CONGRESS OF THE UNITED STATES
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CBO

Financial Regulation and the Federal Budget

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At a Glance

Financial regulation affects the federal budget directly through spending for programs that support the stability of financial institutions and through the taxes and fees that those institutions pay. Regulation also affects the budget indirectly through its effects on the economy, which generate a trade-off: Increased financial regulation may lower the likelihood of a financial crisis and mitigate the severity of any crisis that occurred, but it may also raise the cost of financing for investments. Those economic effects feed back into the federal budget.

Federal financial regulation generally falls into three categories: safety and soundness regulation; guarantee, lending, and resolution authorities; and consumer and investor protection. To explore how changes to regulation of all three types might affect the federal budget, in this report the Congressional Budget Office provides a dynamic analysis—that is, it estimates both the direct budgetary effects and the macroeconomic feedback—of the following three illustrative policies, which represent a broad range of proposals affecting the financial sector:

- Reduce banks' capital requirements by 1 percentage point (an example of safety and soundness regulation);
- Eliminate the Federal Deposit Insurance Corporation's orderly liquidation authority, which allows the agency to lend to financial institutions when the stability of the financial system is at stake (an example of the government's guarantee, lending, and resolution authorities); and
- Repeal the ability-to-repay rule, which requires mortgage lenders to make a good-faith determination that borrowers have the ability to repay the loans that they originate (an example of consumer and investor protection).

CBO found that the largest effects on the budget of implementing the policies would stem from macroeconomic feedback. Estimating the economic consequences of the policies required the agency to make numerous assessments about how participants in financial markets might react to changes and how those behavioral changes would in turn affect the economy. Such assessments are inherently uncertain, so when possible, CBO has included ranges of alternative values along with its central estimates. Because of that uncertainty, the estimates of the total effects of the policies on the federal budget, though informative, are nevertheless highly uncertain.

Contents

Notes

Unless otherwise indicated, all years referred to in describing budgetary estimates are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end. Years referred to in describing economic variables are calendar years.

Numbers in the text, tables, and figures may not add up to totals because of rounding.

Supplemental materials for this analysis—including an interactive tool, the computer code used to generate the estimates, and a narrated slide deck—are available on CBO's website (www.cbo.gov/publication/55586).

Summary

Financial institutions, such as banks, play a vital role in the economy by channeling funds from investors to households and businesses that need financing. By doing so, such institutions support economic activity, including household consumption and business investment, and thereby contribute to economic growth and job creation. But instability in the financial industry can spill over into the economy and may even cause severe recessions, as demonstrated by the financial crisis of 2007 to 2009. Financial regulation and government guarantees, such as deposit insurance, are intended to protect consumers and investors and to ensure that the financial system remains stable and continues to make funding available for investments that support the economy.

Regulations and guarantees can, however, reduce efficiency and competition or have other unintended consequences. Excessive regulation can inhibit economic activities that support growth and that pose little risk to the economy. Underpriced guarantees can encourage activities that shift risk to taxpayers and make the economy more volatile and a crisis more likely. When making decisions about regulation, policymakers thus face a trade-off between increased safety and stability on the one hand, and lower costs of financing and faster economic growth on the other.

Financial regulation affects the federal budget directly through spending on programs that support the stability of financial institutions as well as through the revenues generated by the taxes and fees that those institutions pay. Regulation also affects the budget indirectly through its effects on the economy: Under the baseline economic conditions outlined in the Congressional Budget Office's economic forecast, regulation influences the cost and availability of financing and affects not only the likelihood of a future financial crisis but also how severe such a crisis might be.[1] Those economic effects in turn feed back into the federal budget (see Summary Figure 1).

What Are the Main Components of Federal Financial Regulation Under Current Law?

Federal financial policy falls under three main categories:

- Safety and soundness regulation;
- Guarantee, lending, and resolution authorities; and
- Consumer and investor protection.

Regulations promoting the safety and soundness of individual institutions support financial stability and protect households who place their savings in the financial system; such regulations directly affect the cost of federal programs such as deposit insurance. The federal government's authority to guarantee deposits, make loans to financial institutions, and resolve failing institutions limits the consequences for the financial system and for households when institutions fail. Regulations aimed at consumer and investor protection discourage or even prohibit practices that might harm consumers of financial products and investors in financial securities.

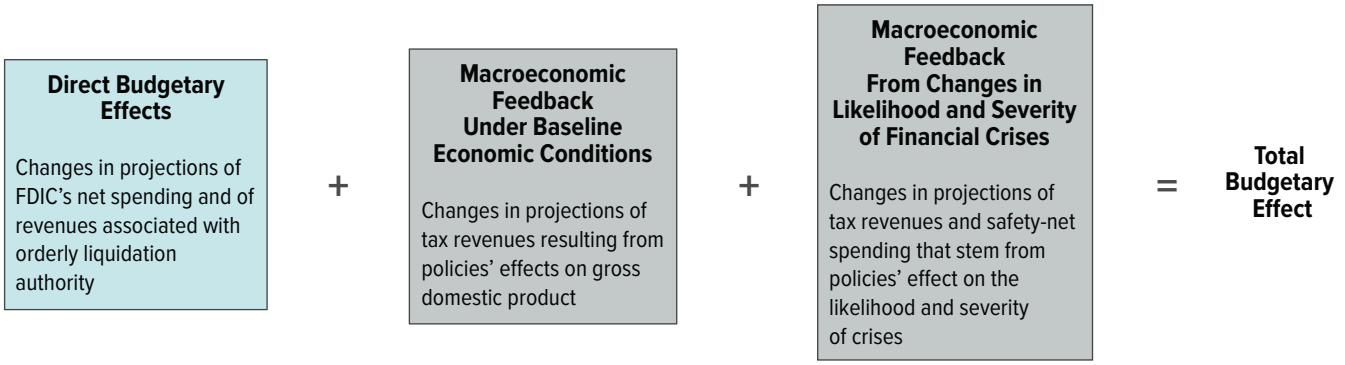
In this report, CBO analyzes the following illustrative policies to demonstrate how changes in each of those three categories might affect the budget:

- Reduce the ratio of capital to total assets that a bank must use to finance its operations by 1 percentage point;
- Eliminate orderly liquidation authority, which allows the Federal Deposit Insurance Corporation (FDIC) to lend to financial institutions when the stability of the financial system is at stake; and

1. For the agency's latest economic forecast, see Congressional Budget Office, *An Update to the Budget and Economic Outlook: 2019 to 2029* (August 2019), www.cbo.gov/publication/55551. The estimates in this report were finalized before the agency's August 2019 baseline projections became available; they are based on the agency's May 2019 baseline projections. See Congressional Budget Office, *Updated Budget Projections: 2019 to 2029* (May 2019), www.cbo.gov/publication/55151.

Summary Figure 1.

How Policy Changes Related to Financial Regulation Affect Projections of the Federal Budget



Source: Congressional Budget Office.

FDIC = Federal Deposit Insurance Corporation.

- Repeal the ability-to-repay rule governing mortgage lending, which requires lenders to make a good-faith determination that borrowers are able to repay before they originate loans.

The three illustrative policies were chosen to represent a broad range of proposals that policymakers have considered or might consider in the future.[2] For simplicity, the three policies all reduce the government's involvement in the financial sector. But the analysis is also relevant for changes that would increase the government's involvement or that would have effects that were somewhat similar in size to those of the illustrative policies.[3] (The three policies were not designed to have effects of the same magnitude as one another.)

What Are the Direct Effects of the Three Illustrative Policies on Spending and Revenues?

The three policies affect the costs of government guarantees and of other payments that the government makes to mitigate the consequences of failing financial institutions. Lowering capital requirements would increase the risk of financial institutions' failing, and if more institutions went under, the cost to the FDIC of resolving such failures—whether by invoking its orderly liquidation authority or by issuing payments from the Deposit Insurance Fund (DIF) to individuals who have deposits at the failed institutions—would rise. If repealing the ability-to-repay rule resulted in financial institutions' issuing more risky mortgages than they do under current law, that policy would also increase the risk of institutions' failing. In addition, those two policies would raise offsetting receipts and revenues by increasing premiums for deposit insurance and the fees charged to financial institutions to offset the higher costs stemming from the higher rate of bank failure. Eliminating orderly liquidation authority would remove from the budget the net costs associated with it under current law, but those savings would be partially offset by increases in the costs of maintaining the DIF.

2. The first illustrative policy represents a class of legislative proposals that affect the stringency of capital requirements. It broadly reflects the direction of recent legislative proposals that have aimed at simplifying capital requirements, particularly for small institutions, and at limiting the scope of capital requirements on the basis of stress tests. The last two illustrative changes would eliminate provisions that were introduced by the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act (Public Law 111-203).

