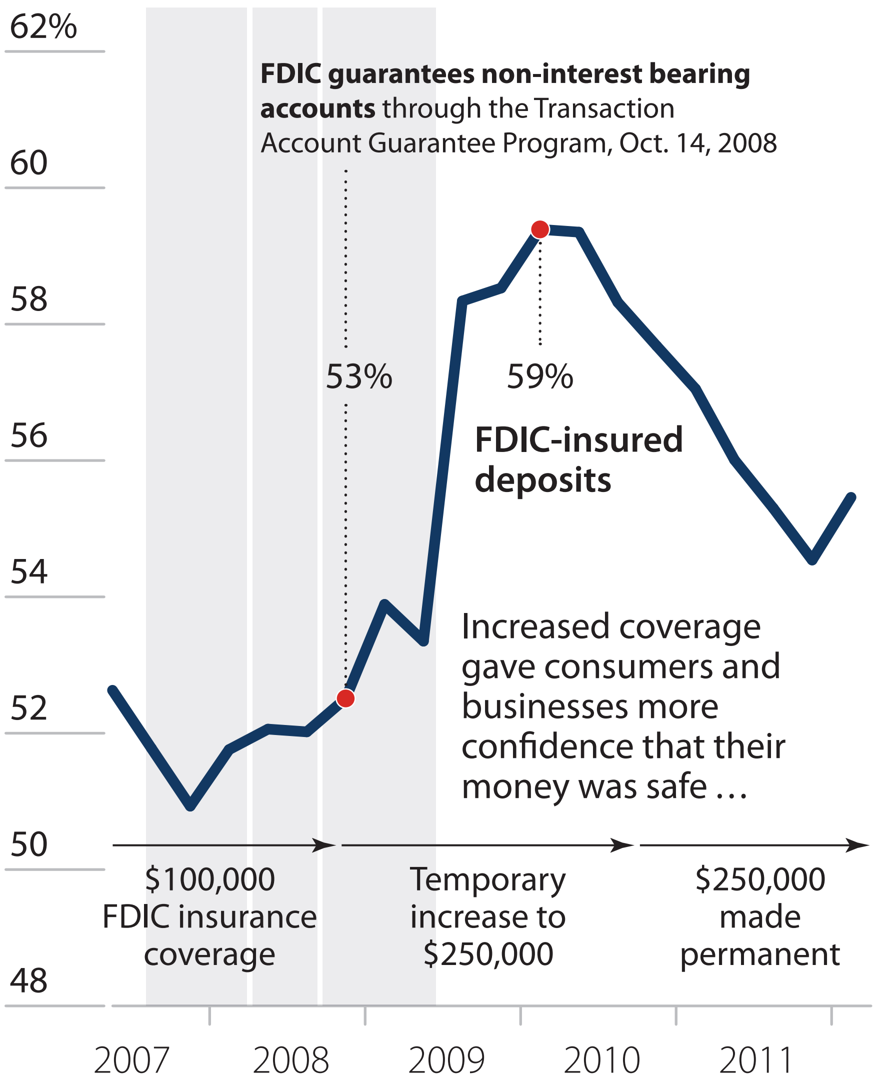
Daily U.S. money market fund flows



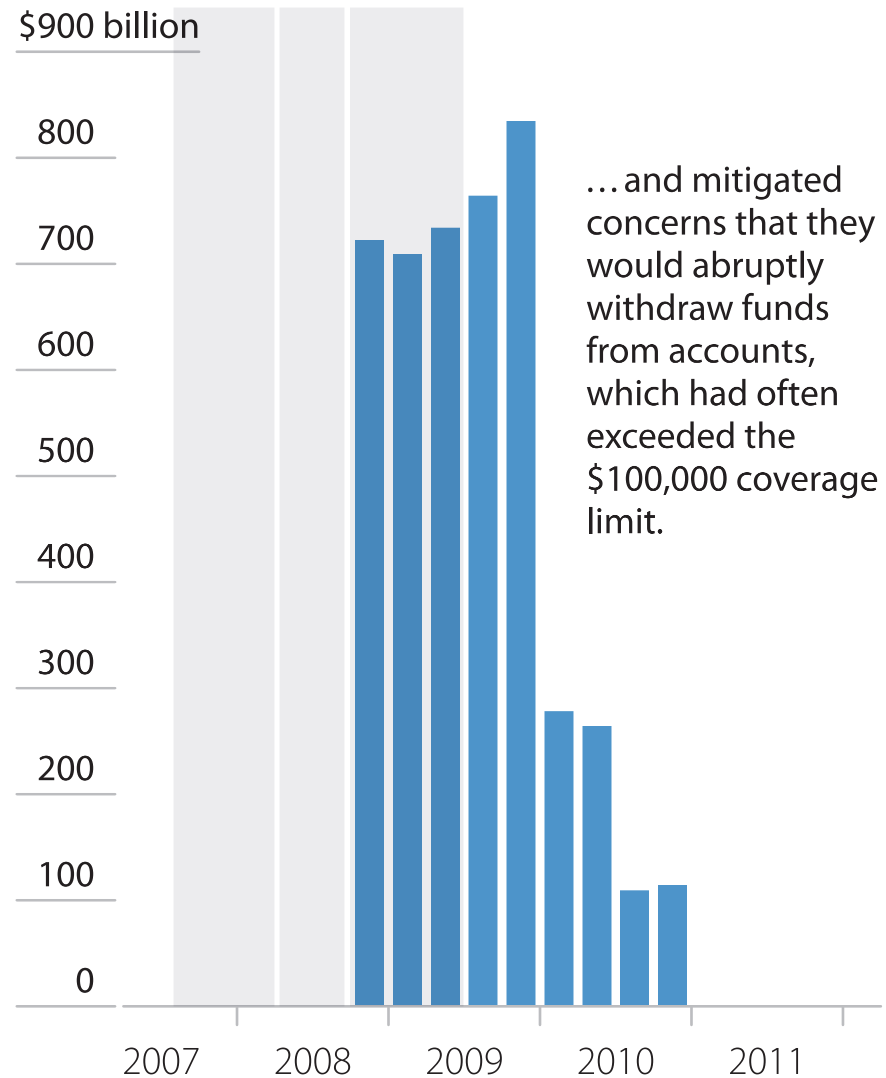
Sources: iMoneyNet; internal calculations based on "Runs on Money Market Mutual Funds," American Economic Review

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



Amounts guaranteed by TAG Program

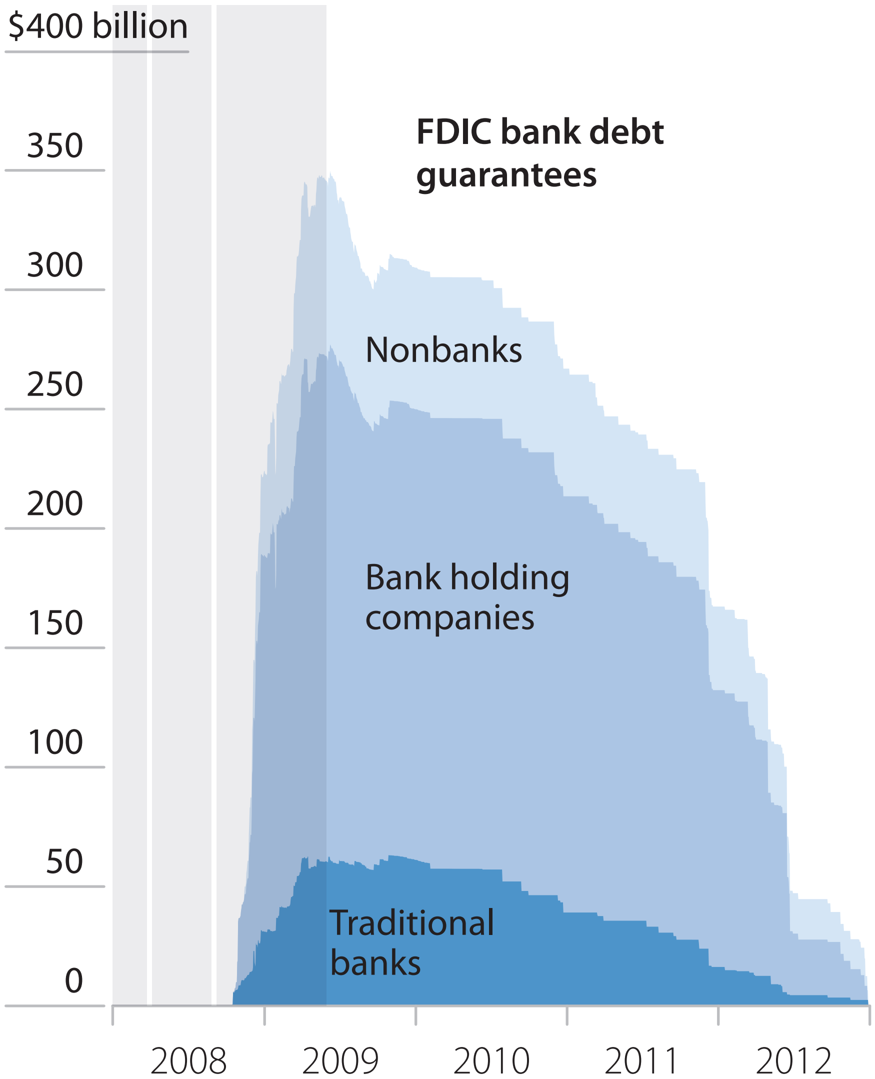


… and mitigated concerns that they would abruptly withdraw funds from accounts, which had often exceeded the $100,000 coverage limit.

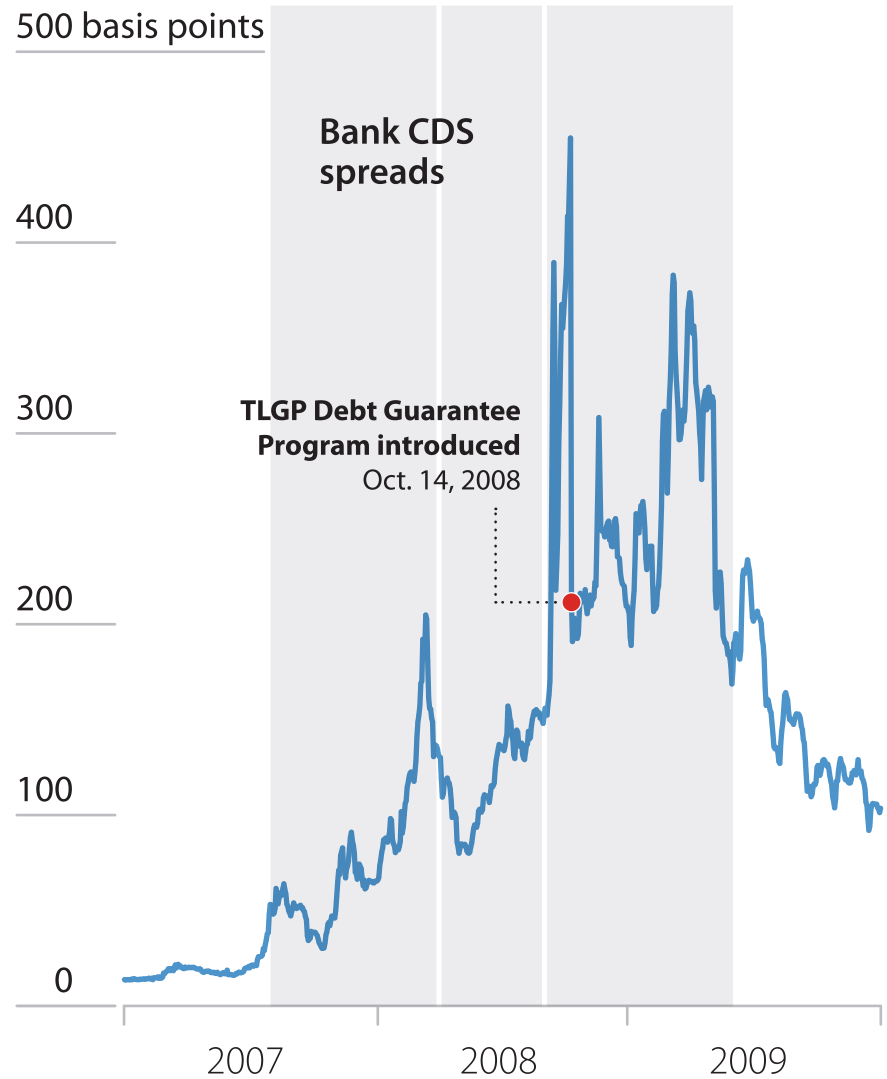
Sources: Federal Deposit Insurance Corp., "Crisis and Response: An FDIC History, 2008–2013"; U.S. Treasury Department, "Reforming Wall Street, Protecting Main Street"

. . . and by agreeing to guarantee new financial debt, the FDIC helped institutions obtain more stable funding.

Senior unsecured U.S. bank debt issuance under TLGP (DGP)*



Average-weighted CDS spread for six big banks



Sources: Debt issuance: Federal Deposit Insurance Corp.; internal calculations; CDS spreads: Bloomberg
*Debt Guarantee Program covered debt issued by both the parent company and its affiliates

The U.S. government moved to strengthen the capital in the financial system as the crisis intensified and Congress provided emergency authority.

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

Injected substantial government capital into the banking system as the crisis worsened.

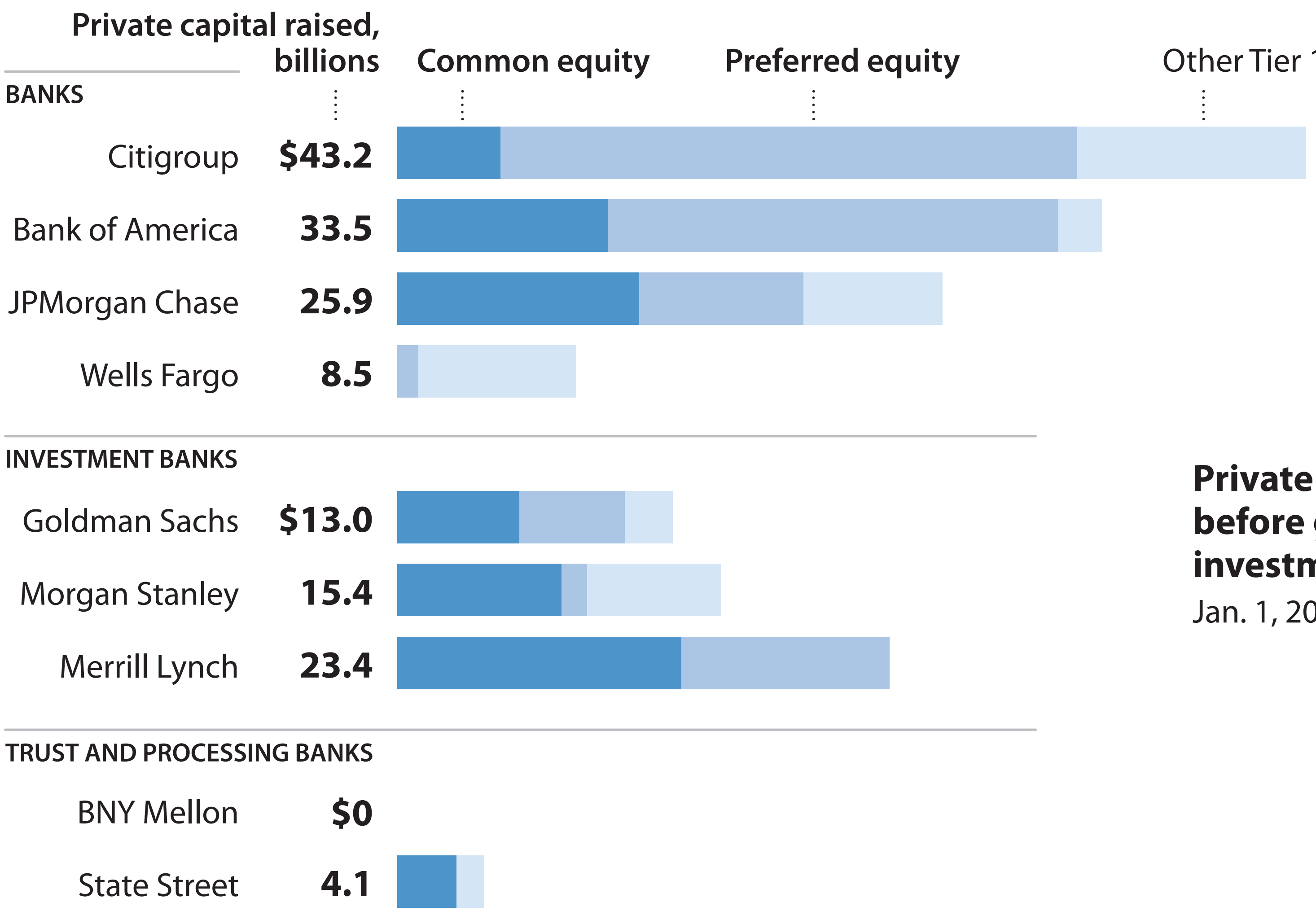
Stabilized the most troubled banks with additional capital and asset ringfence guarantees.

Conducted 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



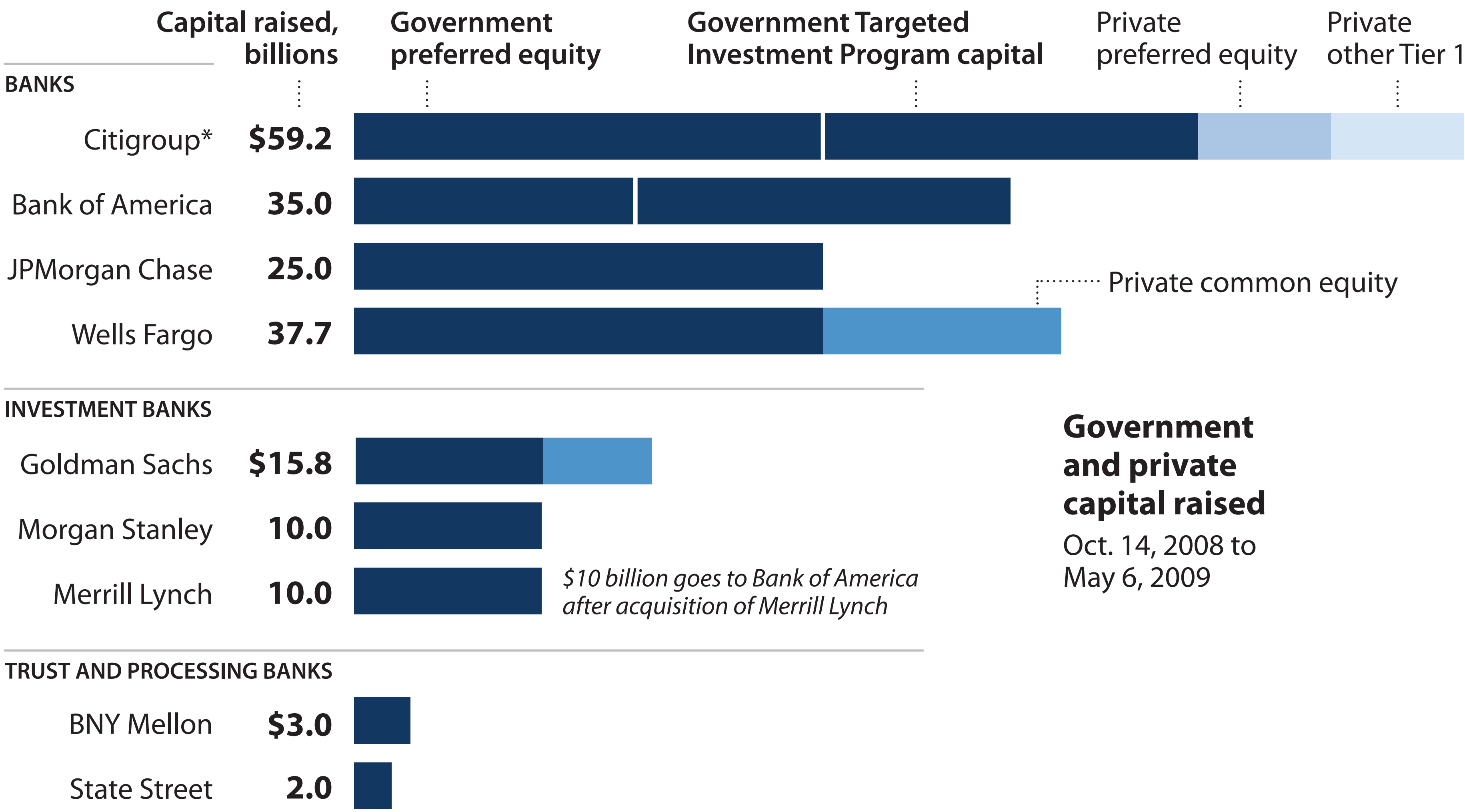
Private capital raised before government investments

Jan. 1, 2007 to Oct. 13, 2008

Sources: Goldman Sachs; Bloomberg

Then, as panic followed the collapse of Lehman Brothers, Treasury made large capital investments in the biggest banks using new authority from Congress …