3. Policies that increase the stringency of financial regulation typically have diminishing marginal effects. For example, the lower the baseline requirement, the greater the effects of increasing capital requirements: An increase from 1 percent to 2 percent in the minimum ratio of capital to assets would have larger effects on firms' cost of financing than an increase from 11 percent to 12 percent would. Furthermore, a *reduction* in capital requirements would have a larger effect than an *increase* of an equal amount starting from the same baseline. The larger the changes in capital requirements, the more likely those changes would be to trigger unintended consequences, such as shifts to and from unregulated sectors of the financial system.

What Are the Economic Effects of the Three Illustrative Policies?

When the financial system is stable, lower capital requirements and the loosened mortgage standards brought about by repealing the ability-to-repay rule would increase the availability—and lower the cost—of financing for investments, thus raising gross domestic product (GDP). Lowering capital requirements would allow depository institutions to finance more of their assets with debt, which would lower the after-tax cost of financing. Repealing the ability-to-repay rule would allow more people to take out mortgages, which would in turn increase residential investment. Both of those changes in policy would, under baseline economic conditions, raise GDP.

Those two policies would, however, also increase the likelihood of a financial crisis, and such a crisis would substantially lower GDP and raise the deficit. Similarly, eliminating orderly liquidation authority would get rid of a tool that policymakers might wish to use to respond to a future crisis. The absence of that tool could raise the severity of an economic downturn that stemmed from a financial crisis that other tools available under current law could not quickly contain. When all possible outcomes are weighted on the basis of their probability of occurring, the negative effects on the economy that the illustrative policies could bring about in some cases more than fully offset the projected positive effects of the policies under baseline economic conditions.

What Are the Budgetary Consequences of Those Economic Effects?

The economic effects of the illustrative policies would feed back into the budget. Under baseline economic conditions, the effects of such macroeconomic feedback on tax revenues would be mixed. By allowing banks to finance more of their operations with debt instead of equity, lowering capital requirements would induce a shift to debt financing that would reduce corporate tax revenues. But by raising GDP, it would also raise both individual and corporate income tax revenues under baseline economic conditions, though by a lesser amount.

Loosening mortgage standards by repealing the ability-to-repay rule would slightly raise productivity and income. But the increase in economic activity would be concentrated primarily in the housing sector, and categories of gross income in that sector, including depreciation and imputed rent, are taxed at lower rates than overall income. The increases in productivity and income from repealing the ability-to-repay rule would thus lead to relatively small changes in total revenues.

Eliminating orderly liquidation authority would give rise to offsetting factors, making both the direction and the magnitude of the policy's economic effects under baseline economic conditions uncertain. CBO estimates that the macroeconomic feedback from implementing that policy would have no effect on the budget, but it is possible that eliminating orderly liquidation authority could either increase or decrease financial institutions' incentive to engage in risky behavior, which would affect economic activity under baseline conditions and change the likelihood of a financial crisis. The precise effects depend on how market participants expect policymakers to use orderly liquidation authority and whether their expectations cause them to take on more or less risk. In addition, the effectiveness of orderly liquidation authority in a crisis would depend on whether the FDIC's exercising that authority increased stability as intended or instead resulted in further uncertainty among market participants.

All three illustrative policies would increase the likelihood and potential severity of a financial crisis. Implementing any of the policies would also increase the likelihood that deficits would rise substantially, because if a financial crisis occurred, revenues would drop, safety-net spending would rise, and the government would incur direct costs to stabilize the financial system. The reduction in tax revenues brought about by a crisis would contribute much more to deficits than would the direct costs of resolving such a crisis, CBO estimates. That projection is based on analysis of the 2007–2009 crisis, whose impact on the budget came primarily through the large drop in tax revenues (both in nominal dollars and as a percentage of GDP) rather than through the costs of resolution through the deposit insurance system. The Troubled Asset Relief Program (TARP), which was created through legislation to stabilize the financial system, is estimated to have cost the federal government a total of $32 billion: Programs that supported financial institutions resulted in a net gain of $12 billion, and mortgage programs and activities that assisted the automotive industry together

cost $44 billion.[4] Legislation enacted after the crisis to stimulate the economy with government spending and tax relief generated substantially larger budgetary costs.

One key takeaway of this analysis is that the largest effects of changes to financial regulation policies on the federal budget stem from macroeconomic feedback (see Summary Figure 2). Although in CBO's projections the magnitude of that macroeconomic feedback exceeds the direct effects of policy changes, projections of the economic effects of changes to financial regulations and federal guarantees—and thus the consequences of those effects on the budget—are subject to greater uncertainty than are projections of the direct budgetary effects of such policies.

This report highlights the effects of financial regulation on the federal budget, but those effects are not the only—nor necessarily even the primary—consideration in evaluating financial regulation. In addition to the effects on economic variables and the federal budget, the Congress and the public might wish to consider the effects of financial regulation on large and small businesses or the consequences of financial crises on the well-being of families, homeowners, and communities—including increased rates of foreclosure and eviction, sluggish growth in wages, and losses in household wealth. Furthermore, a crisis would affect not only the budget of the federal government but those of state, local, and tribal governments as well. Such effects could have long-lasting social consequences.

Other studies of financial regulation have used a benefit-cost framework to analyze financial regulation, but such an analysis is beyond the scope of this report. Such an analysis would provide a full inventory of the benefits and costs of alternative policies and would typically highlight the trade-off between improved stability in the financial system and the costs of regulation: Tighter regulation leads to a financial system with lower rates of failure but with higher costs to businesses and consumers. A benefit-cost analysis evaluates policy proposals on the basis of whether the value of the improved efficiency (during stable economic conditions) expected to result from implementing the proposal outweighs the cost of the estimated increase in the likelihood of a crisis stemming from the change. That trade-off between safety and cost is characteristic of efforts to regulate financial markets.

How Uncertain Are the Estimates of Economic and Budgetary Effects?

Because this analysis required numerous assessments about how participants in financial markets might react to policy changes and how their changes in behavior would affect the economy, the estimates are uncertain. All the underlying parameters used to generate those estimates are also, to varying degrees, uncertain. In large part, that uncertainty arises because the probability of a financial crisis is difficult to estimate: Such crises are rare, and federal policy has continued to change over the past century, so the historical data from times when such policy was similar to what it is today are very limited. Furthermore, the next crisis may differ significantly from previous crises, adding even more uncertainty to historically based parameters.[5]

To establish the parameters used in this analysis, CBO drew on academic literature on the causes and consequences of financial crises, the effects of financial regulation, and the predictors of failure for individual financial institutions. In some cases—such as the relationship between banks' levels of capital and rates of failure—the values that CBO used for the parameters are from academic studies. In other cases, the literature does not provide direct evidence to support a particular value for a parameter, but it nevertheless informed the agency's judgments about the parameter. For example, no empirical study of the relationship between orderly liquidation authority and the severity of crises exists because no crisis has occurred since that authority was established;

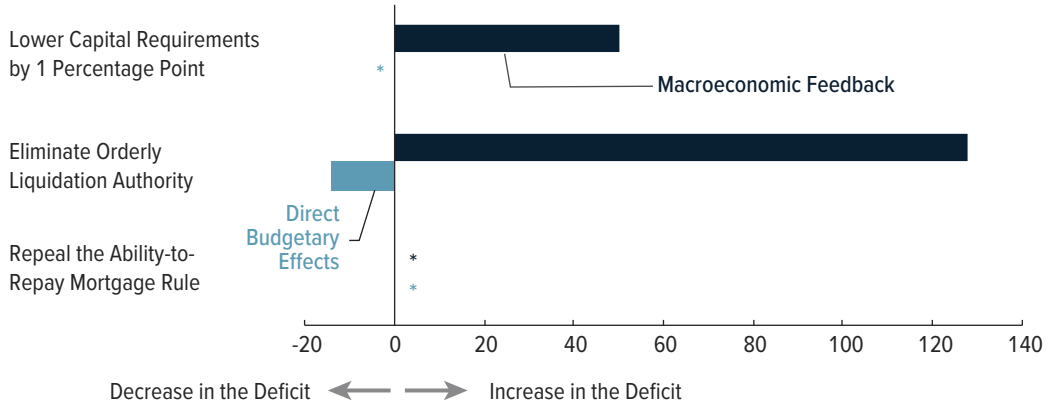
4. See Congressional Budget Office, "Report on the Troubled Asset Relief Program—March 2018" (March 2018), www.cbo.gov/publication/53617. The U.S. financial system was in a precarious state when TARP was created, and the interventions authorized by the legislation posed substantial financial risk to the federal government. In its early estimates, CBO projected that the subsidy cost of TARP programs would be substantially greater than the agency now estimates it actually was. Programs that purchased preferred stock from banks and support for American International Group (commonly known as AIG) accounted for much of that cost. The net cost of TARP has proven to be near the low end of the range of possible outcomes anticipated at the program's outset, in part because investments, loans, and grants made to participating institutions through other federal programs and by the Federal Reserve have helped to curtail TARP's costs.

5. Supplemental materials posted along with this report on CBO's website (www.cbo.gov/publication/55586) highlight the sensitivity of the agency's projections to the underlying parameters.

Summary Figure 2.

Budgetary Effects of Three Illustrative Policies, 2020 to 2029

Billions of Dollars



The magnitude of the macroeconomic feedback exceeds the direct budgetary effects of all three policies in CBO's projections. But such dynamic analysis is subject to greater uncertainty than CBO's analysis of the direct budgetary effects of policy changes.

Source: Congressional Budget Office.

* = between -$500 million and $500 million.

thus, there are no data on which to base such a study. In that case, CBO reviewed studies of the economic performance of countries that resolved their banking crises using different approaches, and it also considered ways that orderly liquidation authority might be used in future crises.

Two Caveats About This Analysis

In accordance with the conventions the agency uses to prepare cost estimates, CBO conducted this analysis under the assumption that current laws governing spending and revenues will generally remain unchanged. The projections provide estimates of how the illustrative policies would affect the budget during and after a crisis if the Congress did not pass any emergency legislation to address it. That limitation is especially significant in the analysis of the scenario in which orderly liquidation authority is eliminated. For that analysis, CBO compared the crisis response that would occur through orderly liquidation authority under current law with the response that would be likely to occur if that authority was eliminated and the government relied on other mechanisms in place under current law. The analysis does not include the effects of legislation that the Congress might pass after a crisis was already under way to address unforeseen problems. Although CBO's projections reflect the assumption that current law remains unchanged, the agency takes into account assessments about how market participants' behavior would be affected by their anticipating policy decisions, including possible changes in law, during a crisis.

Also by convention, this report projects the budgetary effects of the illustrative policies on a cash basis over 10 years. That timeframe gives a truncated picture of the long-run budgetary effects of the illustrative policies. For example, the FDIC determines premiums and assessments to ensure that they are high enough to recoup costs over the long run. Sometimes the lag between when the FDIC experiences losses and when it charges premiums to cover them is greater than 10 years. In that situation, long-run costs would be lower than those indicated by the 10-year projections because revenues would be received after the projection period ended. Similarly, the 10-year cash estimates give a truncated picture of the economic effects of the illustrative policies. Policies that change the cost of financing investment may take more than a decade to fully affect the stock of productive capital.

CHAPTER

1

Financial Regulation Under Current Law

The financial system connects people and institutions that have savings with households and companies that need those funds for investment and consumption. In addition, the financial system provides liquid markets in which people can buy and sell investments; ensures that information about investments is quickly brought to markets by traders, who determine prices; and provides an insurance mechanism that households and businesses can use to trade and share risks.

The financial system consists of various types of institutions and markets. Households and institutions pool their savings in banks, mutual funds, and other intermediaries, which in turn use those funds to make loans to other households and to invest in companies. Investment banks help companies issue stocks, bonds, and securities backed by mortgages and other loans, and brokers help households purchase those securities in financial markets. To protect against the financial consequences of events such as fires, accidents, and litigation, households and businesses buy insurance and securities that share the risk.

Regulation is intended to reduce the likelihood and severity of disruptions to the financial system and to protect consumers and investors through, for example, capital requirements that require financial institutions to back up their obligations with shareholders' funds. One key objective of financial regulation is to promote the safety and soundness of individual institutions. Guarantee, lending, and resolution authorities help protect the financial system and households by promoting the stability of financial institutions, maintaining public confidence in them, and limiting the consequences when a financial institution fails. Protecting consumers and investors—by requiring institutions to disclose information about their financial standing and the terms and conditions of their consumer products, for example—is another component of financial regulation.

When it is successful, regulation can increase consumers' confidence in the system and their willingness to participate in financial markets. But regulation can have negative consequences for competition, innovation, and efficiency because it imposes costs that lead to less borrowing and lending and thus slow economic growth (see Table 1-1). In addition, guarantee, lending, and resolution authorities can create an incentive for banks to engage in riskier activities than they might if their creditors or shareholders faced the full consequences of such behavior when it turned out badly. Moreover, regulators face many challenges: They must address the complexities of the financial system while ensuring the regulations are not overly complicated, they have only limited information to work with, and financial institutions strategically adapt in response to regulations.

Goals and Challenges of Financial Regulation

Because the financial system plays a vital role in the economy, disruptions in the system can have significant consequences for economic activity. The 2007–2009 crisis illustrated how instability in financial markets can negatively affect the welfare of households. During the crisis, stock prices dropped by over one-half, house prices by almost 20 percent, and household wealth by about 15 percent. The unemployment rate, which was 5 percent before the crisis, rose to 10 percent; the number of people employed fell by almost 9 million; and the number of people working part time who would prefer to work full time rose by nearly 5 million. Moreover, the long-term unemployment experienced by many job seekers may have had a lasting effect on their career prospects. In those years, the percentage of mortgages entering foreclosure each quarter also rose, from an average of roughly 0.4 percent before the crisis to a peak of nearly 1.5 percent in 2009 (see the top panel of Figure 1-1). The following year, lenders completed foreclosure on more than 1 million homes.

The 2007–2009 crisis also had a significant effect on state and local finances (see Box 1-1 on page 10). State revenues fell by more than 10 percent during the crisis, putting pressure on program areas for which state spending is the highest—education, health, and social

Table 1-1.

An Overview of Financial Regulation

	Safety and Soundness Regulation	Guarantee, Lending, and Resolution Authorities	Consumer and Investor Protection
Objective	Support economic and financial stability	Limit consequences to financial and economic system when institutions fail	Prohibit or discourage practices that harm consumers and investors
Potential Unintended Consequence	Might inhibit valuable economic activities that pose little risk	Sharing burden of negative outcomes of risky behavior might encourage institutions to take excessive risks	Might prohibit products that could help consumers
Example	Capital requirements	Orderly liquidation authority	Ability-to-repay mortgage rules

Source: Congressional Budget Office.

services—just as demand for safety-net programs was rising. For example, the financial difficulties of state and local governments led to an abrupt drop in the number of teachers and other public school employees. From 2008 to 2012, school employment dropped by over 300,000, partly through the layoff of around 60,000 school employees in 2009 alone and partly through attrition (see the bottom panel of Figure 1-1.)

The goal of safety and soundness regulation is to support financial stability and protect households and businesses who place their savings in the financial system (see Table 1-1). Capital requirements, which require that a minimum proportion of banks' assets be financed by equity rather than by deposits or other forms of debt, are a key element of safety and soundness regulation. They ensure that financial institutions have larger buffers of capital to absorb losses before they fail or require government support. When an institution fails, deposit insurance reduces the consequences to the financial system and to households, and it can help maintain a stable source of funding to financial institutions.

Consumer protection rules generally discourage or prohibit the use of financial products that regulators identify as harmful to consumers, and investor protection rules generally require businesses to file financial disclosures and prohibit fraud in financial statements. The ability-to-repay rule is an example of a rule meant to protect both consumers and investors. In an attempt to discourage the origination of mortgages that are likely to end in foreclosure, the rule requires lenders to make a good-faith determination that borrowers have the ability to repay the loans that they originate. The rule established a "safe harbor" for lenders by defining a large class of qualified mortgages (primarily on the basis of the ratio of borrowers' debt obligations to income) for which lenders are automatically presumed to have complied with the rule. Until 2021, all mortgages eligible for purchase by Fannie Mae and Freddie Mac are also classified as qualified mortgages, effectively exempting the vast majority of mortgages with balances under $484,350 in 2019 from ability-to-repay claims, even if they do not meet the other criteria for the safe harbor.[1] After 2021, mortgages eligible for purchase by Fannie Mae and Freddie Mac will no longer automatically be presumed to be in compliance with the rule; they must meet the other criteria to comply.[2]