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

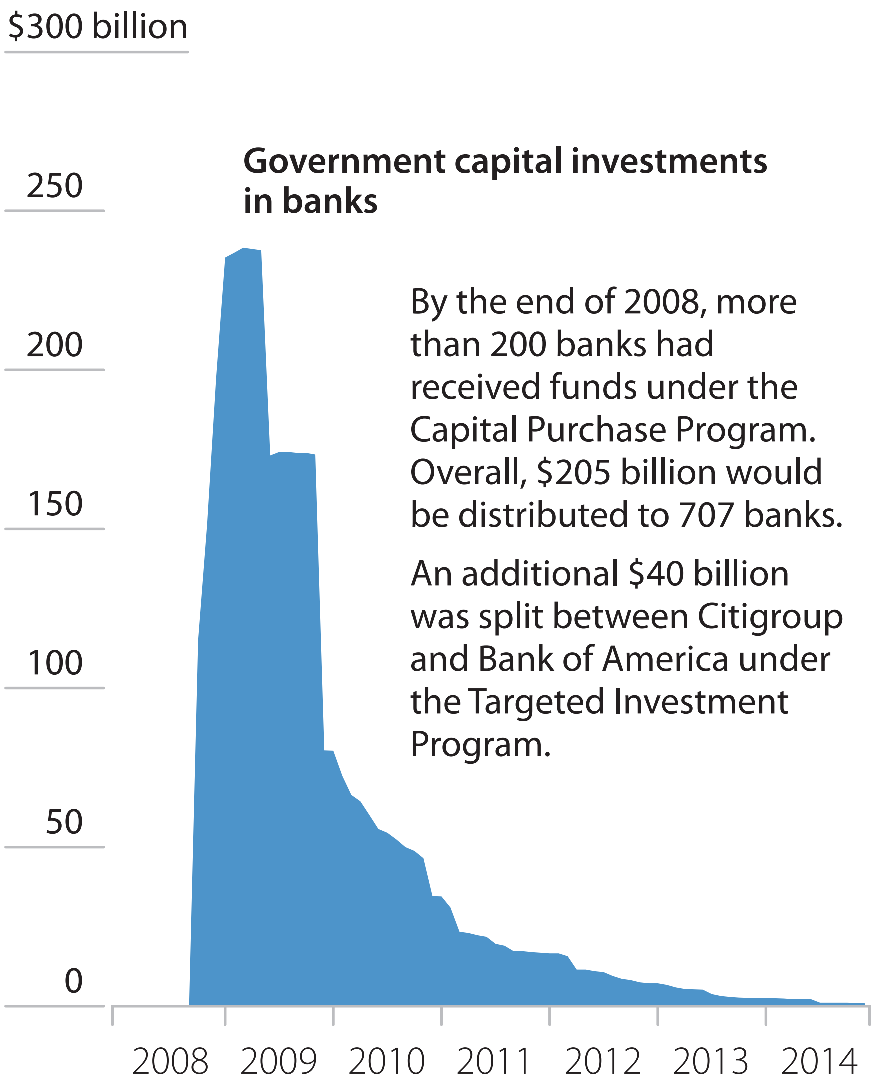


Source: Goldman Sachs

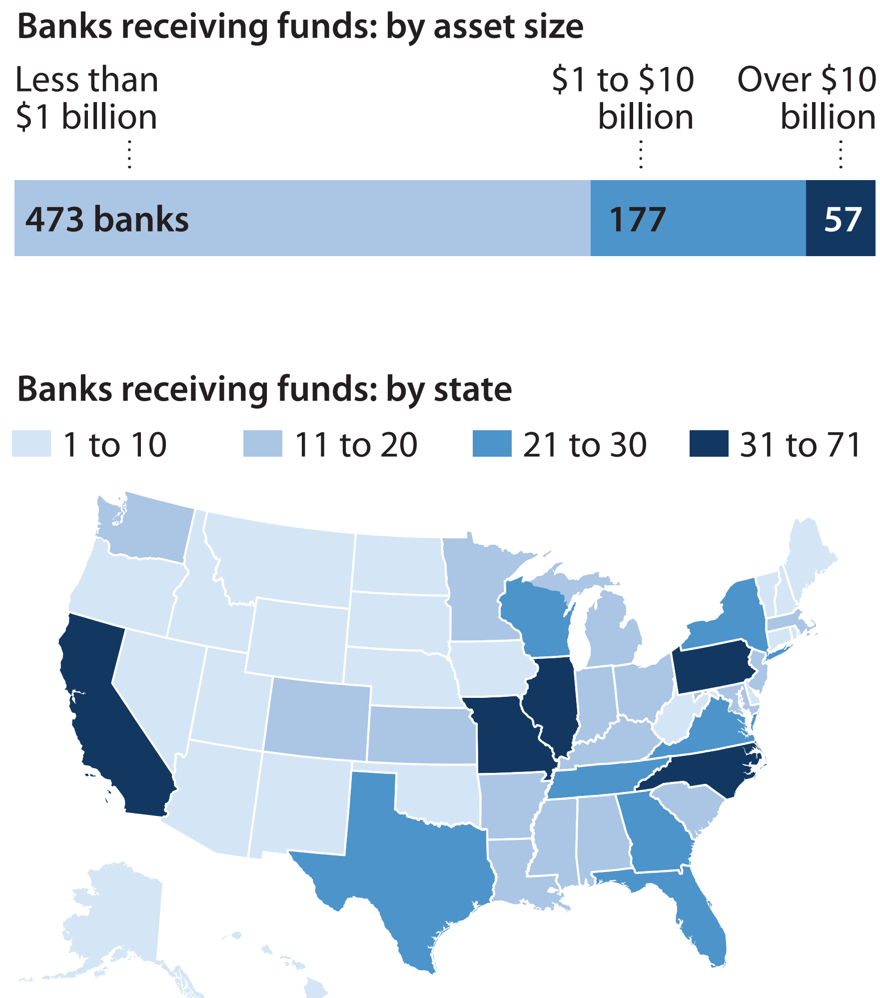
*Citigroup ultimately also converted approximately $58 billion of government and other preferred stock into common shares

…and used additional funds to make direct government investments in hundreds of smaller banks.

Prinicipal outstanding for government bank capital investments



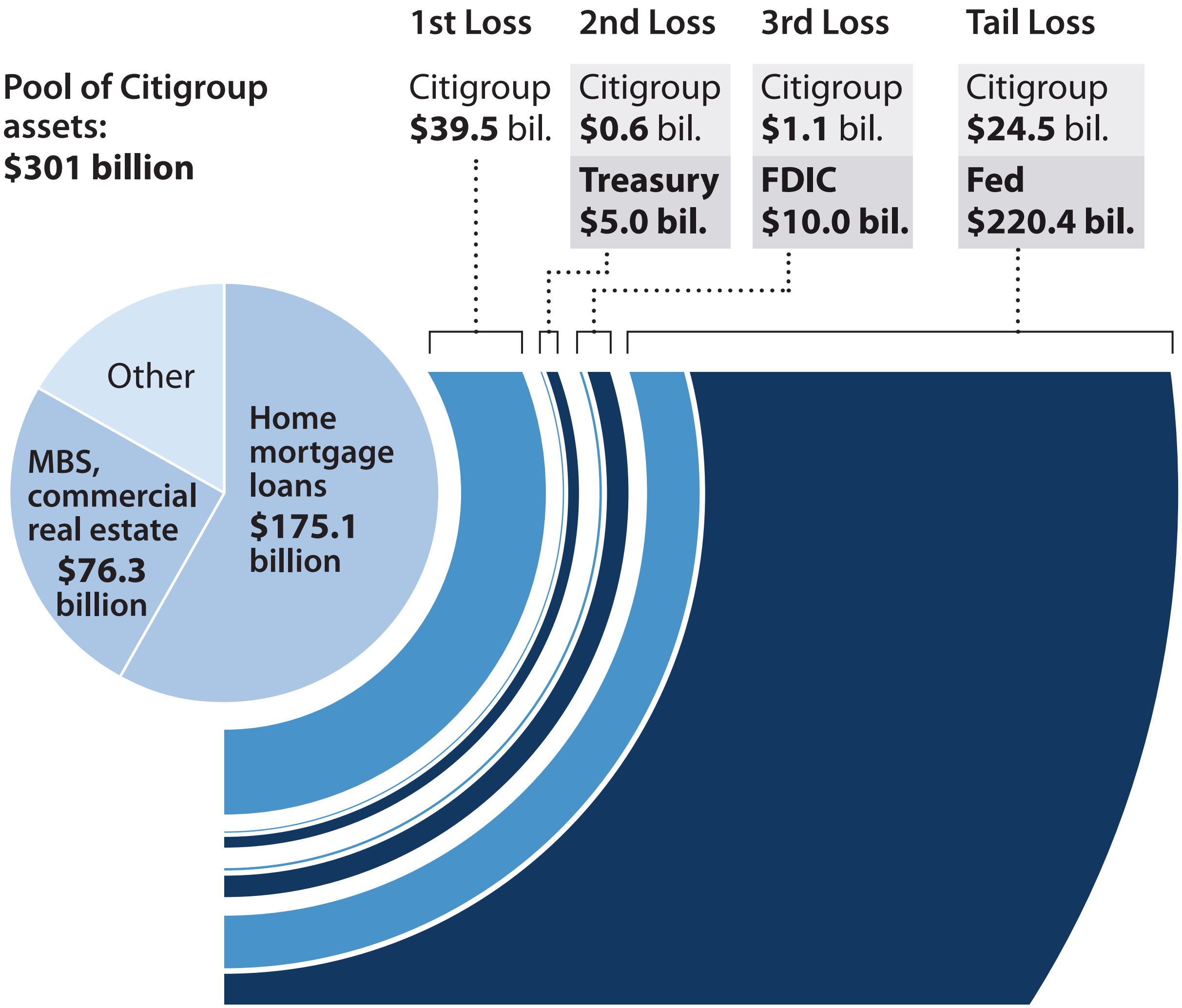
Distribution of banks receiving government capital investments

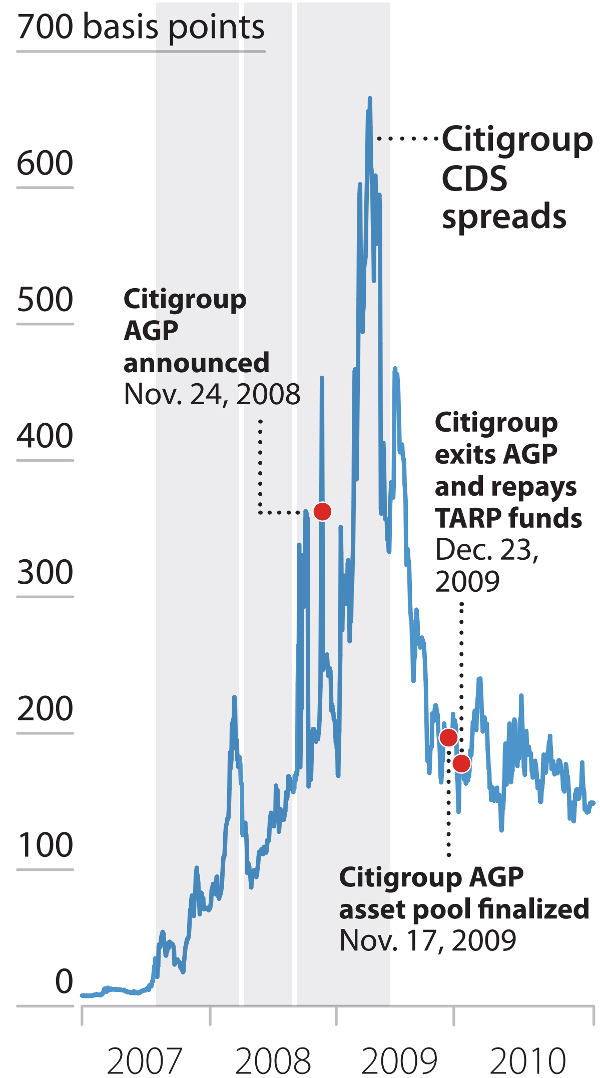


Sources: Timeline of funds outstanding: TARP Tracker; banks receiving funds, by asset size: U.S. Treasury, "Troubled Asset Relief Program: Two Year Retrospective"; banks receiving funds, by state: internal calculations based on TARP Investment Program transaction reports, August 8, 2018

The government expanded its tools with additional capital injections and asset guarantees for the most troubled banks, Citigroup and Bank of America.

Asset Guarantee Program (AGP), Citigroup assets, and "ringfence" loss responsibility structure

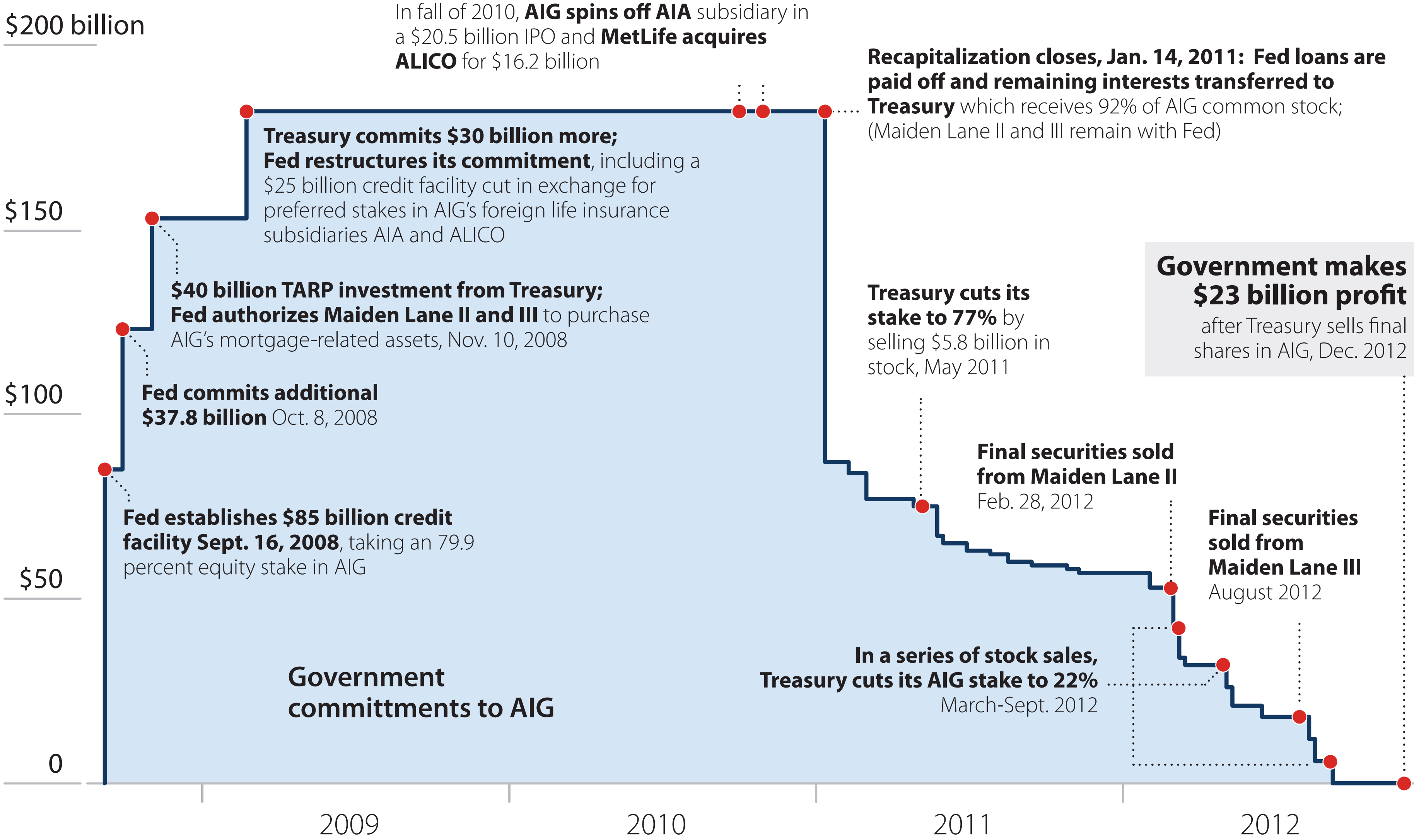




Sources: Asset Guarantee Program terms: Special Inspector General for TARP, "Extraordinary Financial Asisstance Provided to Citigroup, Inc."; CDS spreads: Bloomberg

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

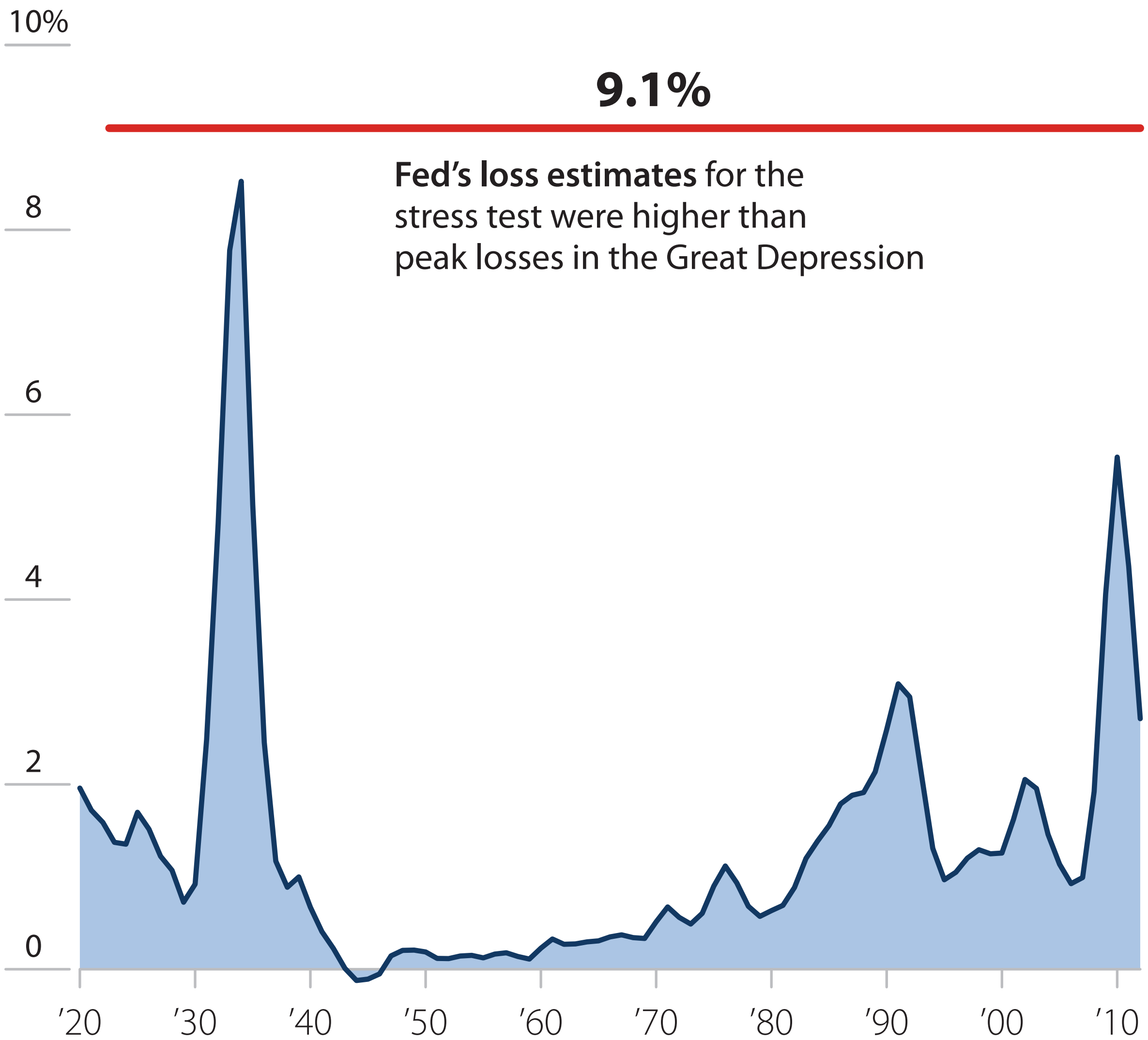


Source: U.S. Treasury Note: Repayments occurred over the lifetime of the commitment. Any reduction in the commitment, however, is not reflected until the January 2011 recapitalization transaction.