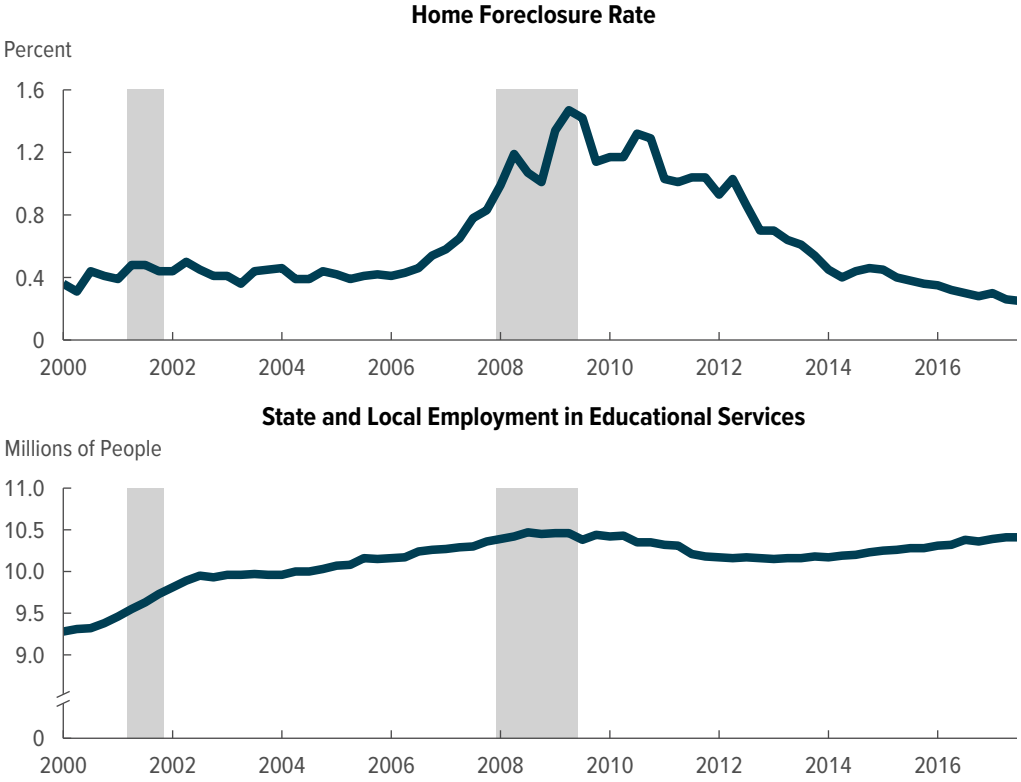
Regulators face numerous obstacles and pitfalls in pursuing financial stability and consumer and investor protection, and financial regulations can have unintended consequences. One obstacle regulators face is that financial markets are complex by nature and create risks

1. See Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 6407, 6536 (January 30, 2013), www.federalregister.gov/citation/78-FR-6407. If Fannie Mae and Freddie Mac exit conservatorship before 2021, the exemption for mortgages that those companies are eligible to purchase will end at that date.

2. See Qualified Mortgage Definition Under the Truth in Lending Act (Regulation Z), 84 Fed. Reg. 37155, 37162 (July 31, 2019), www.federalregister.gov/citation/84-FR-37155. The Consumer Financial Protection Bureau plans to allow the expiration to take place in January 2021 as scheduled or after a short extension.

Figure 1-1.

Effects of Financial Crises on Households and on State and Local Services



After the 2007–2009 financial crisis, the percentage of mortgages entering foreclosure each quarter more than tripled.

In the wake of that crisis, state and local governments' revenues dropped significantly. One consequence was that they cut funding for public education and employed fewer teachers.

Source: Congressional Budget Office, using data from the Mortgage Bankers Association and the Bureau of Labor Statistics.

Data are quarterly.

that regulators, whose information about the markets is incomplete, may fail to predict and address. Another is that markets evolve more quickly than regulators can react, and participants may adapt to regulation in a way that undermines the goals of such regulation. For example, financial activity might shift from the regulated products to new sectors and products that are less tightly regulated. As for unintended consequences, financial regulations might create a barrier to competition, especially for small institutions, because the costs of complying can be significant. As fixed costs, such compliance costs place a greater burden on smaller institutions than larger ones, putting the smaller institutions at a competitive disadvantage. Regulation can also raise financing costs and inhibit economically efficient investments.

Orderly liquidation authority and deposit insurance might also have unintended consequences. Although both policies reduce the likelihood of a run on the banking system, they create an incentive for financial institutions to engage in activities that shift risk to the government. Government guarantees may encourage risky behavior because they create an imbalance: When the risk results in a positive outcome, the owners of the private institution earn the full profits (after taxes), but when risks result in poor outcomes, the government pays part of the cost. Financial regulation and risk-based deposit insurance premiums can reduce the impact of those unintended consequences by prohibiting or discouraging risky practices.

Although orderly liquidation authority is intended to support financial stability, it could undermine the system and make it less stable if exercising that authority resulted in greater uncertainty about how losses would be allocated among private creditors. Under bankruptcy laws, recoveries are allocated among an institution's stakeholders according to an order of priority that is

Box 1-1.

The Effects of the 2007–2009 Crisis on State and Local Finances

States' budgets are subject to many of the same forces that affect the federal budget: limited resources, competing priorities, and macroeconomic cycles. But most states face additional constraints, including balanced-budget requirements, revenues that are earmarked for specific purposes (often for transportation and education), and complicated processes for issuing new debt. When faced with a deficit, a state has three primary options to respond: raise additional revenues, reduce spending, or tap its reserve fund. States generally apply those tools in that order, but in some cases, such as in the 2007–2009 financial crisis, they are forced to employ all of those tools to preserve their fiscal health.

Although nearly every state has a balanced-budget requirement, those requirements vary substantially from state to state: Some requirements are constitutional; others are statutory. Some require only that proposed budgets be balanced; others, that enacted budgets be balanced. And some permit deficits to be carried over and addressed in the following fiscal year, while others do not.[1] Whatever their form, balanced-budget requirements force states to quickly resolve any deficit that arises.

The 2007–2009 crisis tested states' ability to navigate within those constraints. The most direct effect of the crisis and recovery was a sharp decline in revenues. From 2008 to 2010, the sum of all states' general fund revenues fell by 10.4 percent, from $680 billion to $609 billion. Revenues have since rebounded, primarily because personal income (and thus taxes on it) has risen and because states have made changes to their tax laws. In 2018, general fund revenues for all states totaled $850 billion.[2]

To balance their budget after the significant decline in revenues began in 2008, states made corresponding changes to the other side of the ledger. They cut total expenditures by 10.7 percent, from a prerecession peak of $687 billion in 2008 to $613 billion in 2011.[3] Those cuts occurred in the sectors in which states' spending is highest: education, health, and social services.

While states were cutting expenditures, federal spending rose dramatically. Some of that increase was the result of automatic spending—such as spending for unemployment insurance—and required no new legislation. But much of the increase stemmed from new laws, such as the American Recovery and Reinvestment Act of 2009, which provided substantial assistance to states, including a temporary increase in federal matching funds for Medicaid.

Many states relied on a reserve (or rainy-day) fund to balance their budget. Nearly all states operate such a fund, the idea of which is based on a simple premise: Surpluses from periods of growth should be reserved to offset deficits during periods of contraction. Each state's fund is unique: Rules governing deposits and withdrawals, how the fund is replenished, the maximum size of the fund, and who has the authority to tap the balance differ from state to state. During the 2007–2009 crisis, states used rainy-day funds to counteract the sharp decline in revenues. Rainy-day fund balances fell from $33 billion in 2008 to $27 billion in 2010. By 2018, the median balance reached $60 billion, exceeding the prerecession peak both in absolute terms and as a share of state expenditures. In 2019, 32 states expect to run a surplus and add to the balance of their rainy-day fund.[4]

1. Kim Rueben and Megan Randall, *Balanced Budget Requirements: How States Limit Deficit Spending* (Urban Institute, November 2017), https://tinyurl.com/yxd9syp5.
2. National Association of State Budget Officers, *The Fiscal Survey of States, Fall 2018* (NASBO, 2018), https://tinyurl.com/ydxmltmm (PDF, 2.17 MB).
3. National Governors Association and National Association of State Budget Officers, *The Fiscal Survey of States, Fall 2010* (NASBO, 2010), https://tinyurl.com/y3y2c9vn (PDF, 3.18 MB).
4. National Association of State Budget Officers, *The Fiscal Survey of States, Fall 2018* (NASBO, 2018), https://tinyurl.com/ydxmltmm (PDF, 2.17 MB).

defined beforehand. Orderly liquidation authority could add uncertainty by giving the Federal Deposit Insurance Corporation the authority to change that priority, which could result in losses to stakeholders who would not bear them under bankruptcy laws. During a crisis, that uncertainty could create instability. Even under baseline economic conditions, it could dampen economic activity and slow output growth by making investments that would be relatively safe under bankruptcy laws appear to be more risky.

The high degree of state governments' involvement in regulation under current law creates obstacles for any federal legislation that might change financial regulation. Various entities at the federal and state levels promote financial stability and consumer and investor protection. Insurance companies are regulated primarily by state insurance commissions. Securities markets are regulated at the federal level by the Securities and Exchange Commission and the Commodity Futures Trading Commission, while brokers and investment advisers are subject to federal and state regulation. Likewise, both federal and state regulators oversee depository institutions. In addition, various government guarantee and insurance programs at the federal and state levels protect consumers of financial products from the consequences of the failure of regulated institutions.

The Dodd-Frank Wall Street Reform and Consumer Protection Act, enacted in 2010, created the Financial Stability Oversight Council (FSOC) in the Department of the Treasury to coordinate financial regulation among market segments and between the federal and state levels. Comprising officials from various agencies, the FSOC has the authority to designate a nonbank financial firm as systemically significant, thereby subjecting it to additional regulation, but otherwise the council has no authorities beyond those of its participating agencies. The FSOC is also charged with reporting to the Congress on emerging threats to financial stability.