U.S. STRATEGY

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



SCAP capital shortfall, May 7, 2009

BIGGEST CAPITAL RAISES NEEDED

Bank of America $33.9

Wells Fargo $13.7

GMAC $11.5

Citigroup $5.5 billion*

**$58.1 billion was raised by converting preferred shares into equity*

SMALLER CAPITAL RAISES NEEDED

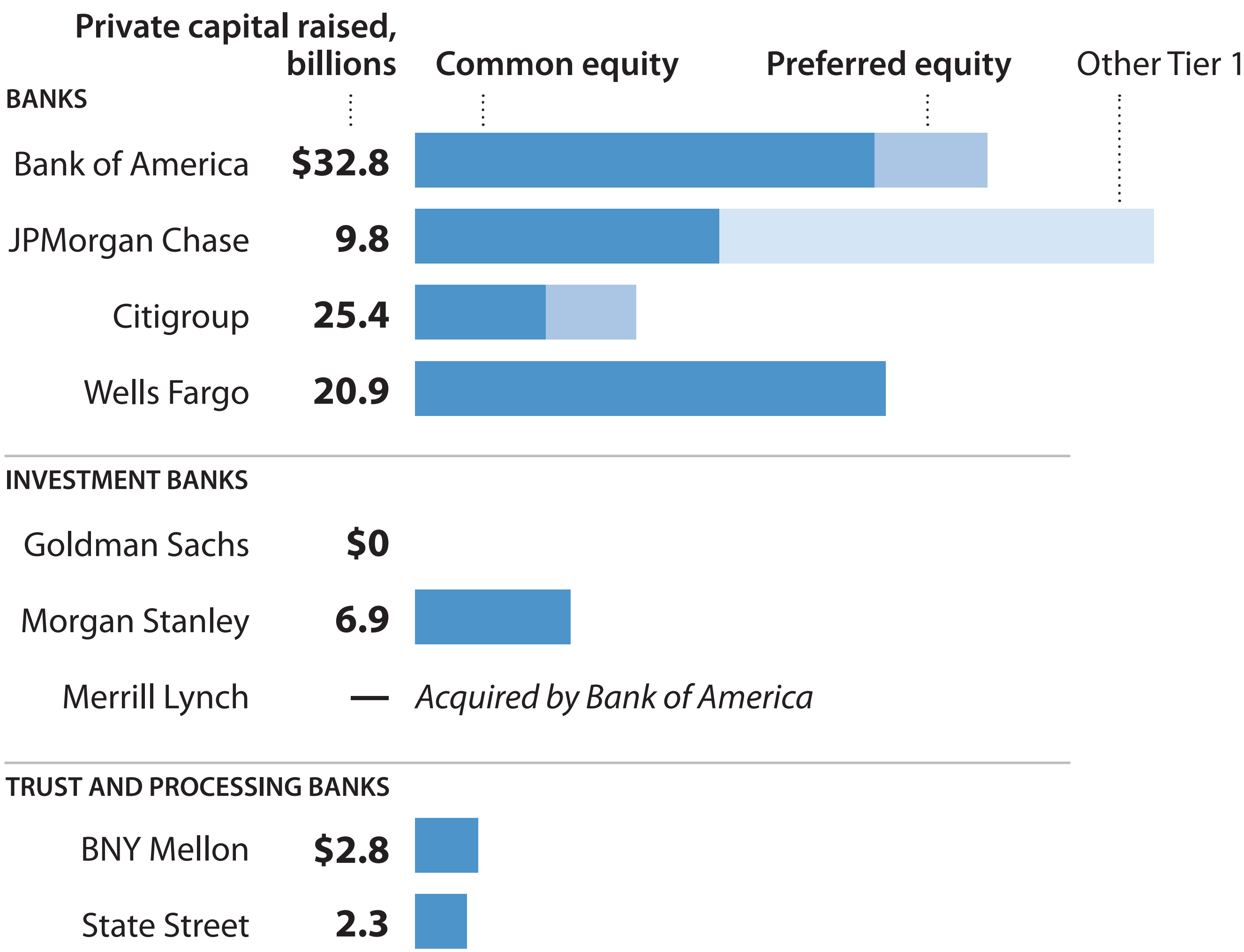
$2.5 Regions Financial
$2.2 SunTrust Banks
$1.8 Morgan Stanley
$1.8 KeyCorp
$1.1 Fifth Third Bank
$0.6 PNC Financial

No additional capital was needed at nine other intitutions

Sources: Federal Deposit Insurance Corp.; Federal Reserve Board; International Monetary Fund
Note: The 19 largest bank holding companies at the time were subject to the Supervisory Capital Assessment Program (SCAP).

…and accelerated the return of private capital.

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



Private capital raised after stress test results released

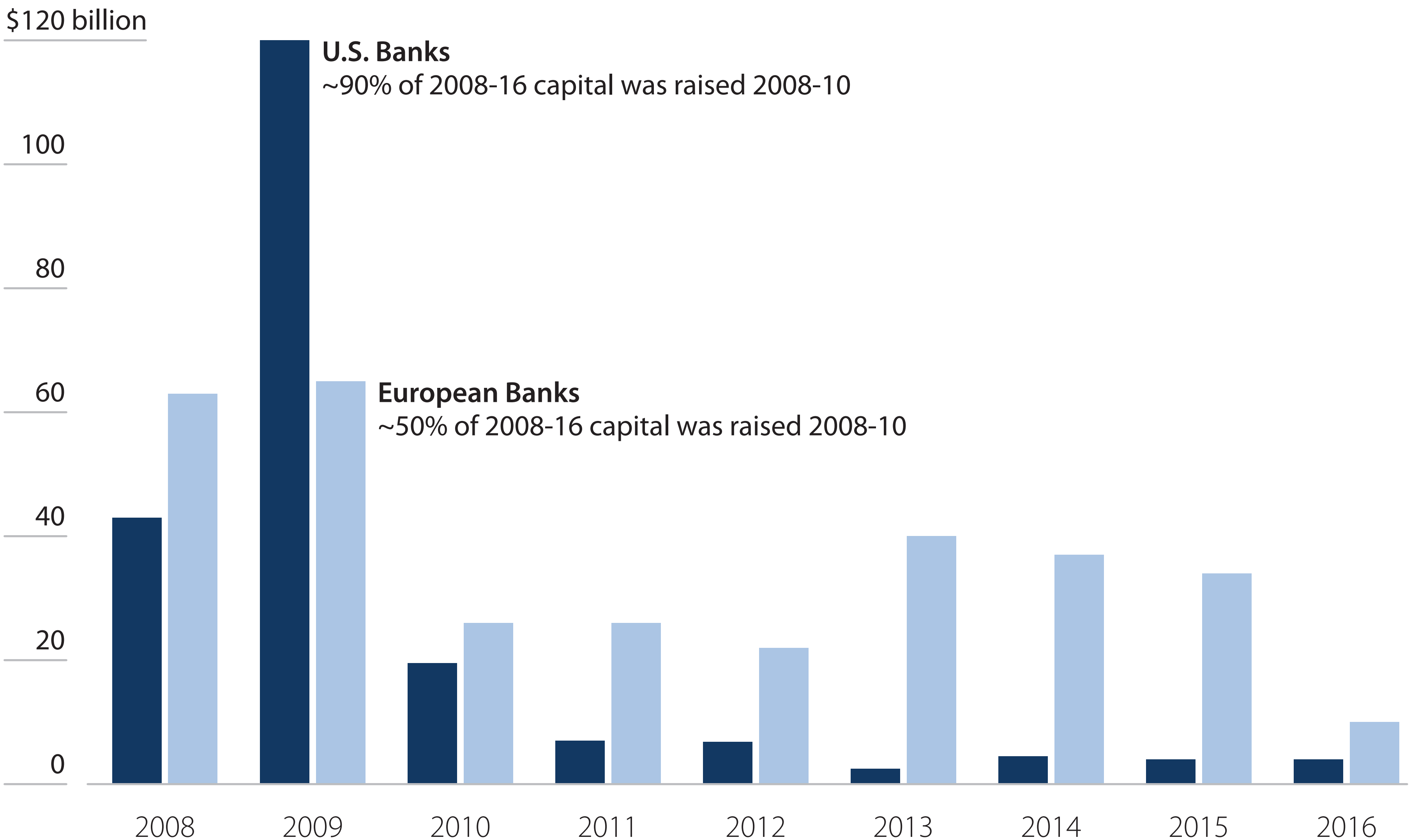
May 7, 2009 through Dec. 31, 2010

Source: Goldman Sachs

U.S. STRATEGY

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

Capital raised each year

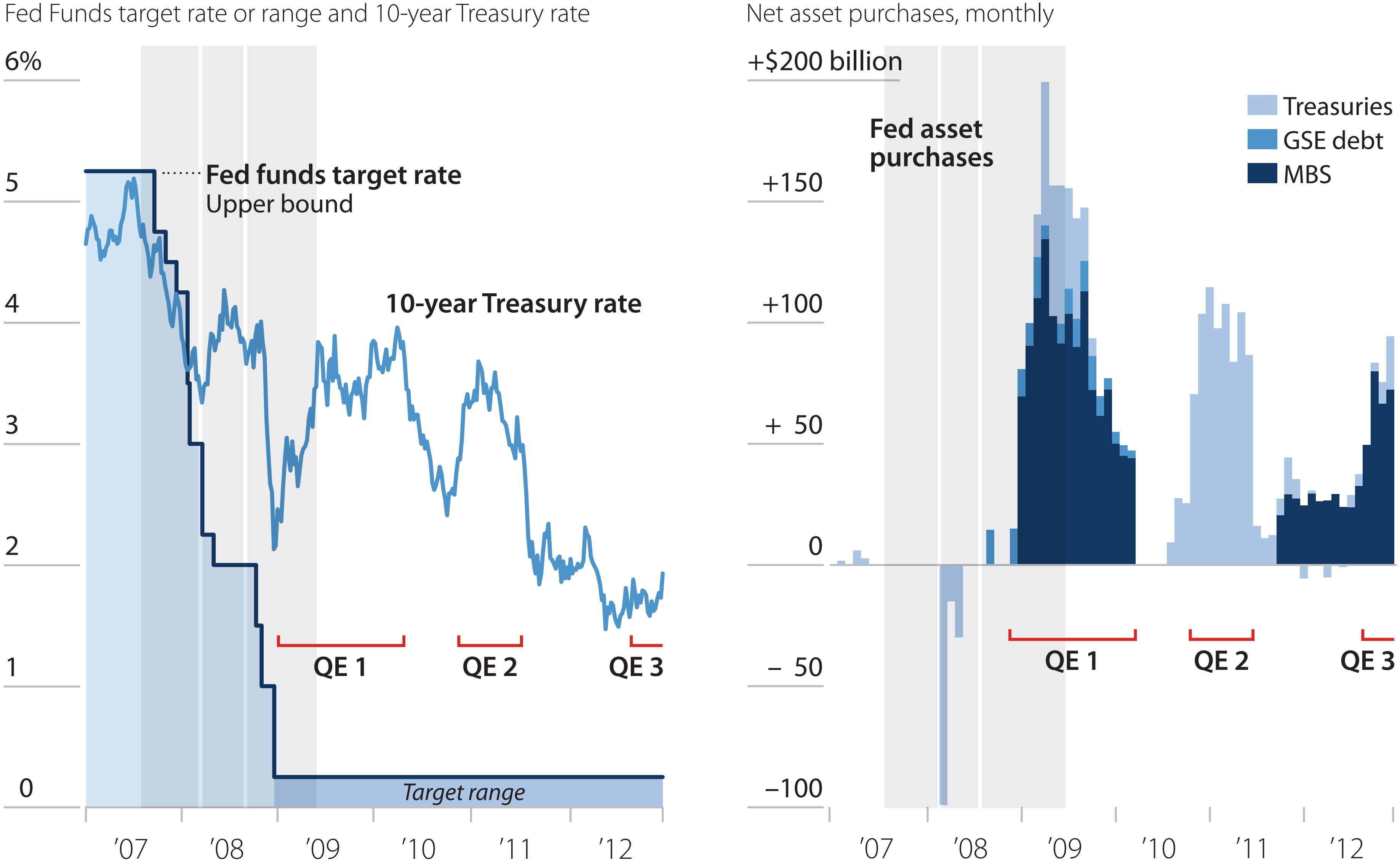


Source: Goldman Sachs

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

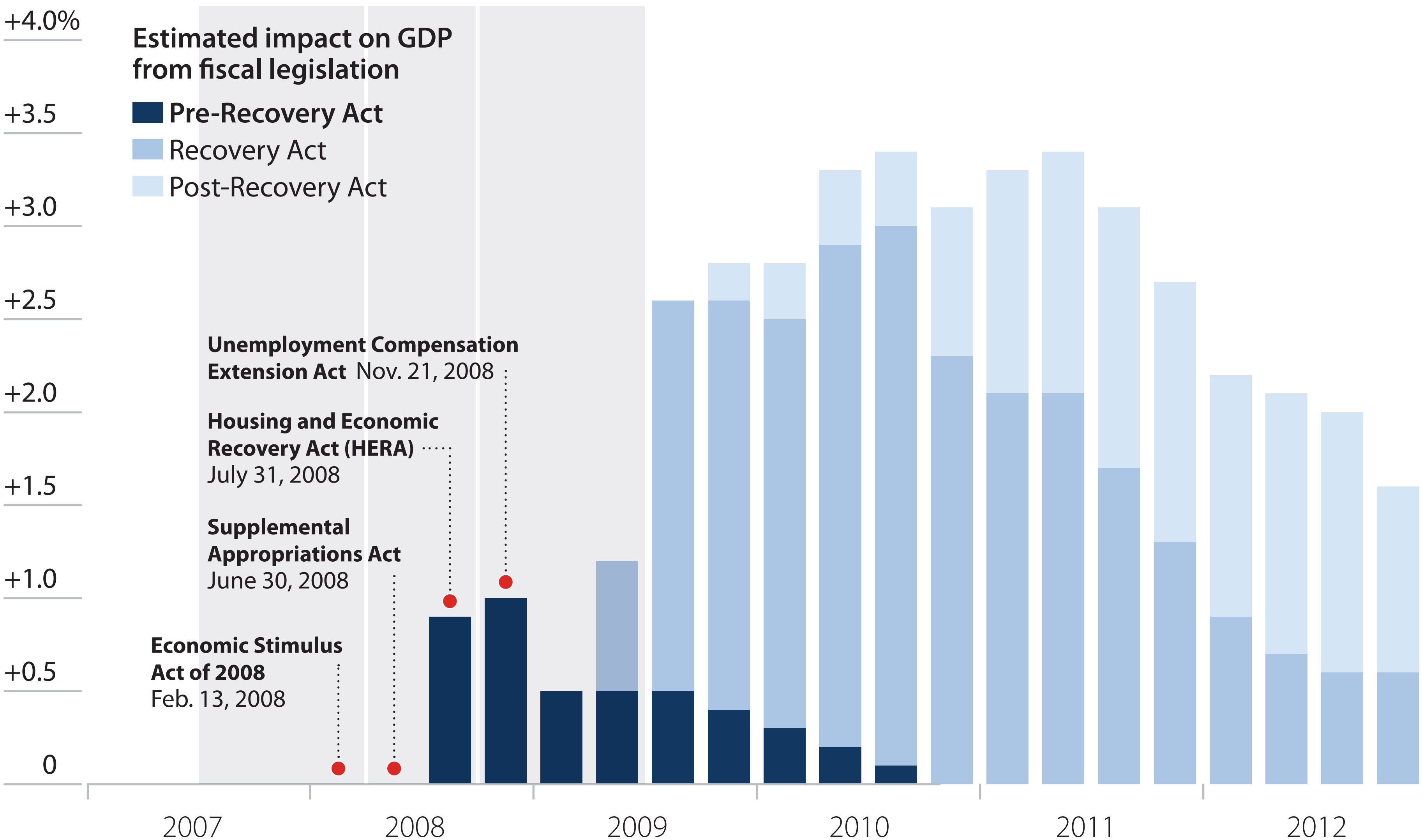
As the Fed funds rate neared zero, the Fed made large-scale asset purchases to drive down long-term interest rates — a policy known as quantitative easing.



Sources: Target rate: Federal Reserve Board; 10-year Treasury: Federal Reserve Board via Federal Reserve Economic Data; monthly asset purchases: Haver Analytics

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.

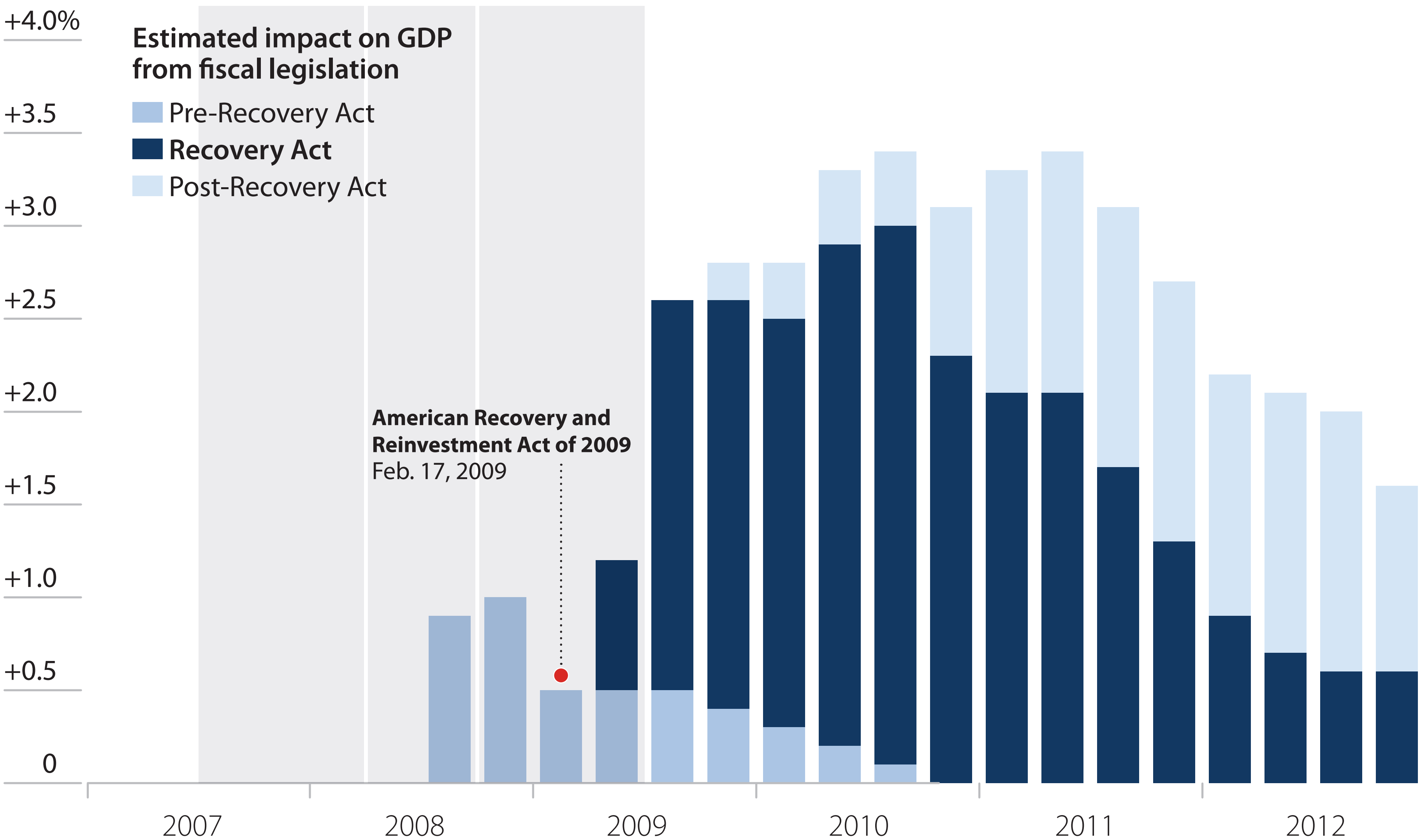
Quarterly effect of fiscal stimulus measures on GDP



Sources: Council of Economic Advisers; Congressional Budget Office; Bureau of Economic Analysis; calculations by Jason Furman
Note: $168 billion represents the combined stimulus from pre–Recovery Act measures through 2012.

The Recovery Act of 2009 provided a larger mix — $712 billon — of temporary tax cuts and spending increases, offsetting some but not all of the fall in GDP.

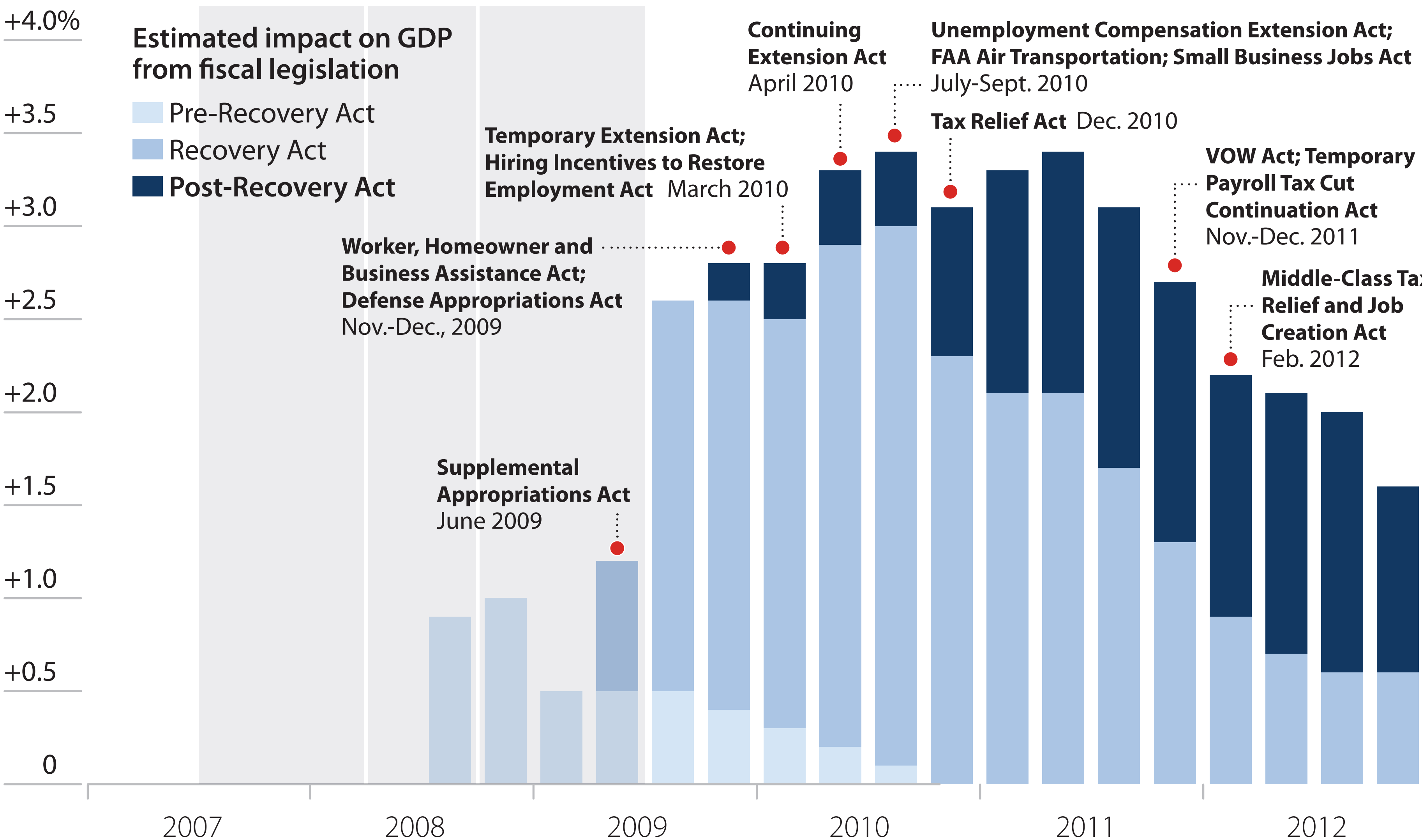
Quarterly effect of fiscal stimulus measures on GDP



Sources: Council of Economic Advisers; Congressional Budget Office; Bureau of Economic Analysis; calculations by Jason Furman
Note: $712 billion represents the stimulus from the Recovery Act through 2012.

A further $657 billion from a series of smaller post-Recovery Act measures added to the level of economic support . . .

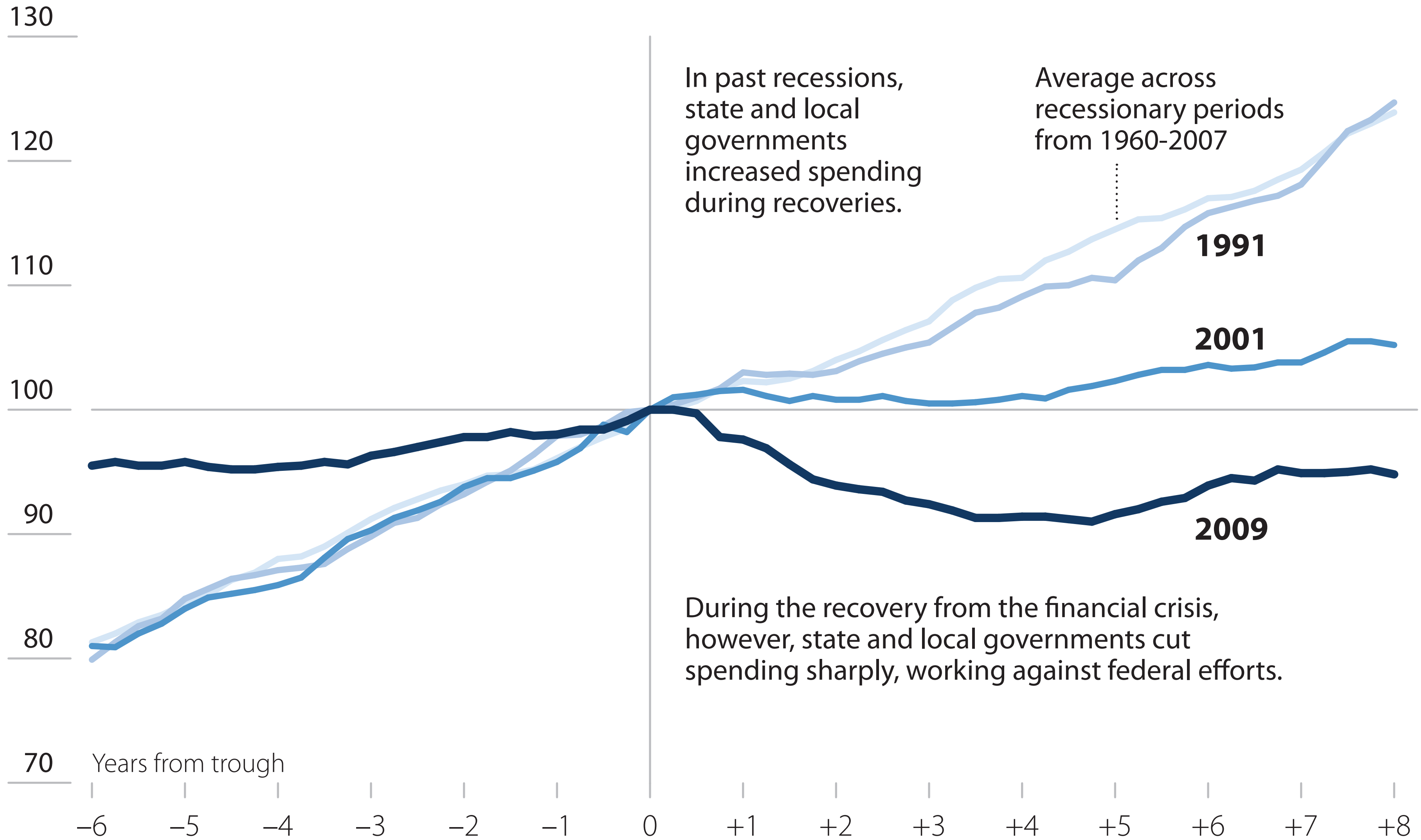
Quarterly effect of fiscal stimulus measures on GDP



Sources: Council of Economic Advisers; Congressional Budget Office; Bureau of Economic Analysis; calculations by Jason Furman
Note: $657 billion represents the combined stimulus from post–Recovery Act measures through 2012.

…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 trough



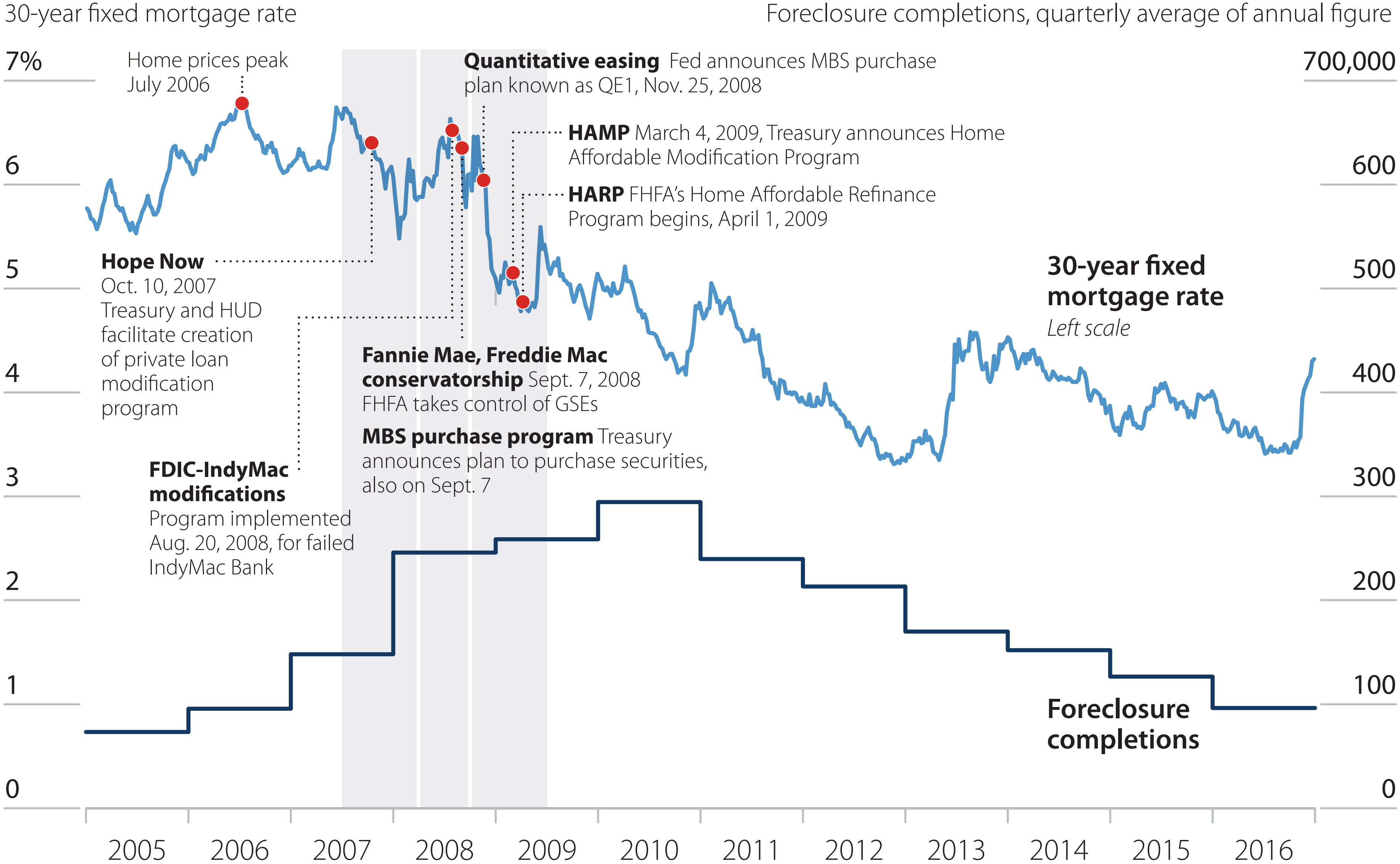
Sources: Bureau of Economic Analysis; internal calculations
Note: Average does not include the 1980 recession owing to overlap with the 1981–82 recession.

The government put in place a series of housing programs:

- To lower mortgage rates and ensure the availability of credit
- Help 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.

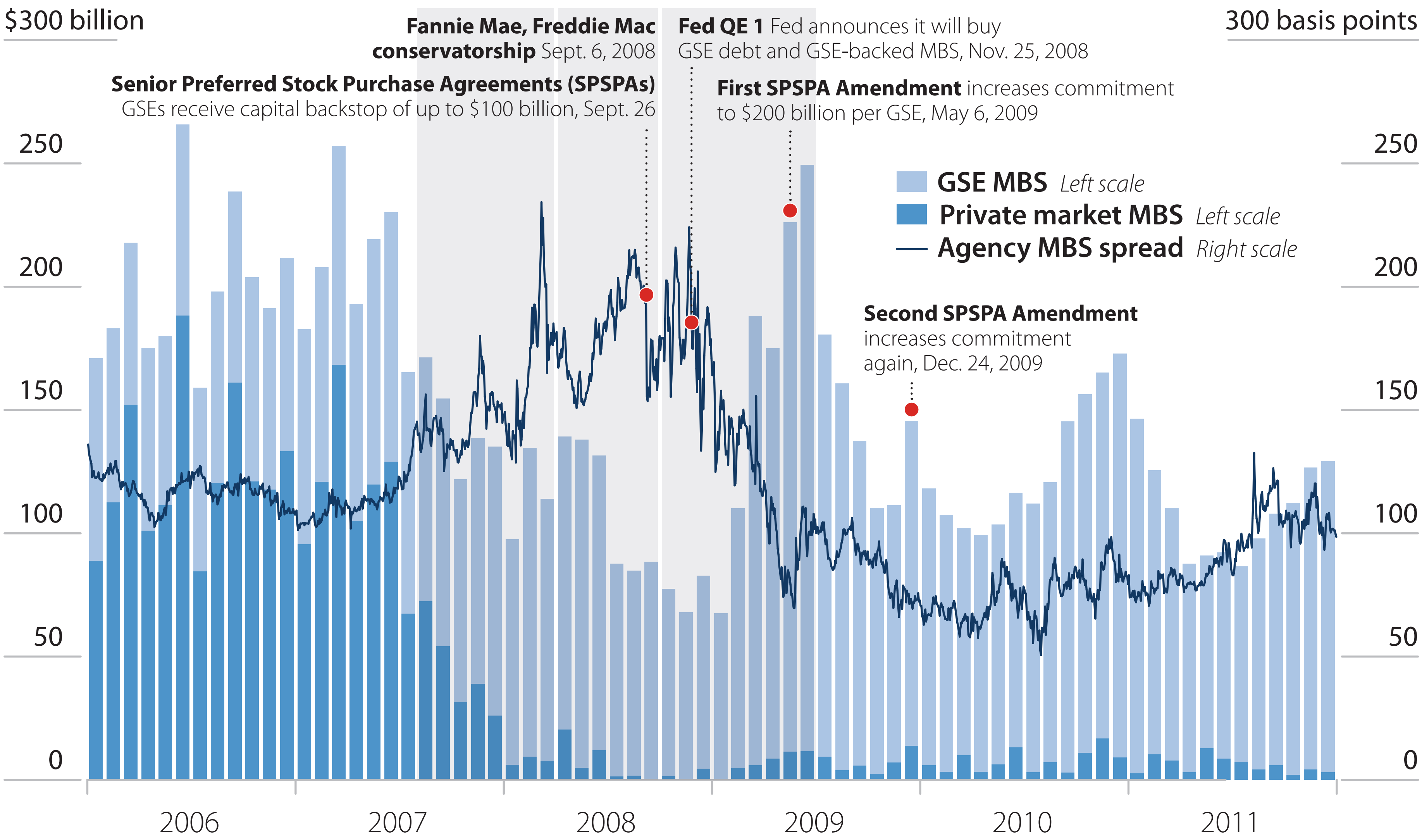


Sources: Mortgage rates: Freddie Mac via Federal Reserve Economic Data; foreclosure completions: CoreLogic

Government support of Fannie Mae and Freddie Mac kept mortgage credit flowing and stabilized the housing market after private issuers pulled back.

Mortgage-related securities issuance

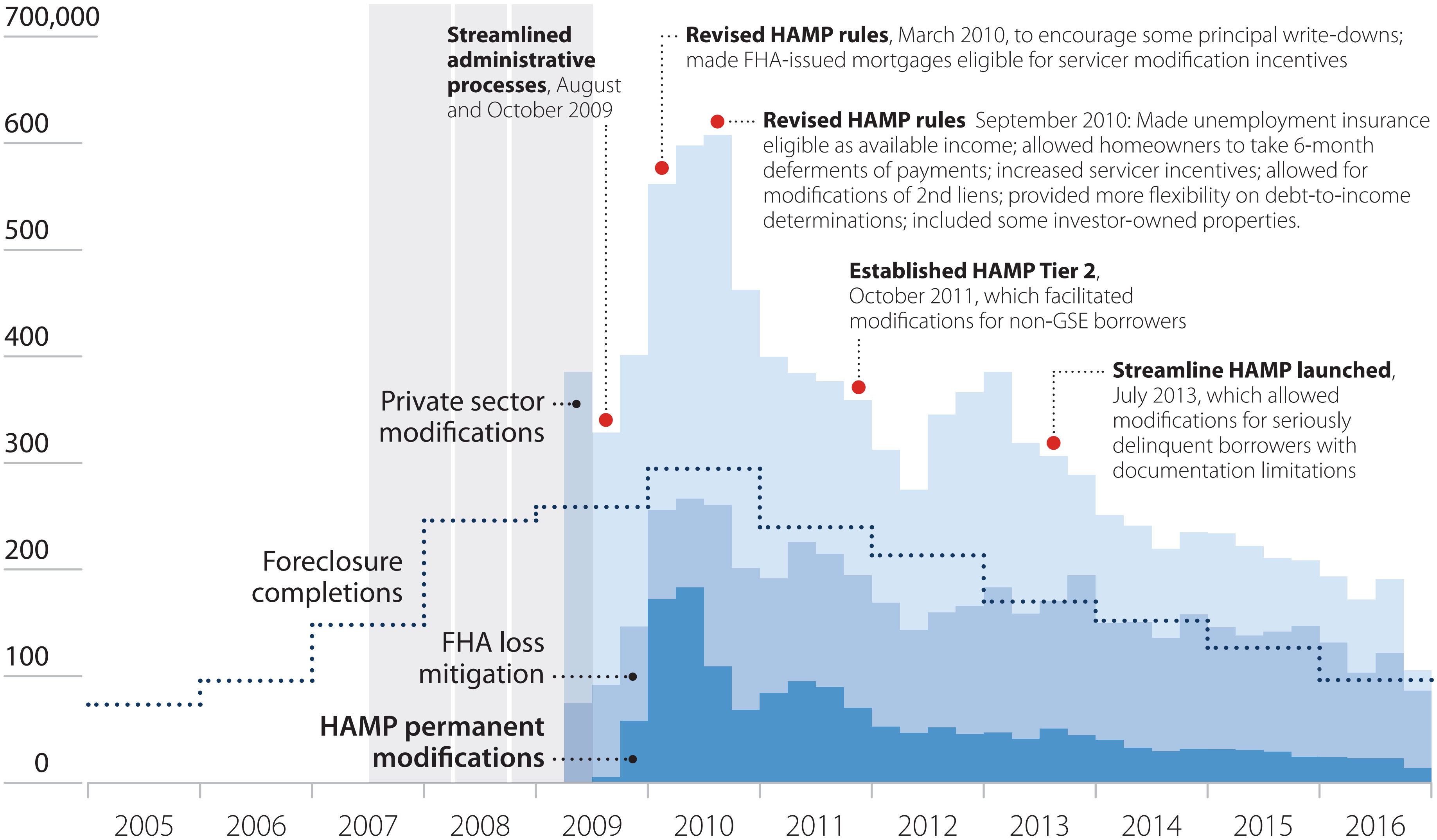
Spread between FNMA 30-year current coupon MBS and 10-year Treasury



Sources: MBS issuance: Securities Industry and Financial Markets Association; agency MBS spread: Bloomberg

Loan modification programs, including HAMP, directly or indirectly helped nearly 9.9 million struggling homeowners with their mortgages.

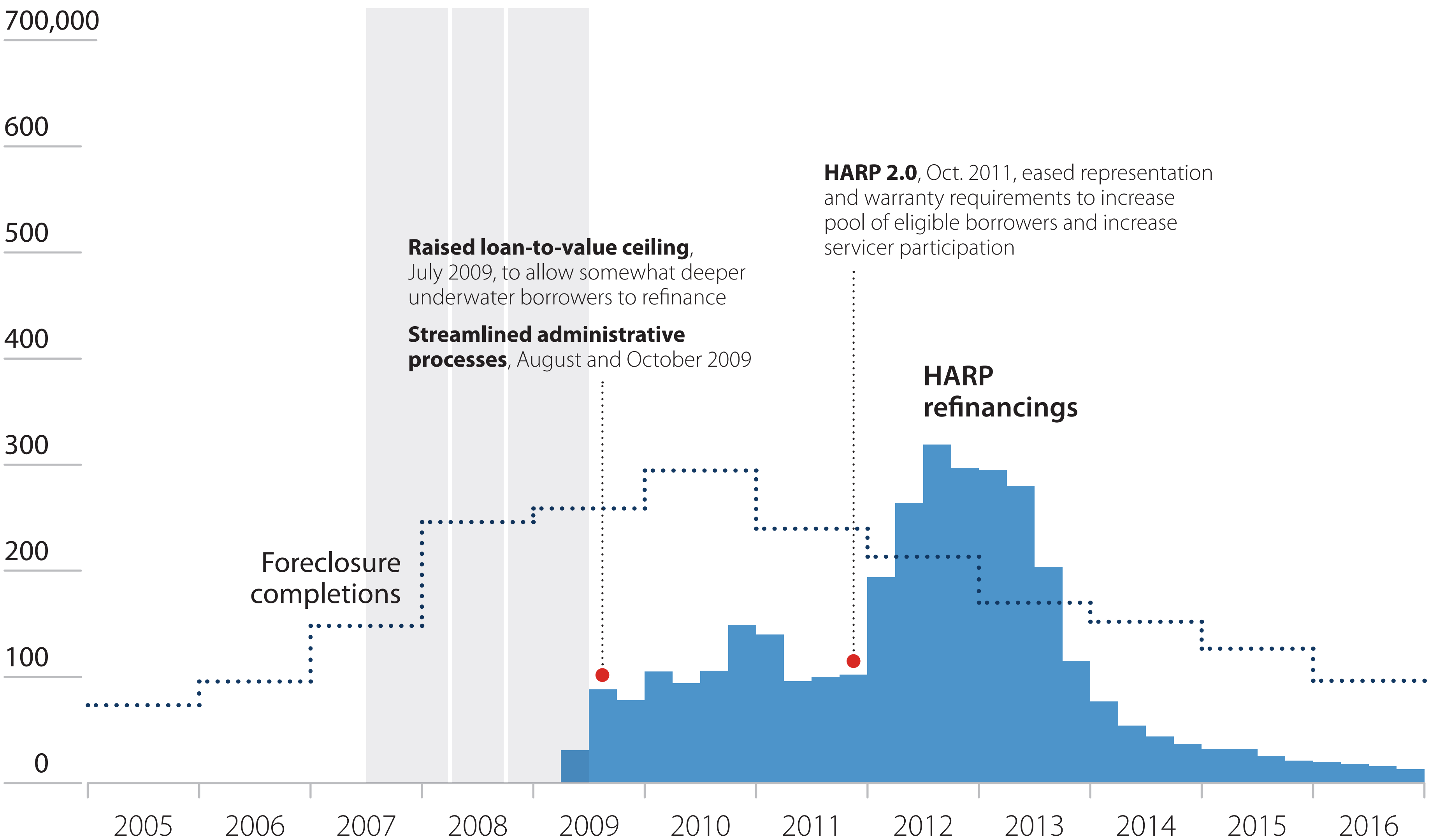
Mortgages receiving modification aid, April 1, 2009, through November 30, 2016



Sources: Dept. of Housing and Urban Development (FHA loss mitigation); U.S. Treasury (HAMP modifications); HOPE Now Alliance (HOPE Now modifications; CoreLogic (foreclosure completions, quarterly average of annual rate) Note: Modifications through Nov. 2016; other program results through 2016.