Federal laws governing capital requirements leave significant details to the discretion of regulators. Under current law, regulators implement a broad statutory authority to determine the minimum amount of capital that financial institutions must use to finance their assets and how that minimum requirement varies on the basis of the kind of assets that a depository institution holds. Regulators examine depository institutions to identify and limit the risks that they face. In addition, to avoid regulatory competition and promote an international banking system, regulatory efforts are often coordinated internationally through agreements that align capital requirements for banks that operate in more than one country.

Safety and Soundness Regulation

Safety and soundness regulation promotes financial stability by reducing the risk of individual institutions' failing and the consequences of such failures. It also limits the incentive to place risk on the government that arises from deposit insurance and other federal guarantees. Without such regulation, failures of individual institutions—particularly large interconnected ones—could cause disruptions in the financial system by creating panic that might spread to other institutions.

Some of the key tools used for safety and soundness regulation are capital requirements, liquidity requirements, policies that incentivize risk management, and federal supervision of institutions. Capital requirements mandate that financial institutions (including depository institutions such as banks, credit unions, and savings associations) maintain prescribed amounts of capital—that is, the money shareholders have invested in the institution, or equity—to serve as a buffer against losses. Financing more of their assets with equity capital (as opposed to debt that needs to be repaid) reduces the risk that depository institutions will have insufficient resources to fulfill their obligations. Companies fail when they are unable to meet their obligations, but bank regulators such as the FDIC tend not to wait until depository institutions reach that point and instead intervene when such institutions' capital falls below a critical level to limit the costs of resolution to the federal government, including costs stemming from losses that are covered by federal deposit insurance.[3] If two depository institutions had identical assets, business models, and management, the one that financed its business with more capital would be less likely to fail than the one that relied more heavily on borrowed funds.

Because banks face multiple minimum capital-to-asset-ratio requirements based on different measures of capital and assets as well as additional requirements that regulators impose on the basis of stress tests and other tools, it is difficult to boil down minimum capital levels to a single ratio. The binding capital requirement at any given time for an institution depends on the measured risk of its assets, the proportions of its capital in various categories, the results of stress tests, and the assessment of regulators. On average, institutions currently fund about 10 percent of their assets with shareholders' money; however, institutions' capital-to-asset ratios vary widely, in part because some institutions choose

3. Under its authority to take "prompt corrective action," the FDIC can close a bank with a capital-to-asset ratio of less than 2 percent.

to maintain higher ratios than required.[4] In addition to capital requirements, banks face liquidity requirements that require them to hold enough cash, or assets that can be easily converted into cash, to fulfill their obligations and fund their activities under unexpected circumstances that resulted in, for example, the sudden withdrawal of a large proportion of their deposits or the loss of access to credit markets.

Financial Guarantee, Emergency Lending, and Resolution Authorities

The federal government's authorities to provide financial guarantees, issue emergency loans, and resolve failing institutions help prevent individual institutions' financial troubles from spreading throughout the system and protect the savings of depositors and other stakeholders. The FDIC furthers those objectives through the traditional deposit insurance system and, since 2010, through its orderly liquidation authority.

Deposit Insurance

The federal government established the FDIC in 1933 to forestall runs on banks, which were common occurrences at the time. Before the advent of the FDIC, bank runs occurred when many depositors withdrew their funds from a bank and the news of their withdrawals spread, causing others to withdraw and creating the possibility that the bank might have insufficient cash on hand to repay depositors. As the news spread and fear of bank failure mounted, more people would withdraw their money, which only further increased the risk that the bank would fail, creating a vicious circle. A run on one bank could prompt a run on other banks, either because those other banks had lent to the first bank or because they faced the same risks; that contagion effect expanded the vicious circle.[5]

Deposit insurance is intended to halt the vicious circle by removing the fear among depositors that a bank run will result in the loss of their funds. Depositors are assured that if a financial institution fails and is unable to return their deposits, the FDIC will issue payments to them up to the statutory maximum amount or find a healthy institution to assume the failing institution's obligations to them. The FDIC attempts to recover the costs of those payments by selling the failed institution's assets, but the remainder of the cost is paid out of the Deposit Insurance Fund. The balance of that fund is maintained by assessments that the FDIC collects from depository institutions.

One drawback of that system is that because the government assumes part of the losses incurred by failing institutions, regulation is needed to constrain activities that would shift risk from private investors to the government. Faced with that challenge, regulators try to design rules that align market participants' incentives with regulators' goals. Capital requirements are an example of such an approach: By requiring shareholders to bear some of the risk of the institutions in which they invest, such requirements give shareholders a financial incentive to monitor the institution's risk.[6]

The maximum amount that the FDIC insures per account has increased over time through legislation. The most recent changes to those limits were made after the 2007–2009 financial crisis began. The Emergency Economic Stabilization Act of 2008 temporarily raised the limit from $100,000 to $250,000, and two years later, the Dodd-Frank Act made that increase permanent. In addition, after uninsured depositors began withdrawing their funds from some of the nation's largest banking organizations during the financial crisis, the FDIC used its preexisting authority to expand insurance in times of "systemic risk" to extend conditional guarantees to nondeposit liabilities and previously uninsured deposits.[7]

4. The FDIC reported that the aggregate "core capital (leverage) ratio," which is based on a non-risk-adjusted measure of capital, was 9.76 percent in the first quarter of 2019. See Federal Deposit Insurance Corporation. *Quarterly Banking Profile, First Quarter 2019* (May 29, 2019), Table I-A, p. 5, www.fdic.gov/bank/analytical/qbp/2019mar.

5. Runs tended to occur on banks that were facing financial difficulties. Academic studies debate whether or not panic spread to healthy banks through a contagion effect. Some scholars argue that bank runs served an economic purpose by rapidly closing institutions that were financially unsound and by serving as an incentive against lax management.

6. See Ben S. Bernanke, "Financial Regulation and the Invisible Hand" (speech given at the New York University Law School, New York, N.Y., April 11, 2007), https://tinyurl.com/y2qybzxb.

7. See Federal Deposit Insurance Corporation, *Crisis and Response: An FDIC History, 2008–2013* (2017), Chapter 3, www.fdic.gov/bank/historical/crisis; and Temporary Liquidity Guarantee Program, 73 Fed. Reg. 64179, 64191 (October 29, 2008), www.federalregister.gov/citation/73-FR-64179.

Orderly Liquidation Authority

In addition to raising the maximum amount of coverage provided by the FDIC to account holders, the Dodd-Frank Act established orderly liquidation authority in 2010, thereby extending the FDIC's resolution authority to nondepository institutions, such as the broker-dealer subsidiaries of bank holding companies. During the 2007–2009 financial crisis, regulators relied on lending and guarantee authorities vested in the Federal Reserve and the Treasury to support nondepository institutions and contain the crisis, revealing the limitations of the regulatory system at the time. Orderly liquidation authority was intended to address those limitations.

During the crisis, investors who had provided funding to nonbank financial firms grew increasingly unwilling to continue to invest in those firms. One form of borrowing on which nonbank financial firms had relied heavily involved what are known as repurchase agreements: Firms sold and agreed to repurchase securities backed by mortgages and other assets. Although before the crisis firms were able to roll over their debt (that is, to renew the agreements to extend their due date), repurchase arrangements became subject to runs during the crisis. That difficulty in rolling over debt increased the likelihood that a significant number of firms would be short of funds to repay their maturing debts, just as they would be during a bank run.[8]

To address that situation, the Federal Reserve exercised its authority to make collateralized loans under "unusual and exigent" circumstances to avoid failures of nonbank financial firms, and the Treasury used the Exchange Stabilization Fund to insure money market mutual funds to stop a run. In 2010, after the crisis had passed, the Dodd-Frank Act placed restrictions on those authorities that would prevent their use under some circumstances. The new restrictions would have precluded the steps that the Federal Reserve and the Treasury had taken to address the crisis; instead, the next time a similar situation arose, regulators could invoke the new authority established by the Dodd-Frank Act—orderly liquidation authority.

Orderly liquidation authority empowers the FDIC to manage the resolution of large financial institutions—including businesses that own or are affiliated with banks and other financial companies that are not banks but that perform some of the functions of banks—outside the typical bankruptcy process. Under that authority, the FDIC may use the Orderly Liquidation Fund (OLF) to, among other things, support a temporary bridge company to assume the operations of the failing company. That authority can be invoked only when the Treasury Secretary and two-thirds of the members of the Federal Reserve Board of Governors certify that other resolution mechanisms are insufficient to restore financial stability and that exercising orderly liquidation authority is therefore necessary to address a crisis (see Figure 1-2). If the FDIC uses funds from the OLF, it will recover those funds by selling some or all of the failing institution's assets, such as one or more of its lines of business or, in the case of a holding company, its subsidiaries. If the proceeds from those sales were not sufficient to recoup the FDIC's costs, then the FDIC would assess fees on other firms for a limited period to recover its net loss.