The HARP program lowered mortgage rates, encouraged refinancings, and helped "underwater" homeowners avoid foreclosure.

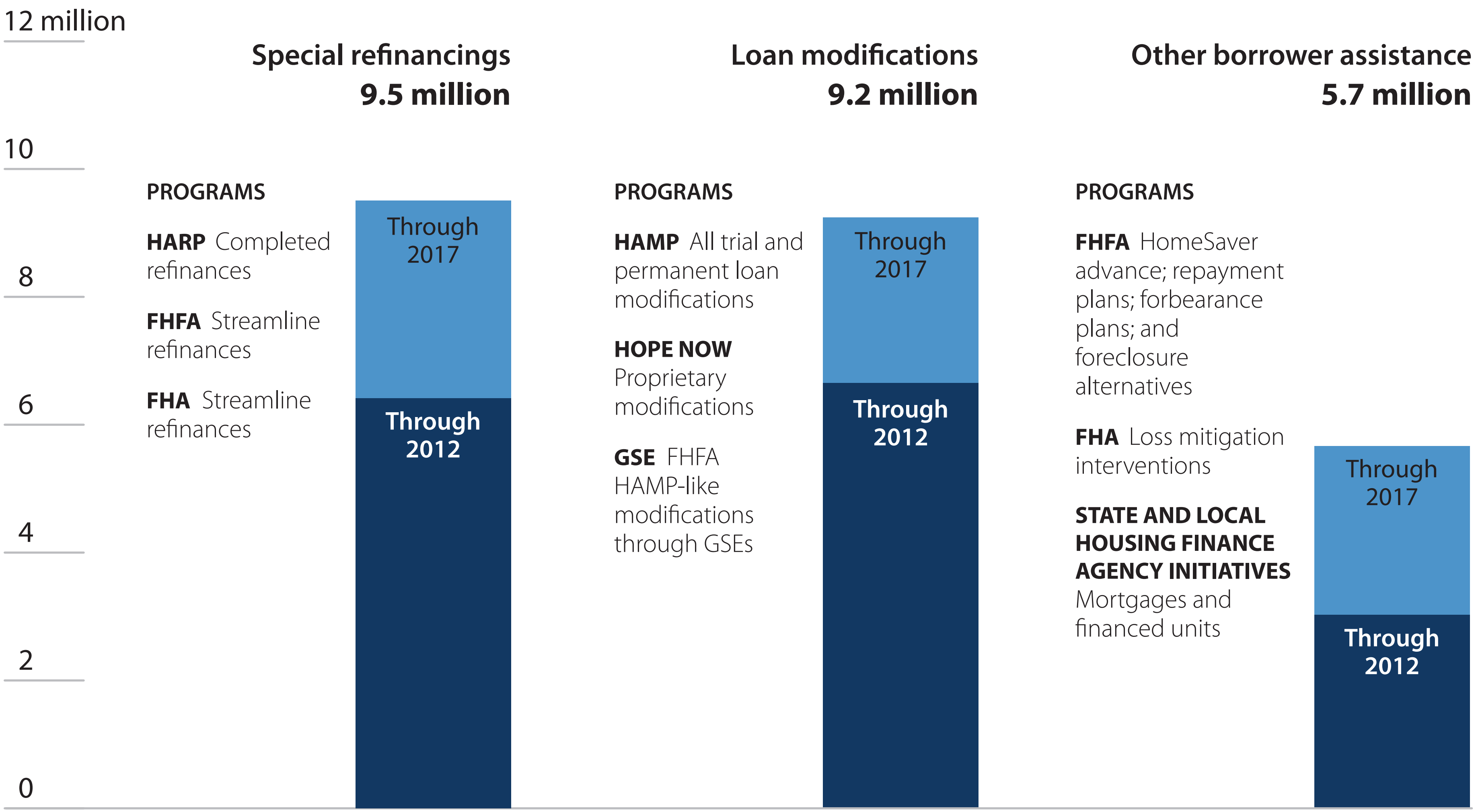
Loans refinanced through the Home Affordable Refinancing Program



Sources: Federal Housing Finance Agency; foreclosure completions: CoreLogic

The government's programs helped millions of homeowners, but were slow to take effect and reached a limited number of people threatened by foreclosure.

Homeowners assisted through crisis-era loan modification programs and other foreclosure prevention actions



Sources: Making Home Affordable program performance reports; HOPE NOW; Federal Housing Finance Agency foreclosure prevention reports and refinance reports; U.S. Department of Housing and Urban Development housing scorecards; Federal Housing Finance Agency aggregate reports; Center for American Progress, "A House America Bond for State Housing Finance Agencies"

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:

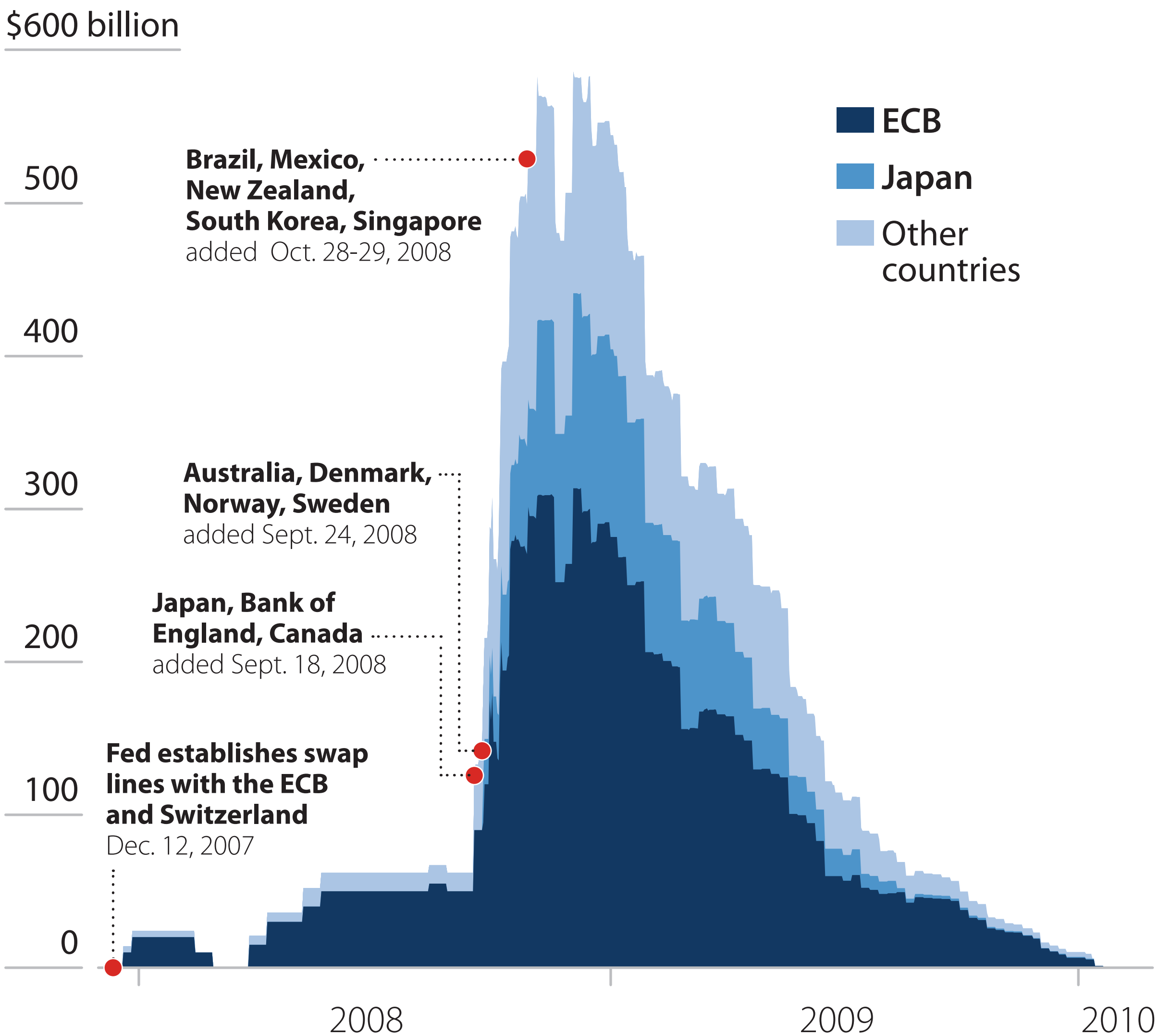
Establish central bank swap lines
to address dollar funding shortages

Coordinate monetary policy
to send powerful message to the markets

Arrange for IMF support
for emerging countries affected by the crisis

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

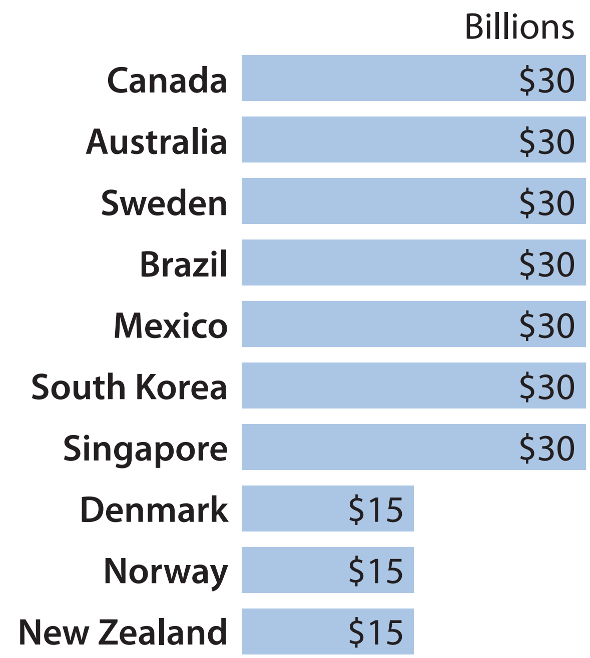
Central bank liquidity swaps



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:

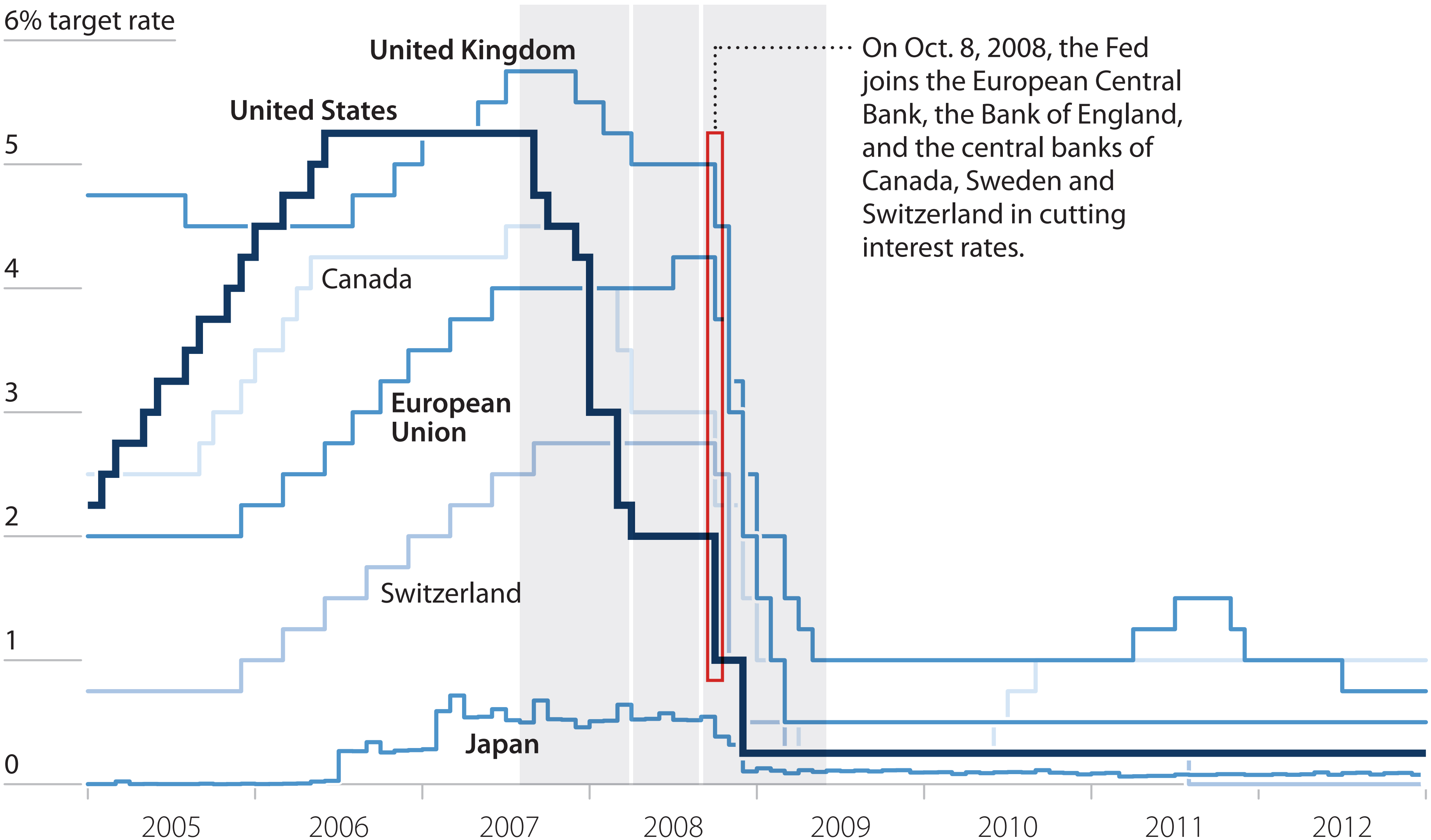


Sources: Central bank liquidity swaps: Federal Reserve Board, internal calculations; maximum commitments: National Bureau of Economic Research, "Central Bank Dollar Swap Lines and Overseas Funding Costs"

U.S. STRATEGY

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

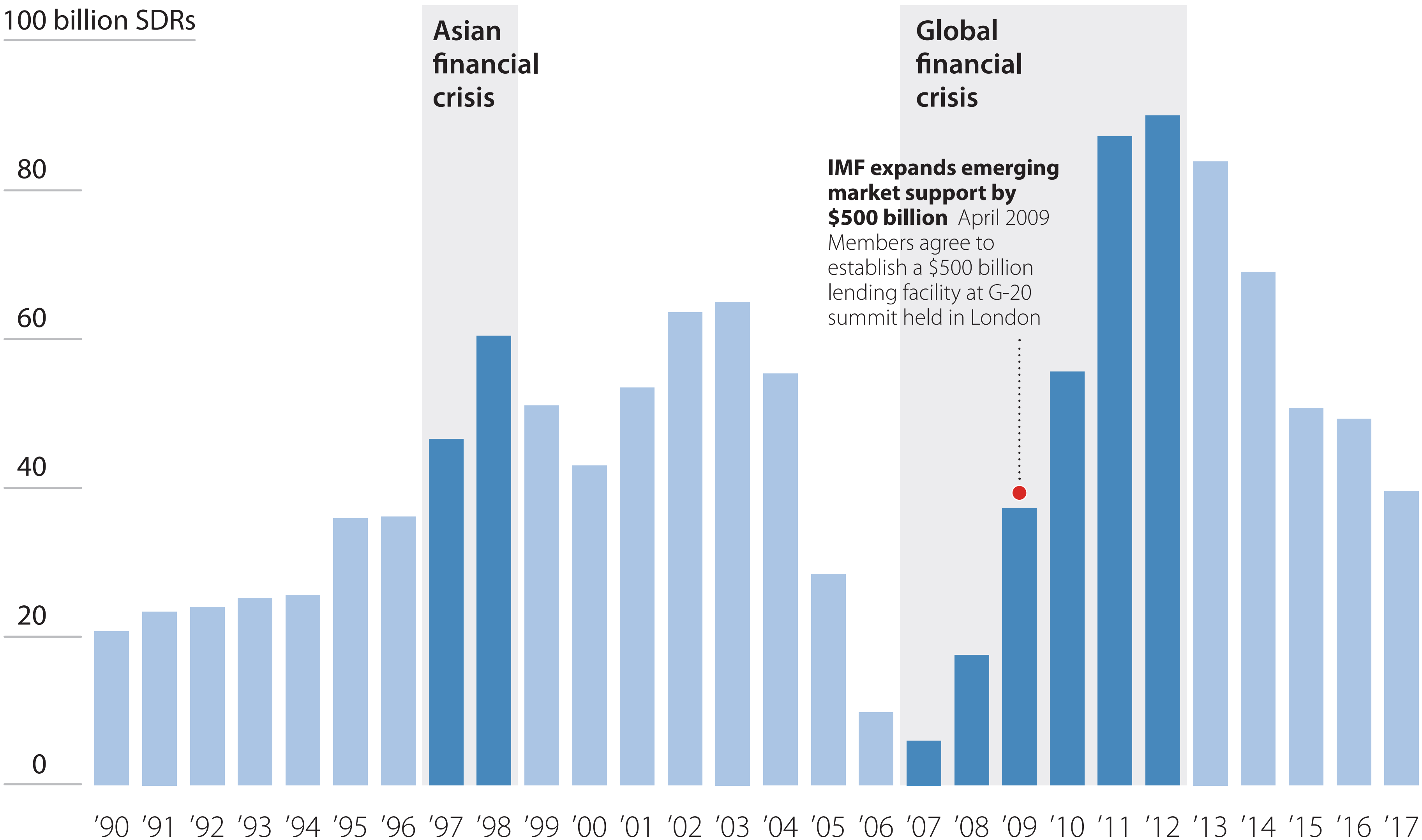
Central bank target interest rates for each country (month-end)



Source: Bloomberg

The G-20 agreed in April 2009 to establish a $500 billion lending facility, allowing the IMF to provide substantial aid to countries affected by the crisis.

IMF credit outstanding for all members

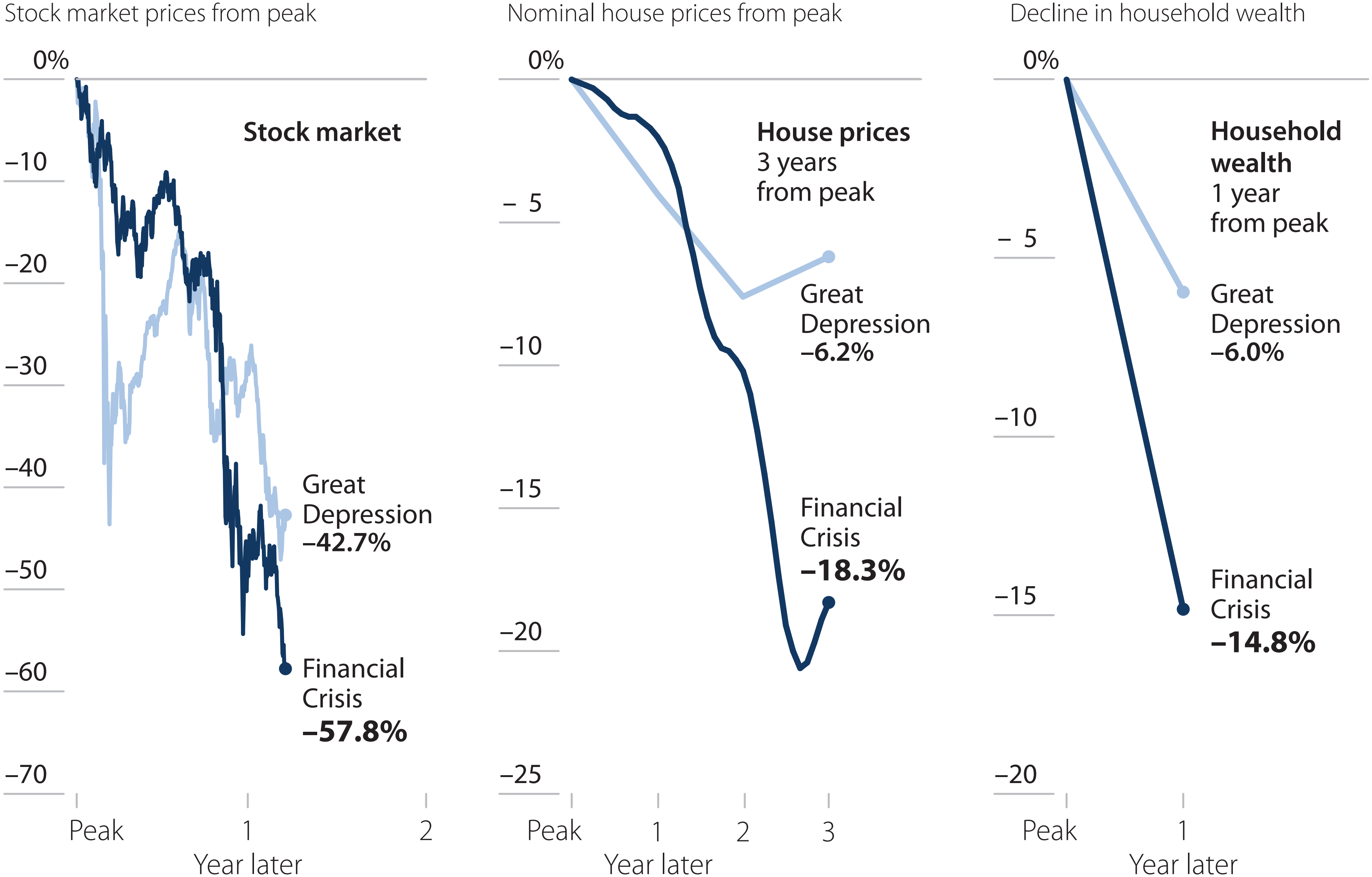


Source: International Monetary Fund

Outcomes

OUTCOMES

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

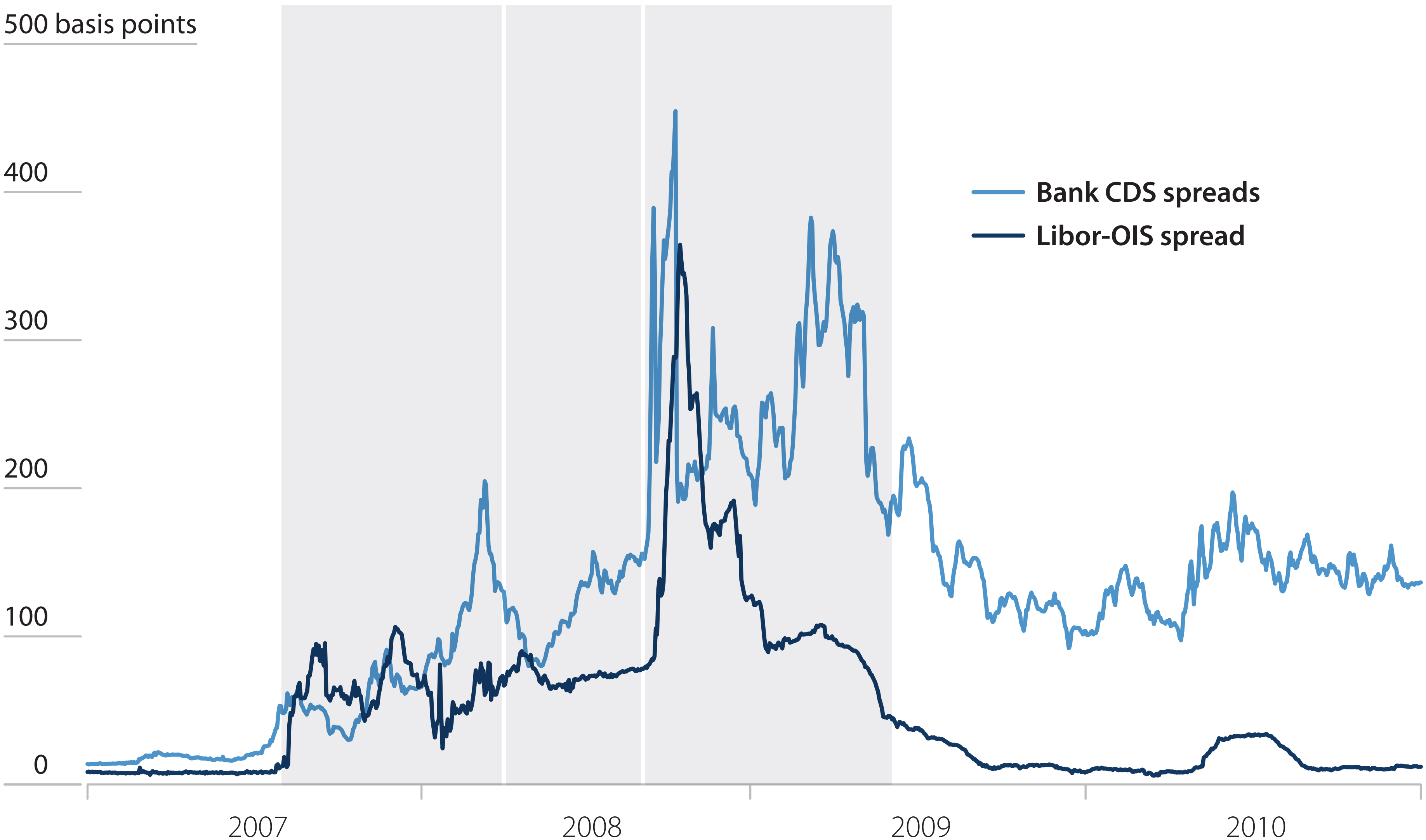


Sources: Stock prices: The Center for Research in Security Prices via Wharton Research Data Services; housing prices: U.S. home price and related data, Robert J. Shiller, *Irrational Exuberance*; GD household wealth: Mishkin (1978); GR household wealth: Financial Accounts of the United States

OUTCOMES

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

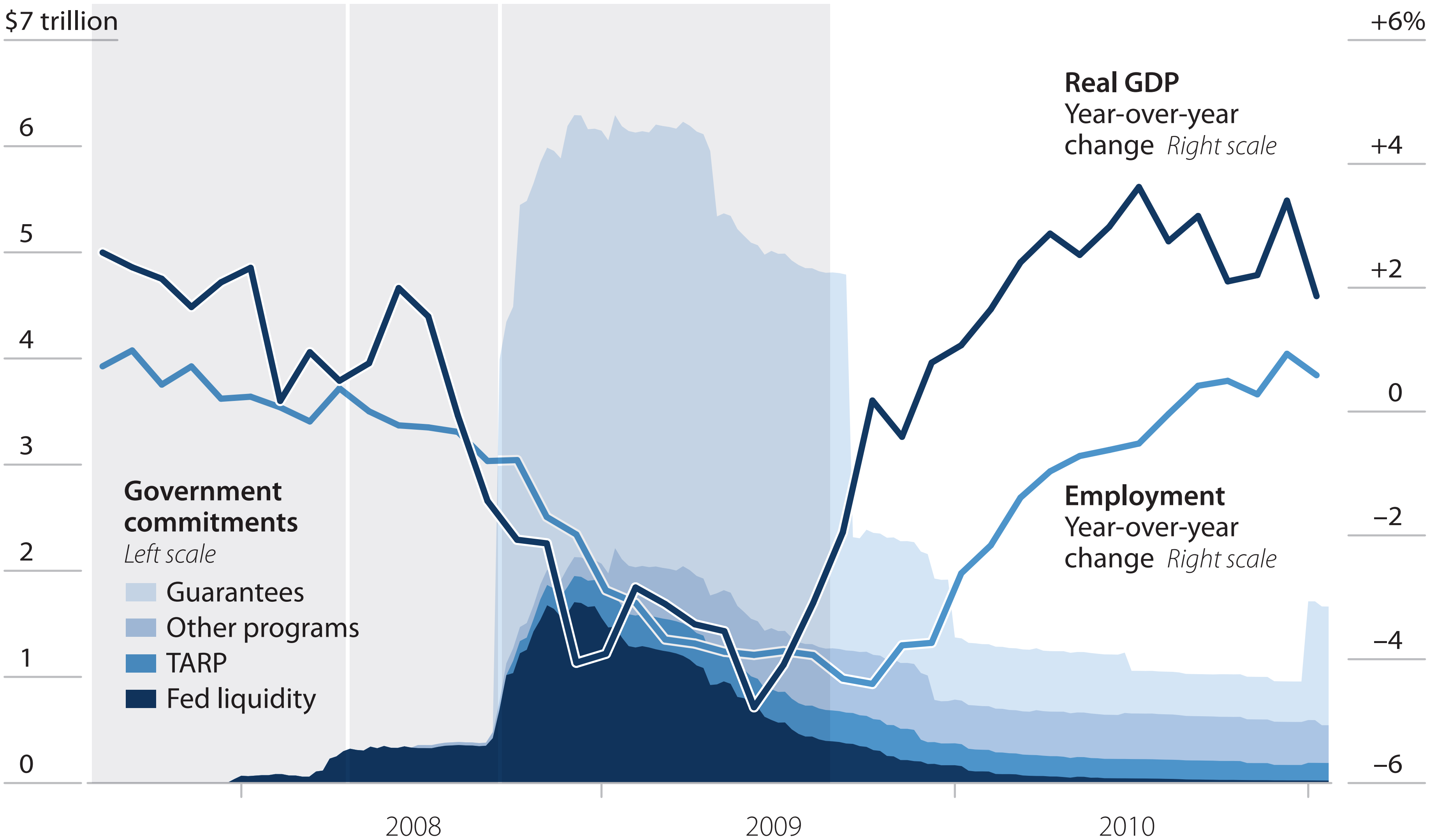
Bank CDS spreads and Libor-OIS spread



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

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

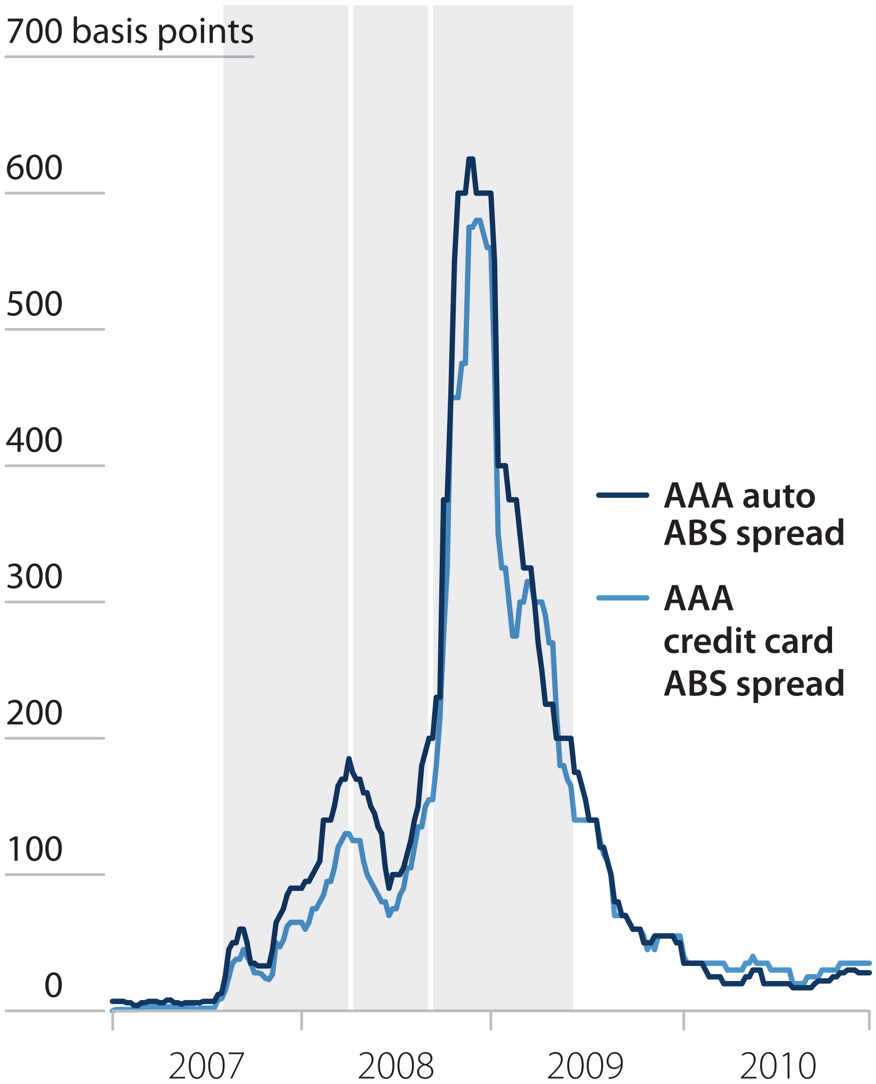
Treasury, Federal Reserve, and FDIC exposures; real GDP and employment, year-over-year percent change (monthly)



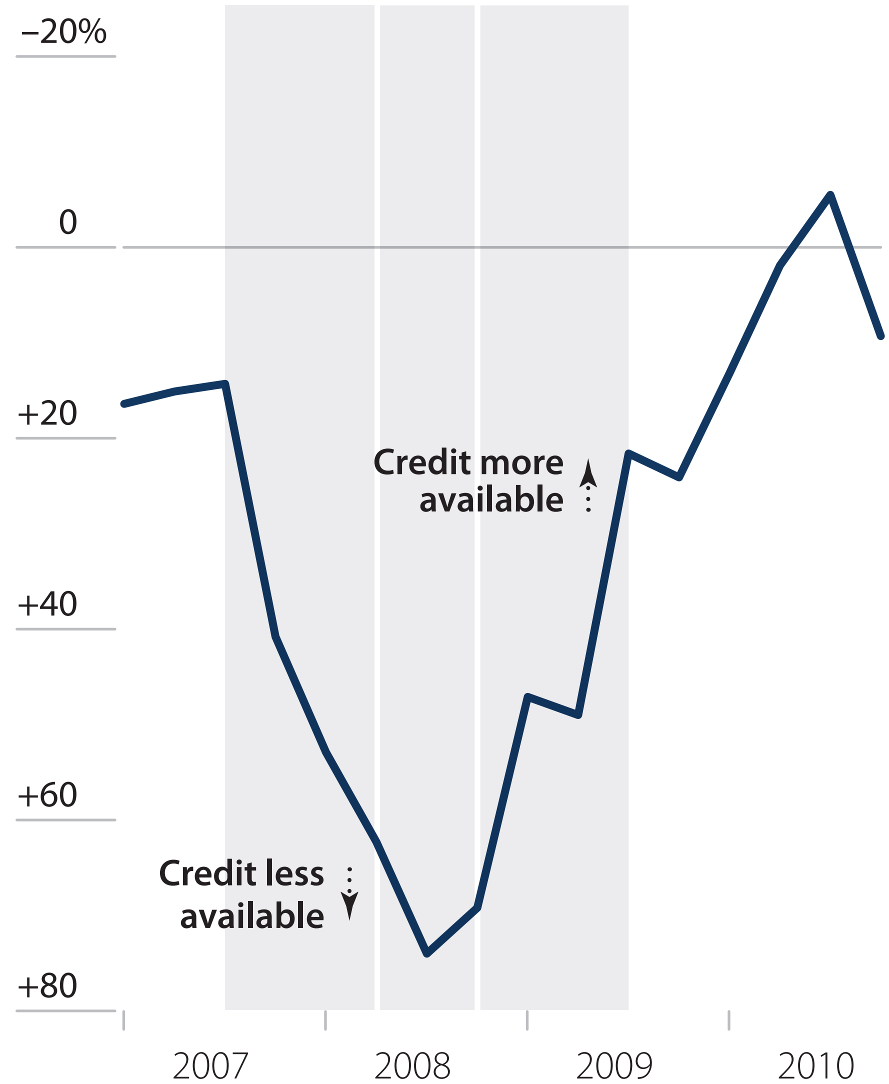
Sources: U.S. government exposures: U.S. Treasury, Federal Reserve Board; Federal Deposit Insurance Corp.; Federal Housing Finance Agency; Congressional Oversight Panel, "Guarantees and Contingent Payments in TARP and Related Programs" via Federal Reserve Bank of St. Louis; internal calculations. Real GDP: Macroeconomic Advisers; Haver Analytics. Employment: Bureau of Labor Statistics; internal calculations

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



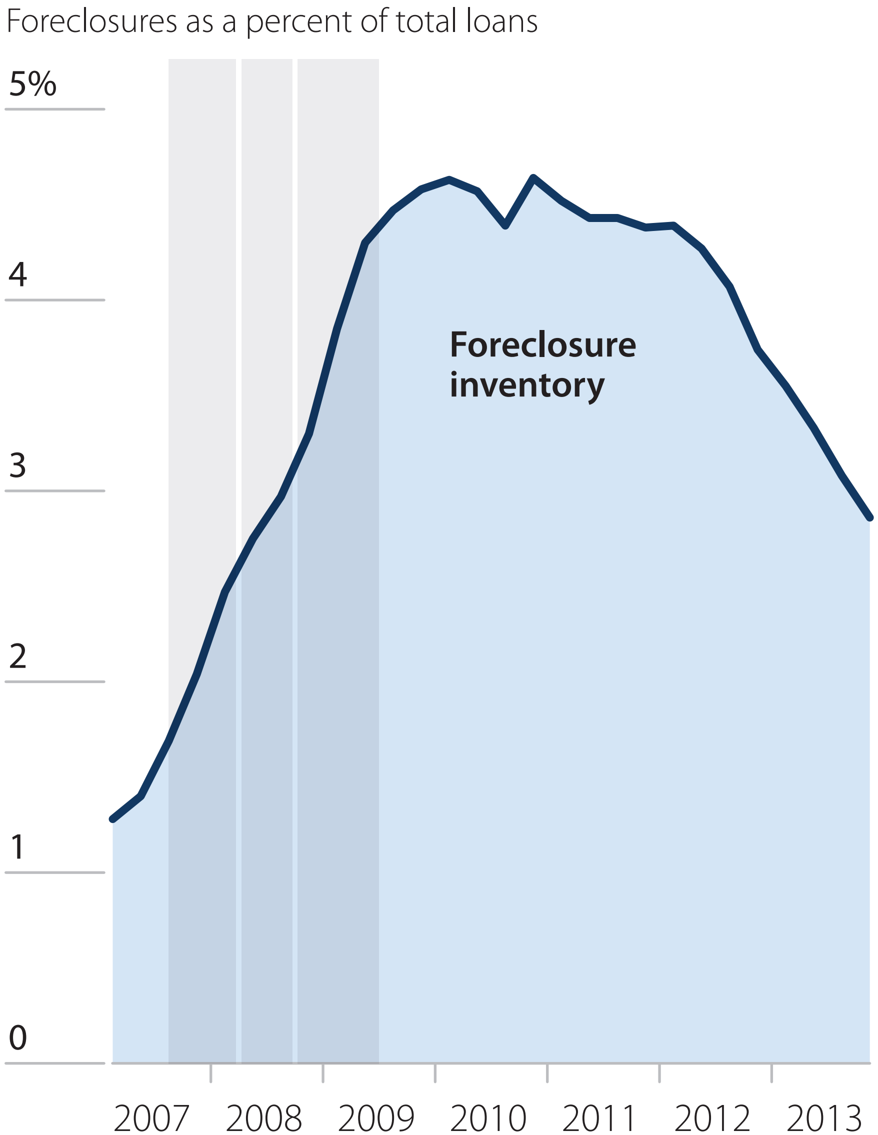
Net respondents tightening standards

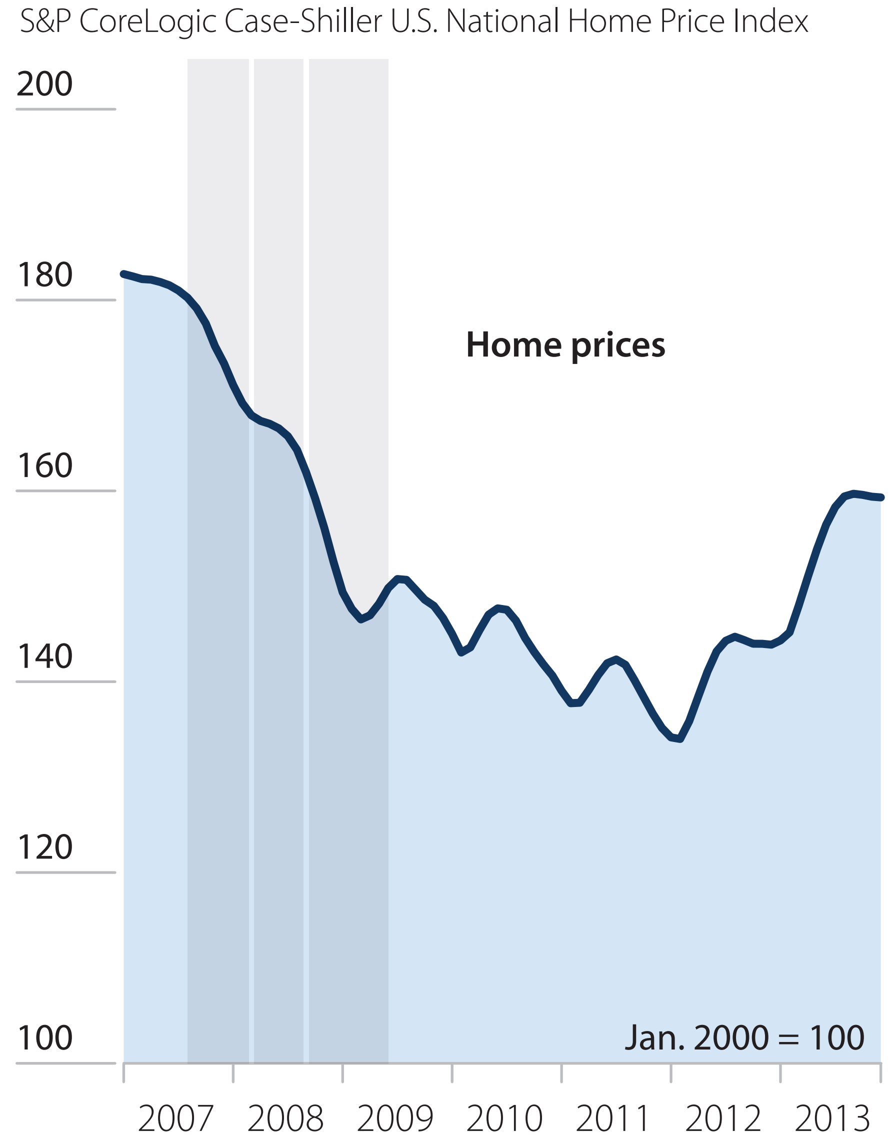


Sources: ABS: J.P. Morgan. Lending standards: Federal Reserve Board, senior loan officer opinion survey on bank lending practices