Costs of Deposit Insurance and Orderly Liquidation Authority Under Current Law

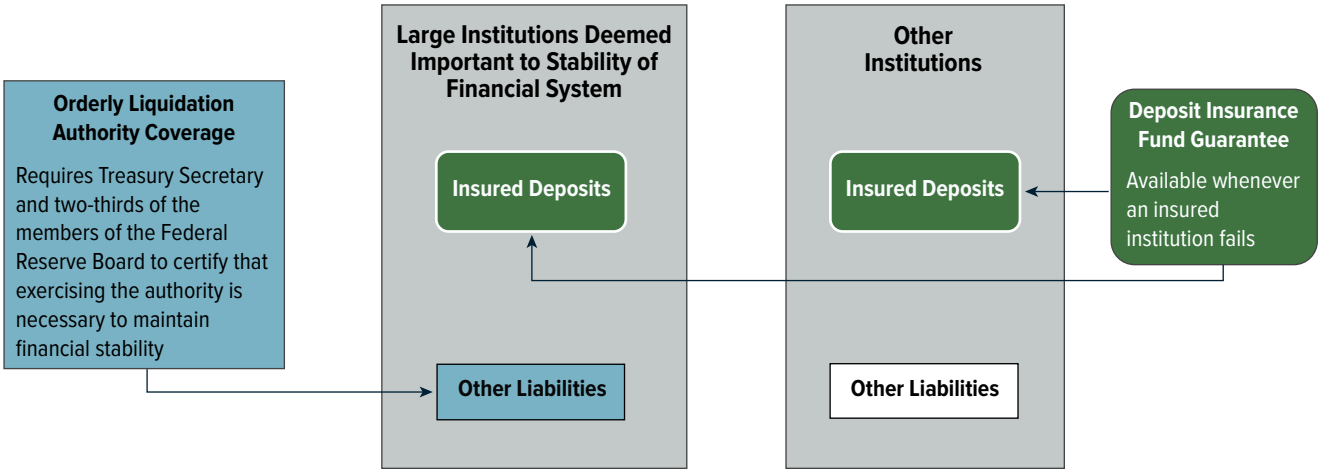
Under current law, the net budgetary cost of deposit insurance equals the cost of resolving bank failures minus the premiums that the FDIC receives from banks, which are treated as an offset to spending. The FDIC aims to charge premiums that, over the long run, are sufficient to cover the cost of bank failures and create a fund balance that buffers against higher-than-expected losses in the future. Sometimes there is a significant lag between when the FDIC experiences losses and when it charges premiums to cover them, so the 10-year projection period may provide a truncated picture of the long-run budgetary effects of policies affecting the FDIC. Accrual measures of the costs of the FDIC's activities may provide more accurate information than cash measures about those costs over the long run (see Box 1-2).[9]

8. See Gary Gorton and Andrew Metrick, "Securitized Banking and the Run on Repo," *Journal of Financial Economics*, vol. 104, no. 3 (June 2012), pp. 425–451, https://doi.org/10.1016/j.jfineco.2011.03.016.

9. For a discussion of how fair-value accounting might apply to deposit insurance and orderly liquidation authority, see Congressional Budget Office, *Measuring the Costs of Federal Insurance Programs: Cash or Accrual?* (December 2018), www.cbo.gov/publication/53921. This report uses fair-value (that is, market-value) estimates to measure the effect of changes in policy on financing costs. Such measures might help policymakers understand the cost of the FDIC's significant exposure to market risk through the deposit insurance program and orderly liquidation authority.

Figure 1-2.

The Relationship Between Guarantees Provided by the Deposit Insurance Fund and the Orderly Liquidation Fund



Source: Congressional Budget Office.

The baseline projections of the costs of deposit insurance and orderly liquidation authority are based on data collected since the FDIC's inception in 1933 (see Figure 1-3). Bank failures and instances in which the FDIC used the tools at its disposal (the authority to purchase distressed assets at a premium, for example) to financially support a failing institution are highly concentrated in a limited number of years, mostly during the 1980s banking crisis and during and after the 2007–2009 financial crisis. The data show that the number of bank failures can increase abruptly and significantly after a period of few or no failures. For example, no institutions failed in 2005 or 2006, but the highest failure rates in the FDIC's history were recorded over the three years that followed.

To reflect those circumstances, the failure projections used for the baseline are probabilistic: They place some weight on the possibility of high failure rates and much more weight on the higher probability of a failure rate that is low or even zero. The resulting failure projection for each year is higher than the actual number of institutions that will fail in most years but much lower than the number of institutions that would fail in a year in which a crisis occurred.

The episodic nature of bank failures—and the fact that banking regulations have changed significantly throughout history—creates a great deal of uncertainty in the estimates. Because accurately measuring the likelihood of rare events such as banking crises requires data that span a long period, CBO uses data on banks that span the FDIC's entire history to measure the likelihood of bank failures.[10] But the extent and types of regulation have changed considerably over that period, limiting the relevance of much of that data to forecasting future failure rates under current law. The data for 2011 and later years—the years under the Dodd-Frank Act—are the most relevant to the future, but that span is too short to provide a suitable sample. CBO's baseline estimate of the failure rate of financial institutions thus falls between the very low rate that has prevailed since the passage of the Dodd-Frank Act and the average historical rate.

The payments that the FDIC makes to depositors under the deposit insurance program and to other stakeholders under orderly liquidation authority represent gross costs to the federal government. Although the FDIC generally recovers most, but not all, of its payments for

10. Statistical analysis of data on thousands of banks for each year can be used to estimate the effect of an institution's characteristics (such as its capital) on its risk of failure relative to that of other banks, but the large sample in each period does not translate into a more accurate measure of absolute risk of bank failures because the failures of individual banks in a time period are not independent from each other.

Box 1-2.

Measuring the Cost of the Federal Deposit Insurance Corporation's Activities: Cash Versus Accrual Accounting

To contain financial disruptions and limit their effects on the wider economy, the Federal Deposit Insurance Corporation (FDIC) responds to troubled financial firms by invoking its orderly liquidation authority and to failed depository institutions by issuing payments to depositors. Because such activities entail cash flows over many years, accrual measures can provide more complete information about their long-term costs than can the cash estimates that are typically used in the budget process.[1]

Annual cash flows to and from the two funds that the FDIC uses to carry out its resolution activities—the Orderly Liquidation Fund (OLF) and the Deposit Insurance Fund (DIF)—may not be good indicators of the net costs of a given year's transactions, especially during or after a financial crisis, when losses are large. For any particular year or 10-year period, a snapshot of projected cash flows might reflect recoveries and receipts related to resolutions of financial firms that occurred before the period began and would not include all the receipts from assessments related to resolutions that occur during the projection period.

Although the cash flows of the FDIC are highly uncertain, CBO generally expects that the OLF and DIF will be self-financing over the long run because the FDIC is required under current law to recover costs through fees paid by banks to the DIF and through assessments on solvent financial firms that finance the OLF. Projections of the cash flows to the OLF over the next 10 years truncate a significant portion of the budgetary effects of any resolution that the FDIC might begin during the period, including most of the assessments expected to be collected from healthy firms to offset the FDIC's up-front costs.

In contrast to a cash estimate, an accrual estimate summarizes, in a single number, the net budgetary impact that is anticipated at a particular time from a commitment that will affect federal cash flows many years into the future. Accrual measures of the FDIC's resolution activities would indicate the present value of losses from bank failures when they were incurred by the OLF or the DIF. Such present-value estimates better reflect the fact that, under current law, losses in the DIF will eventually be offset by receipts from the financial industry. Whereas cash measures indicate that the activities related to the OLF add a total of about $14 billion to deficits over the next 10 years, accrual measures show that such activities contribute approximately $3 billion to deficits over the same period. The accrual estimate is not zero even though it accounts for assessments on firms related to resolution activities because costs of about $3 billion are projected to stem from indirect effects of the OLF fees on other federal cash flows—namely, lower revenues from payroll and income taxes.[2] For the deposit insurance program, accrual measures would show no net cost and maybe even net savings, indicating that when the time value of money is accounted for, receipts from the financial industry should at least equal the FDIC's costs and could possibly exceed them.

Generating accrual measures for the FDIC's resolution activities, however, poses some challenges. One challenge is that the FDIC effectively recovers losses for deposit insurance through a combination of assessments made before and after the loss occurs, which makes it difficult to assign costs to a given year. Another difficulty is that the assessments used to replenish the OLF are recorded in the budget as revenues rather than as offsets to spending, so they cannot, under current budgetary rules, be incorporated into an accrual measure of spending. Finally, accrual measures of the activities related to the OLF and DIF would be very sensitive to the choice of interest (or "discount") rate used to calculate the present value of future cash flows.