OUTCOMES

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



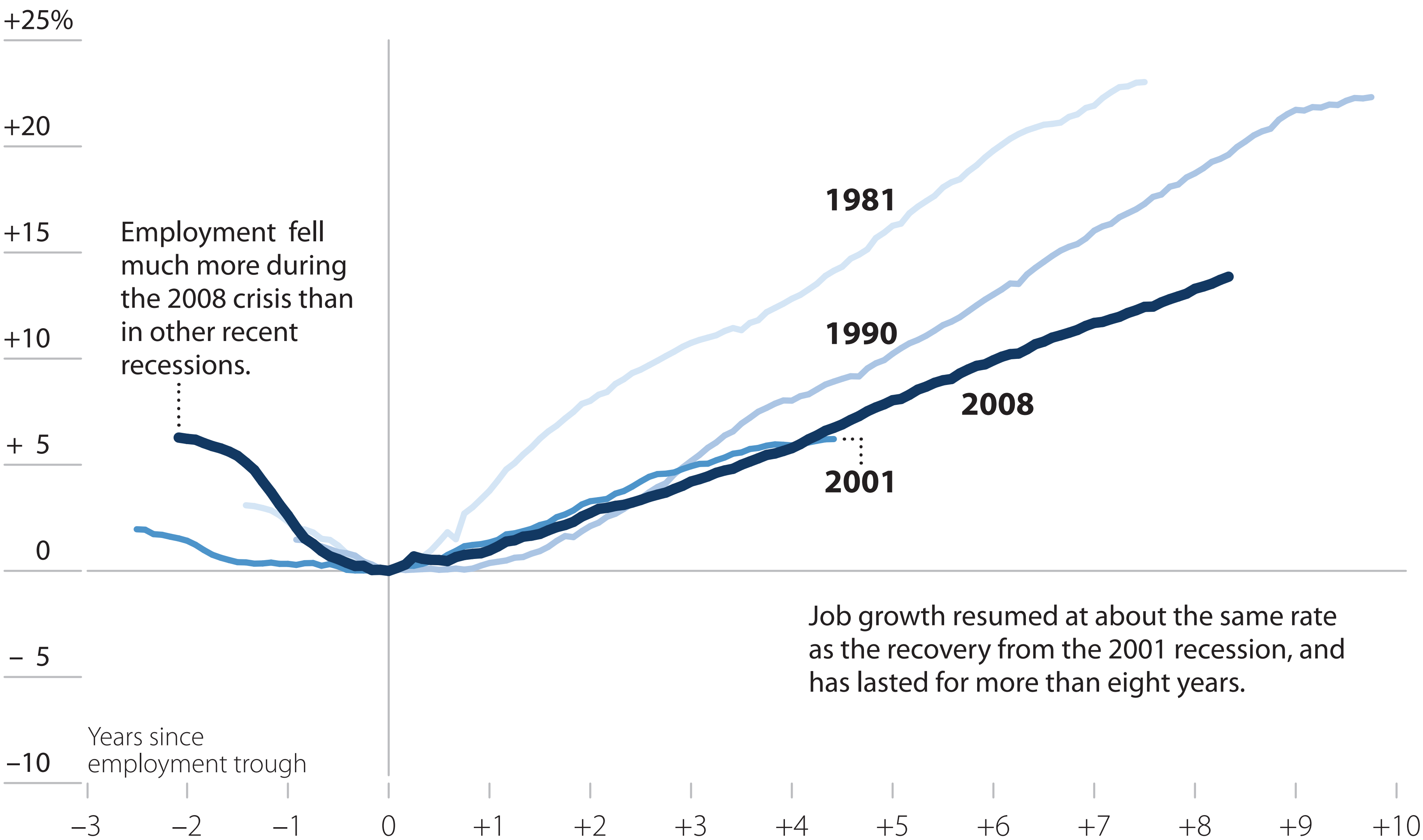


Sources: Foreclosure inventory: Mortgage Bankers Association, Bloomberg; home price index: S&P CoreLogic Case-Shiller U.S. National Home Price Index, not seasonally adjusted, via Federal Reserve Economic Data

OUTCOMES

U.S. job growth rebounded, although it was slower than after other recent recessions.

Change in total nonfarm employment, percentage from trough

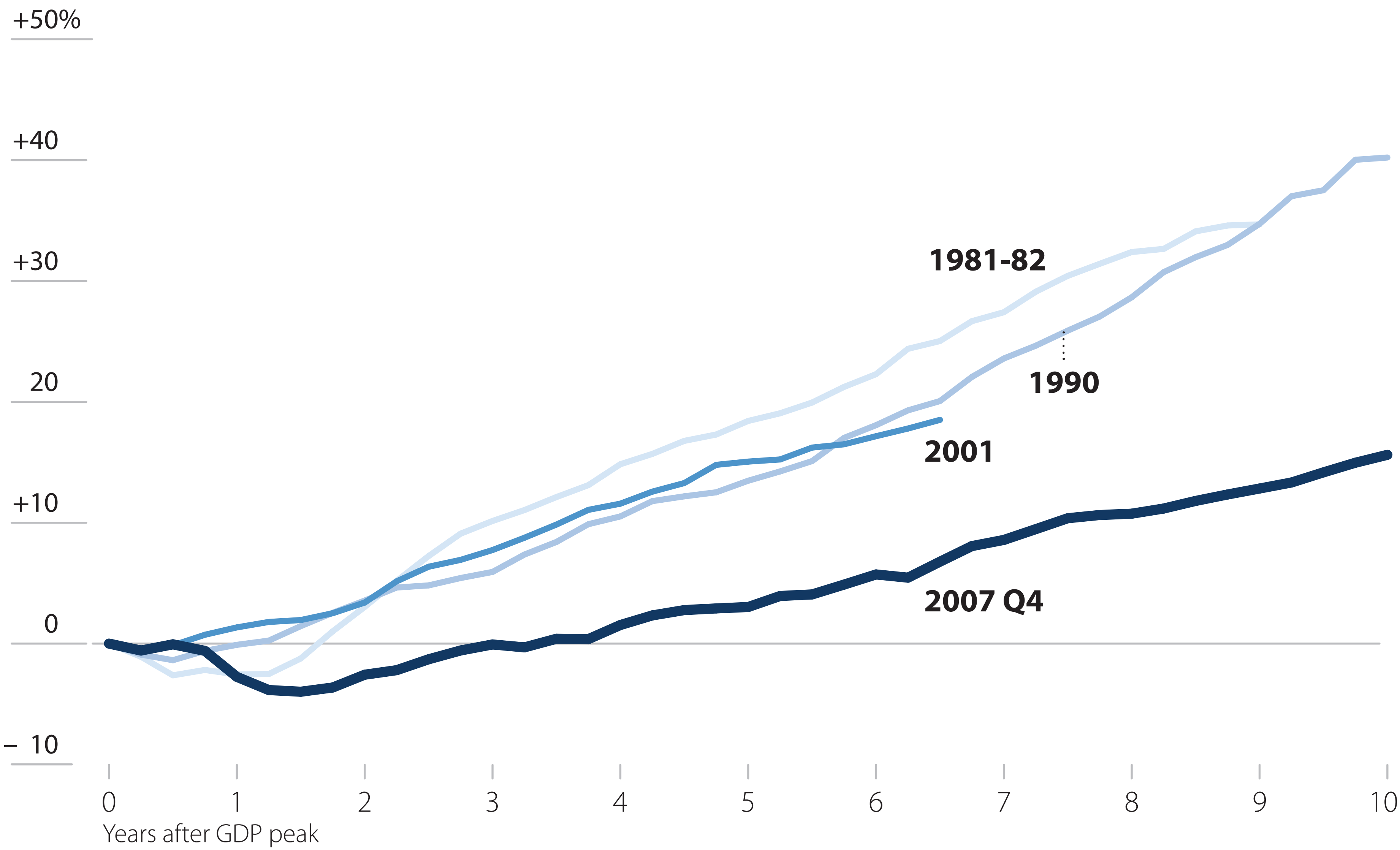


Source: Bureau of Labor Statistics

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

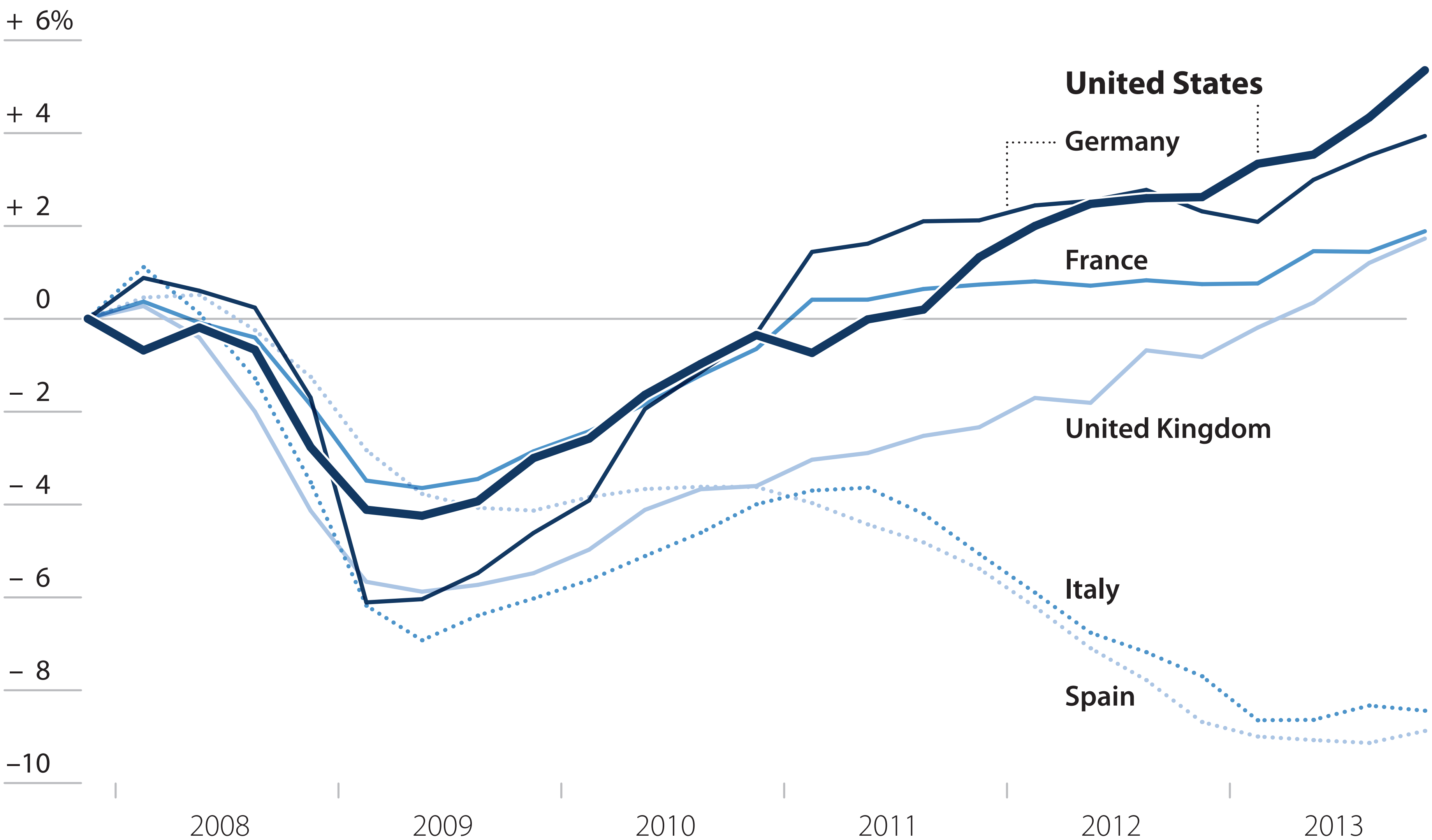


Source: Bureau of Economic Analysis via Federal Reserve Economic Data

OUTCOMES

…although growth has been stronger than in many European countries.

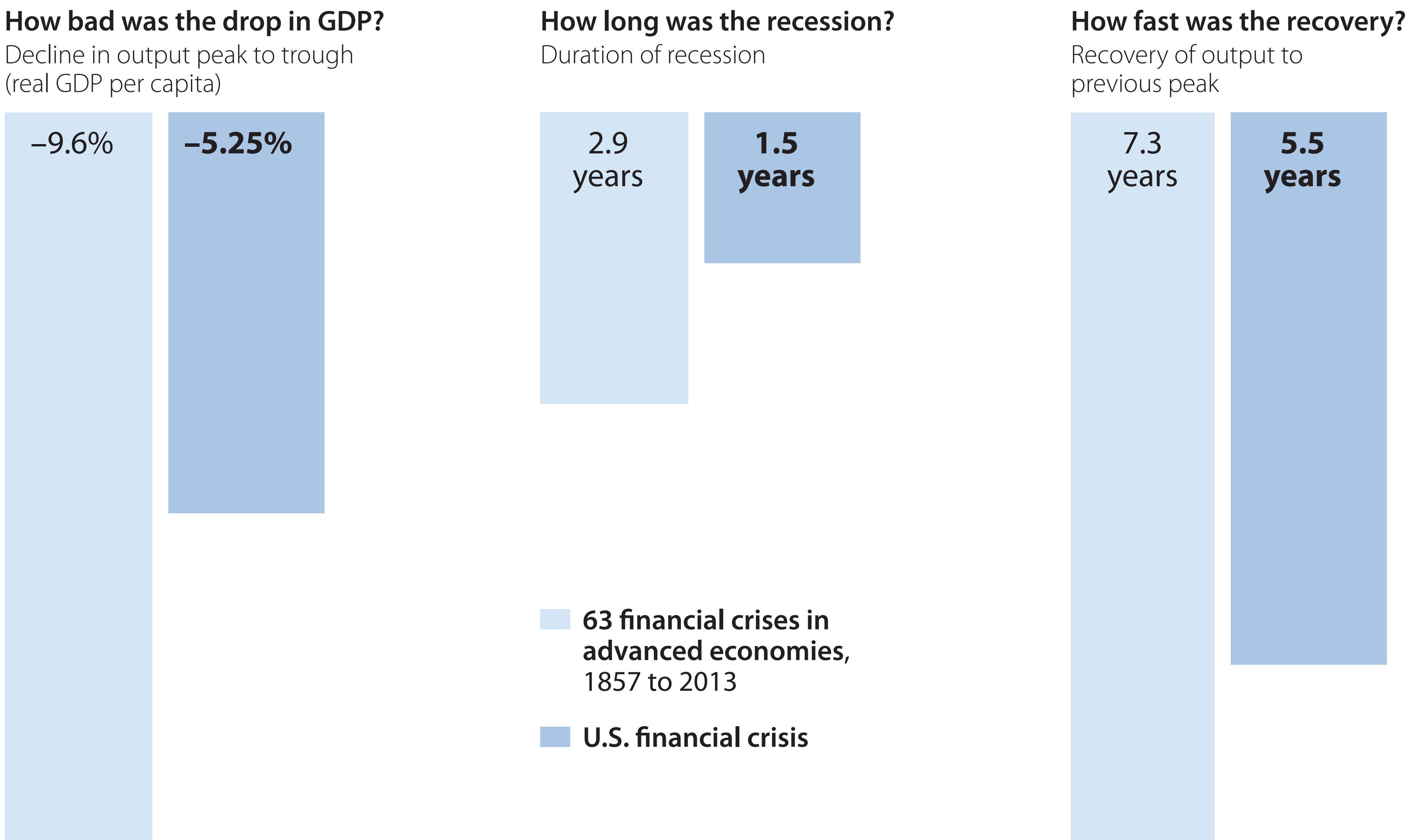
Real GDP, percentage change from 4th quarter 2007



Source: Organisation for Economic Co-operation and Development

OUTCOMES

Financial crises are typically costly to economic output, but the U.S. strategy was able to limit the damage compared to other crises.

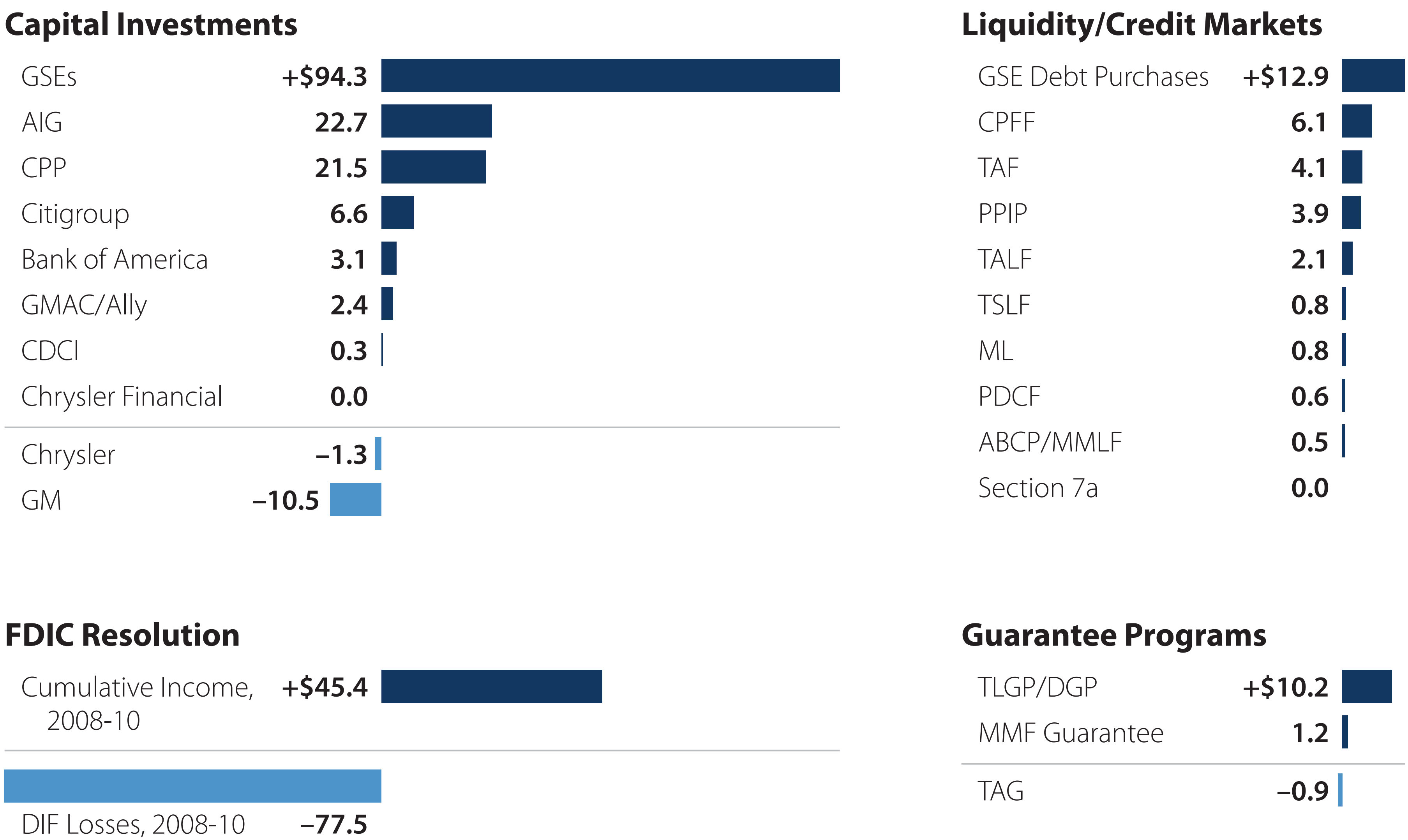


Sources: National Bureau of Economic Research, "Recovery from Financial Crises: Evidence from 100 Episodes"; Bureau of Economic Analysis via Federal Reserve Economic Data, internal calculations

OUTCOMES

In fact, U.S. taxpayers made a profit on the financial rescue.