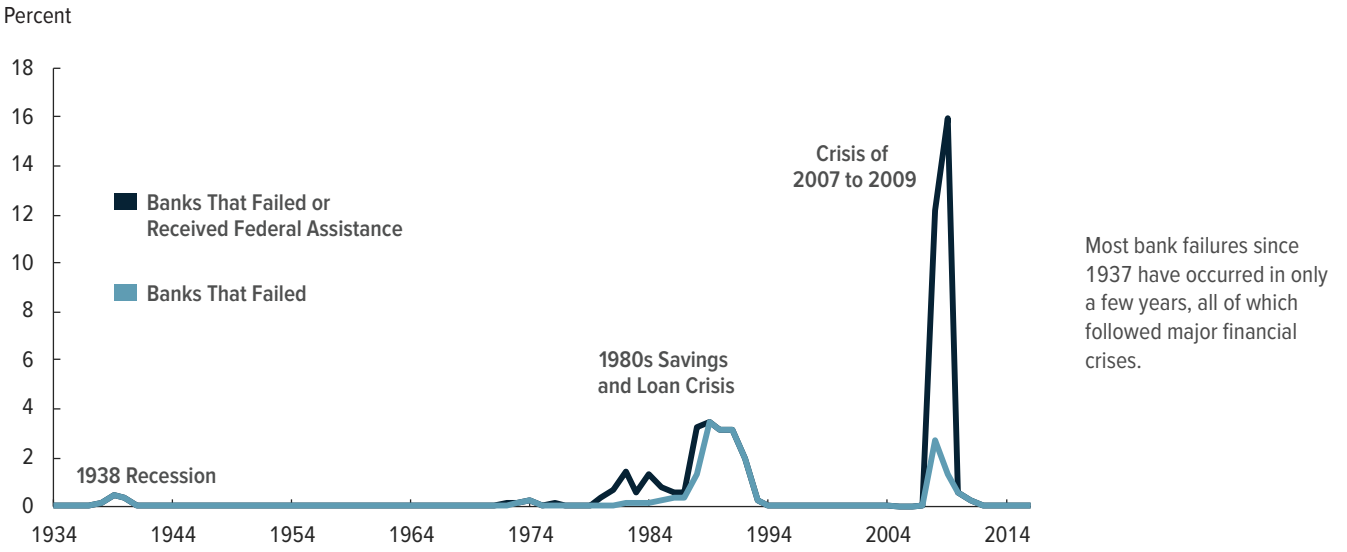
1. See Congressional Budget Office, *Measuring the Costs of Federal Insurance Programs: Cash or Accrual?* (December 2018), www.cbo.gov/publication/53921.

2. Changes in assessments on financial institutions are treated like excise taxes and other indirect taxes that affect businesses' and households' taxable income and thus the amount of federal tax revenues collected. See Joint Committee on Taxation, *New Income and Payroll Tax Offsets to Changes in Excise Tax Revenues for 2018–2028*, JCX-8-18 (March 2018), https://go.usa.gov/xma9t; and Congressional Budget Office, *The Role of the 25 Percent Revenue Offset in Estimating the Budgetary Effects of Legislation* (January 2009), www.cbo.gov/publication/20110.

deposit insurance by selling the failed institution's assets, it must ensure that the balance in the Deposit Insurance Fund can cover the remainder. The agency is required by law to maintain a DIF balance that significantly exceeds the expected costs of the program. Currently, the DIF's balance is above the statutory minimum target

Figure 1-3.

Rates at Which Banks Failed or Received Federal Assistance, 1937 to 2017



Source: Congressional Budget Office, using data from the Federal Deposit Insurance Corporation and the Bureau of Economic Analysis.

The term *bank* is used here to refer to all FDIC-insured depository institutions, including savings associations as well as banks.

The rates have been weighted to account for the size of banks as measured by their total assets. A bank is considered to have failed if regulators closed it. A struggling bank may instead receive federal assistance through the FDIC, which uses various tools (such as buying distressed assets at a premium) to support banks and allow them to remain open.

FDIC = Federal Deposit Insurance Corporation.

of 1.35 percent of total insured deposits but below the 2.0 percent target that the FDIC has set on the basis of its estimate of what would be needed to withstand a future crisis. The agency has therefore set premiums—which are based on the size of the bank and on a formula that captures their estimated risk of failure—at a level that it projects will be sufficient to grow that balance. By contrast, the FDIC does not build a reserve in the OLF; instead, it is authorized to assess fees on large financial institutions to cover net costs only after exercising orderly liquidation authority and borrowing the funds that it needs from the Treasury. Because the FDIC has not exercised orderly liquidation authority, it has not yet assessed such fees.

The costs of deposit insurance and orderly liquidation authority are recorded in the budget on a cash basis; that is, they reflect when payments are actually made or received. In the Congressional Budget Office's May 2019 baseline, the deposit insurance program is projected to *reduce* deficits over the 2020–2029 period by a total of $39 billion (not including interest) because institutions' payments to the DIF, which are recorded as offsetting receipts, are projected to exceed payments from the DIF—a projection that is in line with the FDIC's goal of increasing the DIF balance. By contrast, orderly liquidation authority is projected to increase the deficit by approximately $14 billion over that period—that is, the FDIC is projected to spend more through the OLF than it brings in from recoveries or from assessments on healthy institutions in the 10-year projection period. However, the cost estimate for the 10-year projection period overstates the long-run cost of the OLF because some of the recoveries and other receipts that relate to projected resolutions would be made *after* that period ends.

Although baseline estimates show that depository institutions are projected to pay deposit premiums that exceed the expected costs of the deposit insurance program, those expected costs do not capture the entire value of the program to private stakeholders. In particular, the current budget estimates do not include the cost of market risk, which reflects the tendency of costs to be

higher when the economy performs poorly. A fair-value estimate is an alternative measure of the cost of federal insurance programs that incorporates market risk and thus tends to be higher than a cash estimate. Fair-value estimates provide a more comprehensive measure of the benefit of deposit insurance and orderly liquidation authority to bank depositors and other stakeholders because they encompass the full value of the protection that stakeholders receive from the FDIC. As a result, fair-value accounting provides a better measure of how much deposit insurance and orderly liquidation authority might lower banks' cost of financing than does cash accounting.

Consumer and Investor Protection

Rules designed to protect consumers and investors can affect the federal budget indirectly through their effects on the economy and on the stability of the financial system. Products that harm consumers and investors can create instability in the financial system when their risks abruptly come to light. But restrictions on products can inhibit the flow of credit and thus lower gross domestic product and tax revenues.

The requirement that lenders must make a "reasonable and good faith determination" that borrowers have the ability to repay illustrates how such protections work. The statute and the Consumer Financial Protection Bureau's rule implementing it designate mortgages that meet certain requirements as qualified mortgages and protect lenders that extend such mortgages from ability-to-repay claims. By making banks that issue loans that do not meet those minimum requirements vulnerable to legal claims, the ability-to-repay rule discourages, but does not outright prohibit, banks from issuing mortgages that fall outside that safe harbor. In addition, the rule established minimum documentation requirements for all mortgages, ending institutions' practice, common before the 2007–2009 financial crisis, of issuing mortgages with incomplete documentation of items such as a borrower's income.

The definition of qualified mortgages relies primarily on the debt-to-income ratio, which is commonly used in underwriting. That ratio measures the required monthly payment on the mortgage and on the borrower's other debts (auto loans, for example) against the borrower's monthly income. Among other conditions that the terms of a mortgage must meet to qualify the lender for safe harbor under the rule, the borrower's debt-to-income ratio must be less than 43 percent after payments on the mortgage are accounted for. The rule also includes in the safe harbor any loan originated before 2021 that qualifies for purchase by Fannie Mae and Freddie Mac. That provision substantially reduced the impact of the ability-to-repay rule, and it will continue to do so until 2021, when it is set to expire. (The analysis in this report reflects the assumption that expiration will take place as scheduled; that assumption was affirmed by the Consumer Financial Protection Bureau in July 2019.)[11]

The ability-to-repay rule may help prevent the origination of mortgages that could contribute to widespread losses and, ultimately, a financial crisis. However, it creates a legal liability for lenders—and thus poses the risk of their incurring additional legal costs—which may affect their willingness to lend to consumers. To cover the risk of incurring legal costs on mortgages that fall outside of the safe harbor, lenders are likely to charge a higher interest rate on those mortgages than they might if the rule was not in place. Lenders might also face additional costs to document that the mortgages they originate qualify them for the safe harbor.

11. See Qualified Mortgage Definition Under the Truth in Lending Act (Regulation Z), 84 Fed. Reg. 37155, 37162 (July 31, 2019), www.federalregister.gov/citation/84-FR-37155.

CHAPTER

2

Direct Effects of CBO's Three Illustrative Policies on Spending and Revenues

Changes to the current system of financial regulation would most likely have direct effects on the federal budget by changing the costs of federal programs, the revenues generated by certain fees, or both. To demonstrate how a broad range of changes to financial regulation might directly affect the budget, the Congressional Budget Office analyzed three illustrative policies. The first, reducing capital requirements by 1 percentage point, is an example of safety and soundness regulation. The second, eliminating orderly liquidation authority, illustrates the effects of changing the federal government's guarantee, lending, and resolution authorities. The third, repealing the ability-to-repay rule for mortgages, provides an example of changing consumer and investor protections.