Income or cost of financial stability programs, in billions

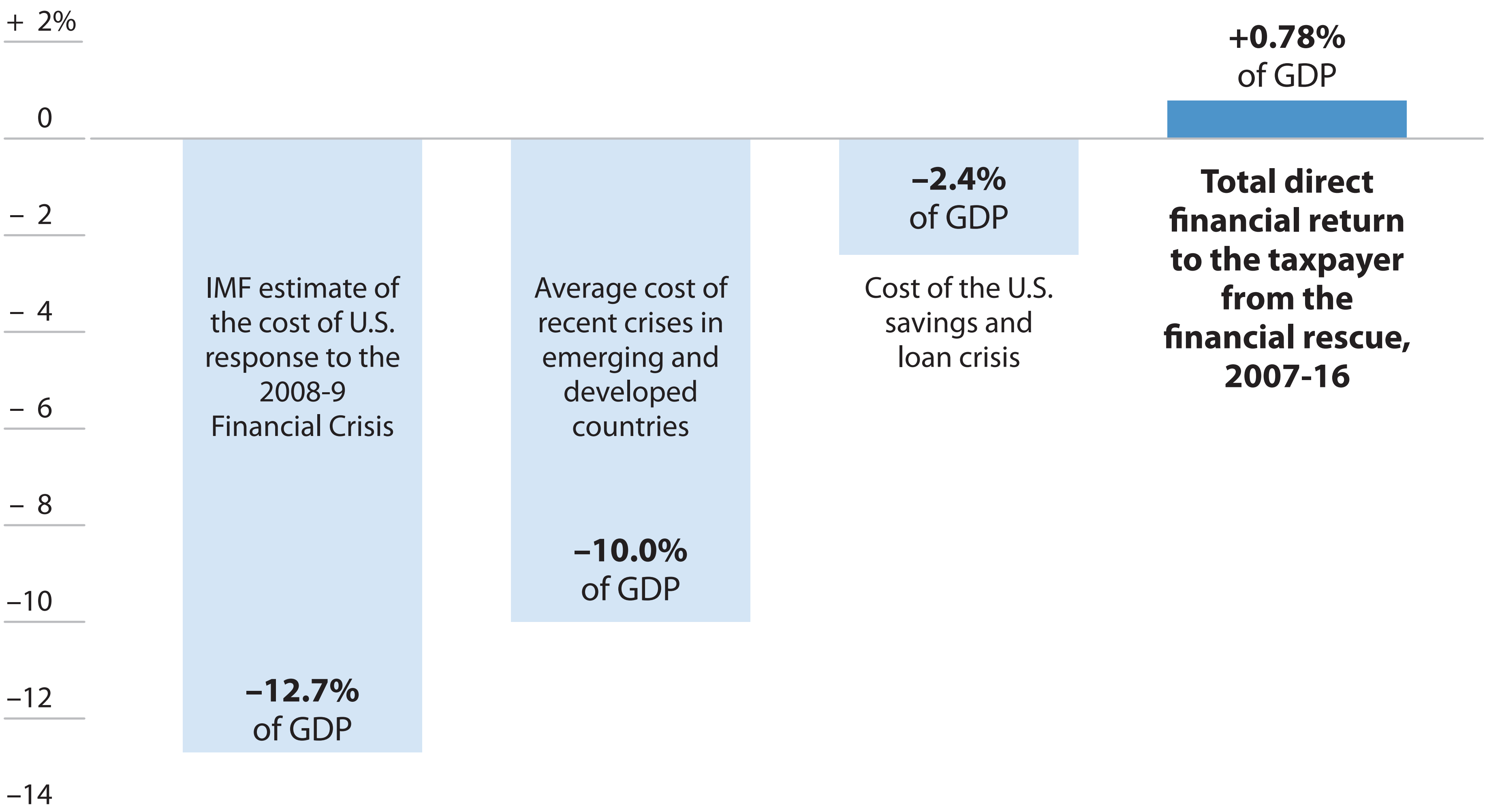


Sources: U.S. Treasury; Federal Deposit Insurance Corp.; Federal Reserve Board; Federal Housing Finance Agency; Congressional Research Service, "Costs of Government Interventions in Response to the Financial Crisis: A Retrospective."
Notes: All figures are reported on a nominal basis. GSE debt purchases as of end of Q3 2013.

OUTCOMES

Compared to initial projections and prior crises, the U.S. response was more effective for the taxpayer …

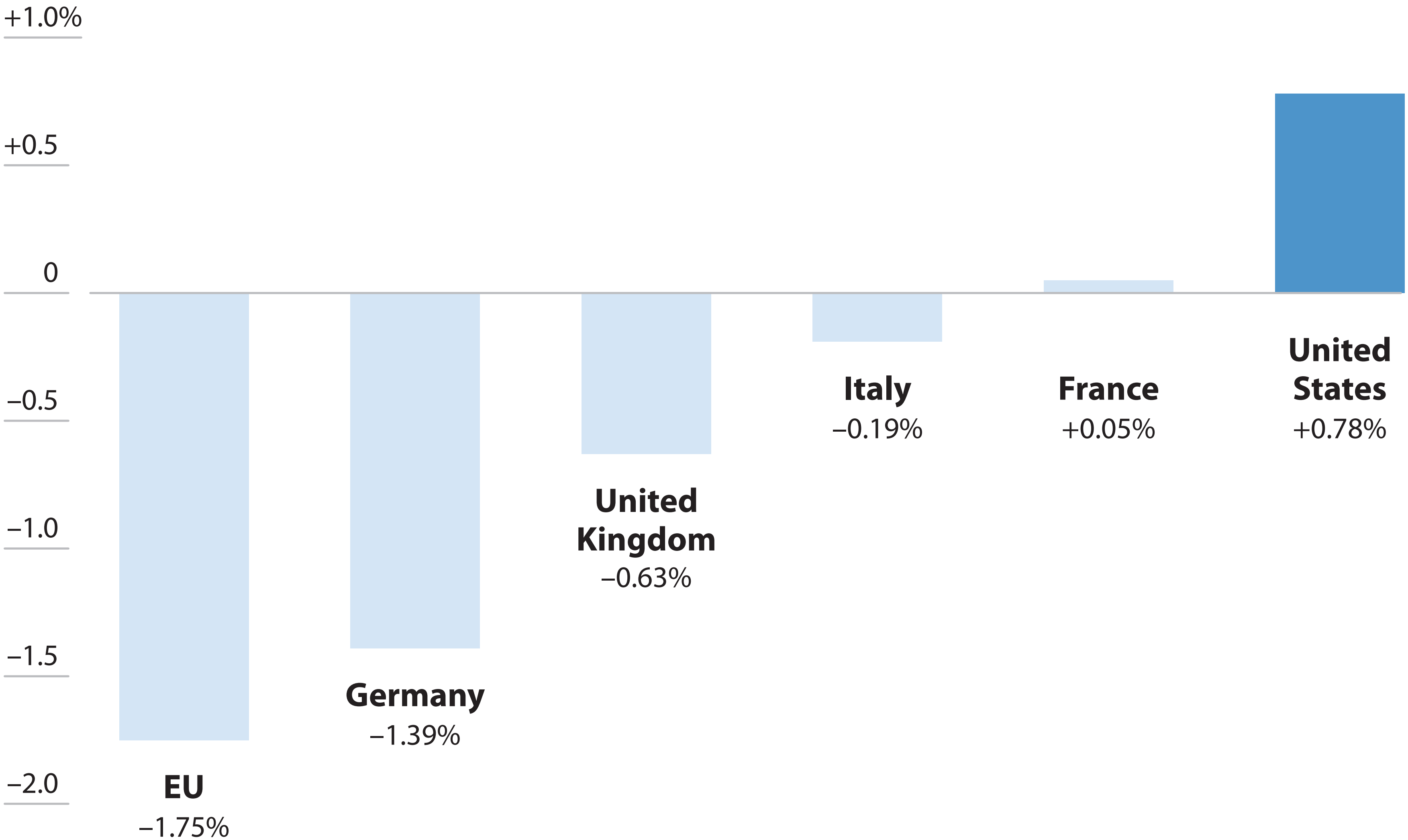
Direct fiscal cost/revenue of financial crisis situations, as a share of GDP



Sources: Average of recent crises: National Bureau of Economic Research, "Recovery from Financial Crises: Evidence from 100 Episodes"; IMF: International Monetary Fund, "Companion Paper — The State of Public Finances: Outlook and Medium-Term Policies After the 2008 Crisis"; savings and loan crisis: Federal Deposit Insurance Corp., "The Cost of the Savings and Loan Crisis: Truth and Consequences", Bureau of Economic Analysis; U.S. 2007-2016: Federal Reserve Board, U.S. Treasury Department, Federal Housing Finance Agency, Federal Deposit Insurance Corp., Bureau of Economic Analysis, internal calculations

…especially relative to the cost of interventions taken by other governments during the global financial crisis.

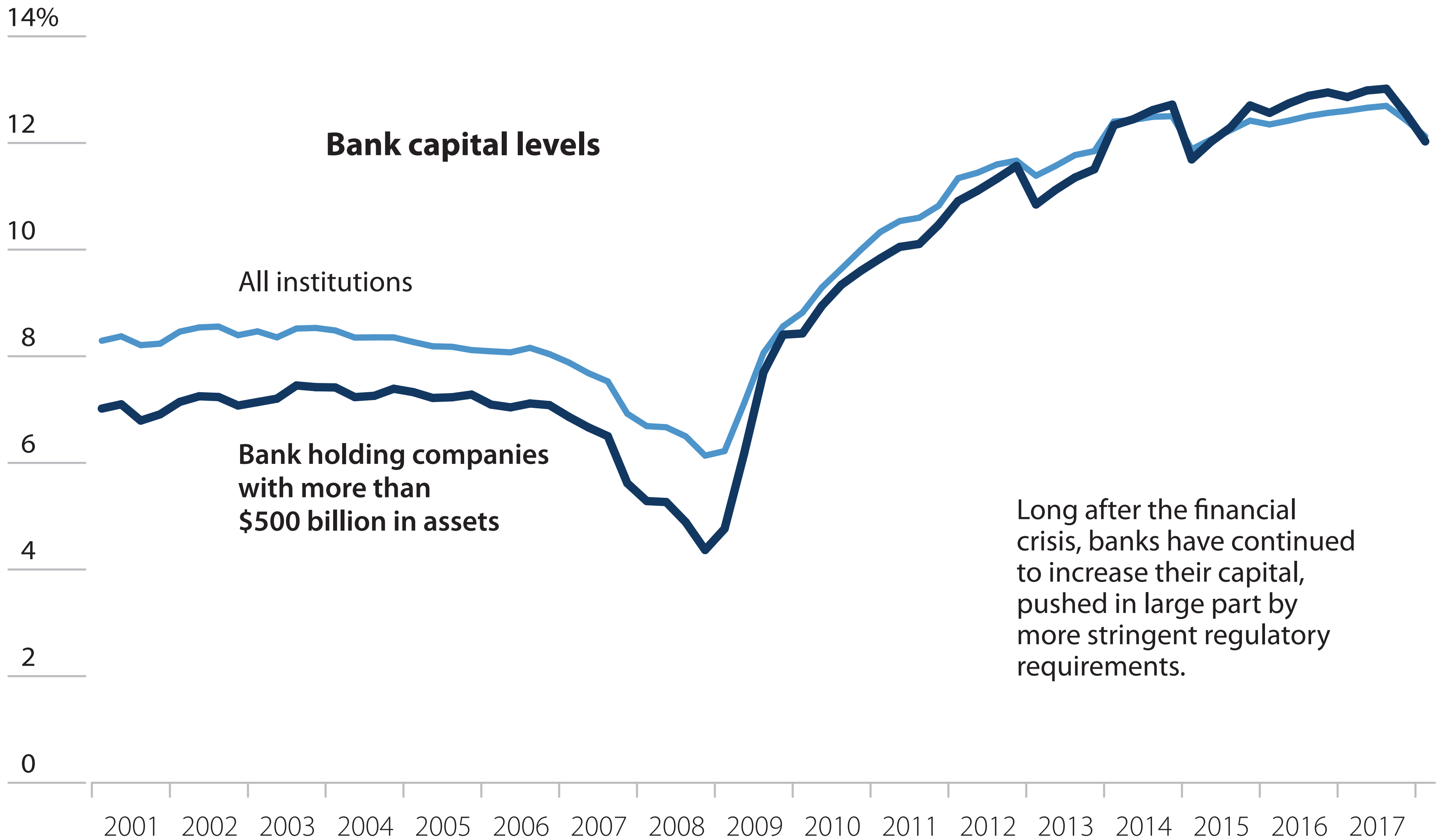
Cumulative direct fiscal revenues/cost of financial crisis interventions, 2007-16, as a share of each country's 2016 GDP



Sources: Eurostat; U.S. Treasury; Federal Deposit Insurance Corp.; Federal Reserve Board; Federal Housing Finance Agency; Bureau of Economic Analysis; internal calculations

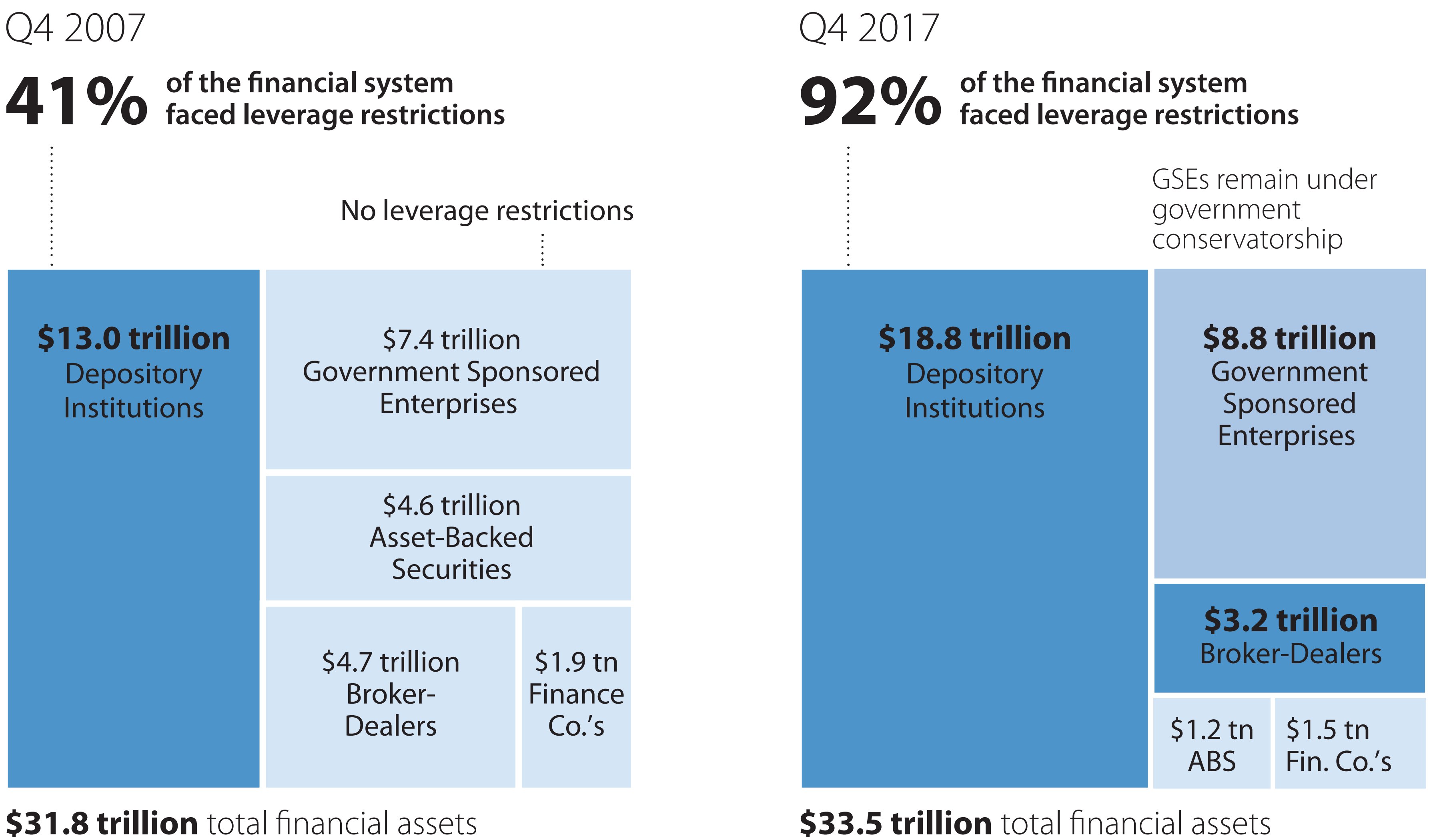
Today the financial system has significantly more capital and would be better able to withstand losses in the event of a severe economic downturn.

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



Source: Federal Reserve Bank of New York's Research and Statistics Group 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.

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



Source: Federal Reserve 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 TOOLS

- Limited reach of prudential limits on leverage
- Limited protections from deposit insurance
- Poor emergency authority
- No ability to inject capital into banks
- No resolution authority for largest banks or investment banks
- No authority to stabilize GSEs

ESSENTIAL CRISIS AUTHORITIES

- Fed emergency lending
- Broader FDIC guarantees
- GSE conservatorship
- Capital injections

POST-CRISIS TOOLS

- Much stronger capital requirements
- Much stronger liquidity requirements
- Much stronger funding requirements
- Resolution authority for large financial failures

POST-CRISIS LIMITATIONS

- Limitations on Fed emergency lending
- No emergency FDIC guarantees without Congressional action.
- No authority to inject capital

This was a terribly damaging crisis. It did not need to be that 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.

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 2007-09 financial crisis, a joint project of the Yale School of Management, Program on Financial Stability and Brookings Institution, Hutchins Center on Fiscal and Monetary Policy.

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We wish to thank the following individuals and organizations:

Brookings/Hutchins: David Wessell, Director; Jeffrey Chang, Vivien Lee

Yale Program for Financial Stability: Andrew Metrick, Program Director; Alec Buchholtz, Anshu Chen, Greg Feldberg, Aidan Lawson, Christian McNamara, David Tam, Daniel Thompson, Chase Ross, Rosalind Z. Wiggins

Golden Triangle Strategies: Emily Cincebeaux, Bill Marsh, Melissa Wohlgemuth

Others: Charlie Anderson, Matthew Anderson, Christie Baer, Michael S. Barr, Monica Boyer, Jason Furman, Robert Jackson, Annabel Jouard, Katherine Korsak, Vivek Manjunath, Drew McKinley, Patrick Parkinson, Wilson Powell III, Ernie Tedeschi

Data sources: CoreLogic®, a property data and analytics company: Goldman Sachs; HUD; iMoneyNet; JPMorgan Chase; SIFMA

Notes

Slide 6:
Re-created with data underlying Figure 10, "The Distribution of Household Income, 2014," Congressional Budget Office (2018), https://www.cbo.gov/publication/53597. See link for definitions of income and income groups.

Slide 7:
Based on Figure 1, Panel 1, Michael Ahn, Michael Batty, and Ralf Meisenzahl, "Household Debt-to-Income Ratios in the Enhanced Financial Accounts," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, January 11, 2018, https://doi.org/10.17016/2380-7172.2138.

Slide 12:
Based on Figure 3.1, U.S. home price and related data, Robert J. Shiller, Irrational Exuberance, 3rd edition, Princeton University Press, 2015, as updated by the author, http://www.econ.yale.edu/~shiller/data.htm.

Slide 14:
Based on Exhibit 1, Gary Gorton and Andrew Metrick, "Who Ran on Repo?" (2012), http://faculty.som.yale.edu/garygorton/documents/whorancompleteoctober4.pdf.

Slide 30:
Based on charts 5 and 6, William English and Patricia Mosser, "Classic Lender of Last Resort Programs," Preliminary Discussion Draft, September 11–12, 2018, https://som.yale.edu/the-global-financial-crisis.

Notes

Slide 32:
Based on Figure 7, Lorie Logan, William Nelson, Patrick Parkinson, "Novel Lender of Last Resort Programs," Preliminary Discussion Draft, September 11–12, 2018, https://som.yale.edu/the-global-financial-crisis.

Slide 33:
Based on Figure 11, Lorie Logan, William Nelson, Patrick Parkinson, "Novel Lender of Last Resort Programs," Preliminary Discussion Draft, September 11–12, 2018, https://som.yale.edu/the-global-financial-crisis.

Slide 35:
Based on Panel A, Lawrence Schmidt, Allan Timmermann, and Russ Wermers, "Runs on Money Market Mutual Funds," American Economic Review, 106 (9): 2625-57, 2016, https://www.aeaweb.org/articles?id=10.1257/aer.20140678.

Slide 36:
Left panel: Based on Slide 4, "Reforming Wall Street, Protecting Main Street," U.S. Treasury, July 2012, https://www.treasury.gov/connect/blog/Documents/20120719_DFA_FINAL5.pdf. RIght panel: Based on Figure 2.4 in "Crisis and Response: An FDIC History, 2008–2013," Federal Deposit Insurance Corp. (2017).

Slide 37:
Traditional banks include depository institutions and associated pooled funding trusts. 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.

Notes

Slide 43:
Based on U.S. Treasury data and AIG infographic and timeline,
https://www.treasury.gov/initiatives/financial-stability/TARP-Programs/aig/Pages/default.aspx.

Slides 49, 50, 51:
Based on Figure 3, Jason Furman, "Fiscal Policy," Preliminary Discussion Draft, September 11–12, 2018,
https://som.yale.edu/the-global-financial-crisis.

Slide 55:
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.

Slide 56:
Based on the figure "Mortgage Aid Extended More than 9.9 Million Times, Outpacing Foreclosures," December 2016 Housing Scorecard, https://www.hud.gov/sites/documents/SCORECARD_2016_12_508C.PDF.

Slide 58:
Based on Table 2, "Housing Programs," forthcoming paper, Michael Barr, Neel Kashkari, Andreas Lehnert, and Phillip L. Swagel, September 11–12, 2018, https://som.yale.edu/the-global-financial-crisis. Some homeowners may have participated in more than one program; the sum of homeowners helped across all categories does not necessarily reflect the number of unique borrowers helped.

Notes

Slide 62:
Maximum commitments were taken from Table 2, Linda S. Goldberg, Craig Kennedy, and Jason Miu"Central Bank Dollar Swap Lines and Overseas Dollar Funding Costs," NBER working paper 15763, (2010), http://www.nber.org/papers/w15763.pdf.

Slide 64:
The stock market 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.
Estimates of real household net worth (wealth) during the Great Depression were taken from Table 1, Frederic S. Mishkin, "The Household Balance Sheet and the Great Depression," The Journal of Economic History, Vol. 38, No. 4 (December 1978), pp. 918-937, https://www.jstor.org/stable/2118664.

Slide 66:
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 Asset 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.

Notes

Federal Reserve Liquidity Programs: Reflects loan amounts outstanding under credit and liquidity programs established by 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 to March 2012.