All three illustrative policies would directly affect federal spending and revenues. They all would change the rates at which financial institutions failed and thus would affect spending for government guarantee programs and the fees that offset such spending. Behavioral changes, such as changes in financial institutions' willingness to take risks, would also affect the federal budget and are incorporated in the estimates provided here. The indirect budgetary effects, or macroeconomic feedback—that is, the effects on the budget of changes in economic conditions that result from the policies—are covered separately in Chapter 4.

Two of the policies, lowering capital requirements and repealing the ability-to-repay rule, would increase federal spending for deposit insurance and orderly liquidation authority in the 2020–2029 period. That increase in projected spending occurs because implementing either of those policies would increase the likelihood that banks would fail. The third policy, eliminating orderly liquidation authority, would terminate not only the program's costs but also the offsetting receipts from fees assessed to recoup those costs, both of which are included in CBO's baseline projections. Unlike the other two policies, eliminating orderly liquidation authority would not, in CBO's estimation, increase the likelihood of bank failure. (However, doing so would increase the economic and budgetary consequences of severe financial crises, as discussed in the next two chapters.) The direct budgetary effect of implementing that policy would be to reduce net spending over the 10-year projection period, because under current law, the fees collected for the Orderly Liquidation Fund over that period are not projected to fully cover the costs of payments from the fund.

Lowering Capital Requirements

This illustrative policy would reduce the minimum ratio of capital to assets that institutions are currently required to maintain by 1 percentage point. For this analysis, that reduction is assumed to be accomplished through parallel decreases in multiple capital-to-asset-ratio requirements: The minimum ratio of capital to risk-weighted assets would be reduced by 1.5 percentage points, the simple capital-to-asset ratio would be reduced by 1 percentage point, and other requirements that are implemented through stress testing and supervisory practice would be reduced in a parallel way.[1] The notion behind this illustrative scenario is to dial down all requirements to a degree that would be consistent with a 1 percentage-point drop in capital without affecting the design of the capital-to-asset requirements or the relative importance of specific elements of the law. In other words, the policy is simplified; the details of a policy that was implemented to achieve the goal of lowering companies' capital-to-asset ratios by 1 percentage point may have additional effects that are not accounted for in this analysis. Furthermore, because some banks voluntarily maintain a higher capital-to-asset ratio than they are required to, a decrease in capital requirements would not result in all institutions' lowering their ratios by the same amount.

1. On average, institutions maintain a ratio of risk-weighted assets to non-risk-weighted assets of about 2 to 3, so a decrease in risk-weighted assets of 1.5 percentage points would be proportional to a 1 percentage-point decrease in the simple capital-to-asset ratio.

This illustrative policy reflects the broad contours of recent legislative proposals aimed at lowering capital requirements and at limiting the use of stress tests to determine institutions' capital requirements. Such proposals have generally targeted specific aspects of capital requirements. For example, some proposals would reduce the scope and frequency of stress tests and limit regulators' ability to restrict payments to investors on the basis of the results of such tests. Other proposals would limit the amount of capital required to back certain less risky assets. By lowering the amount of capital banks were required to hold in certain circumstances, such proposals would, in effect, reduce capital requirements overall. The budgetary effects of all proposals along those lines would be broadly similar to those of the illustrative policy: The magnitude of the effects would differ, but the direction would be the same.

Lower capital requirements would affect federal spending by increasing the likelihood that banks would fail, thus increasing the projected costs to the Federal Deposit Insurance Corporation of resolving those failures. A decrease of 1 percentage point would, CBO estimates, raise the rate of bank failures by 20 percent. Because not all institutions covered by orderly liquidation authority are banks, lower capital requirements would raise net outlays from the Orderly Liquidation Fund by a smaller amount. That 20 percent increase is CBO's central estimate, based on a number of studies of the relationship between capital and bank failures that provided estimates ranging from about 5 percent to 60 percent.[2] The wide range of effects most likely reflects differences in the studies' methods.[3] In arriving at its estimate of a 20 percent increase in bank failures, CBO accounted for the likelihood that banks would change their risk to offset the effect of changes in capital requirements.[4]

2. See Allen N. Berger and Christa H. S. Bouwman, "How Does Capital Affect Bank Performance During Financial Crises?" *Journal of Financial Economics*, vol. 109, no. 1 (July 2013), pp. 146–176, https://doi.org/10.1016/j.jfineco.2013.02.008; Rebel A. Cole and Lawrence J. White, "Déjà Vu All Over Again: The Causes of U.S. Commercial Bank Failures *This* Time Around," *Journal of Financial Services Research*, vol. 42, nos. 1–2 (October 2012), pp. 5–29, https://doi.org/10.1007/s10693-011-0116-9; Justin Yiqiang Jin, Kiridaran Kanagaretnam, and Gerald J. Lobo, "Ability of Accounting and Audit Quality Variables to Predict Bank Failure During the Financial Crisis," *Journal of Banking and Finance*, vol. 35, no. 11 (November 2011), pp. 2811–2819, https://doi.org/10.1016/j.jbankfin.2011.03.005; Robert A. Jarrow and others, "A General Martingale Approach to Measuring and Valuing the Risk to the FDIC Deposit Insurance Funds" (paper presented at Finance and Banking: New Perspectives, Federal Deposit Insurance Corporation conference, Alexandria, Va., December 5–6, 2003), https://go.usa.gov/xPdCK; Darrell Duffie and others, "Market Pricing of Deposit Insurance," *Journal of Financial Services Research*, vol. 24, nos. 2–3 (October 2003), pp. 93–119, https://doi.org/10.1023/B:FINA.0000003319.53270.73; Robert DeYoung, "De Novo Bank Exit," *Journal of Money, Credit, and Banking*, vol. 35, no. 5 (October 2003), pp. 711–728, https://doi.org/10.1353/mcb.2003.0036; Arturo Estrella, Sangkyun Park, and Stavros Peristiani, "Capital Ratios as Predictors of Bank Failure," *Economic Policy Review*, Federal Reserve Bank of New York, vol. 6, no. 2 (July 2000), pp. 33–52, https://tinyurl.com/y7wbfvbg; David C. Wheelock and Paul W. Wilson, "Why Do Banks Disappear? The Determinants of U.S. Bank Failures and Acquisitions," *Review of Economics and Statistics*, vol. 82, no. 1 (February 2000), pp. 127–138, https://doi.org/10.1162/003465300558560; and Rebel A. Cole and Jeffery W. Gunther, "Predicting Bank Failures: A Comparison of On- and Off-Site Monitoring Systems," *Journal of Financial Services Research*, vol. 13, no. 2 (April 1998), pp. 103–107, https://doi.org/10.1023/A:1007954718966.

3. Those differences include the functional form used to model the relationship between failure and explanatory variables such as capital, the time period covered by the study, the authors' definition of the capital ratio, the other explanatory variables in the models, and the frequency of the observations analyzed. Each model yields an estimate of the size of the reduction in failure rates that might result from an increase in ratio of capital to assets of 1 percentage point, all else being equal. The models with more frequent observations predicted larger reductions, suggesting that the predictive value of capital decays quickly over time. The models that incorporated other explanatory variables in addition to capital tended to have smaller coefficients, suggesting that some of the statistical relationship between capital and failure is based on the tendency of capital levels to be low when other conditions that cause failure are present.

4. For discussion of the relationship between capital and risk taking, see Michael Falkenheim and George Pennacchi, "The Cost of Deposit Insurance for Privately Held Banks: A Market Comparable Approach," *Journal of Financial Services Research*, vol. 24, nos. 2–3 (October 2003), pp. 121–148, https://doi.org/10.1023/B:FINA.0000003320.95646.5f; Paul Calem and Rafael Rob, "The Impact of Capital-Based Regulation on Bank Risk-Taking," *Journal of Financial Intermediation*, vol. 8, no. 4 (October 1999), pp. 317–352, https://doi.org/10.1006/jfin.1999.0276; George Sheldon, "Capital Adequacy Rules and the Risk-Seeking Behavior of Banks: A Firm-Level Analysis," *Swiss Journal of Economics and Statistics*, vol. 132 (December 1996), pp. 709–734, www.sgvs.ch/papers/1996-IV-18.pdf (1.85 MB); Rebecca S. Demsetz, Marc R. Saidenberg, and Philip E. Strahan, "Banks With Something to Lose: The Disciplinary Role of Franchise Value," *Economic Policy Review*, vol. 2, no.2 (October 1996), pp. 33–52, https://tinyurl.com/ybuw3528; Daesik Kim and Anthony M. Santomero, "Risk in Banking and Capital Regulation," *Journal of Finance*, vol. 43, no. 5 (December 1988), pp. 1219–1233,

By increasing federal outlays for resolving bank failures, lowering capital requirements would raise the projected costs of maintaining the Deposit Insurance Fund and the OLF, but those increased costs would be mostly offset. The larger payouts from the DIF would be offset by an increase in the premiums on deposit insurance that the FDIC collects. The agency sets those premium rates using a formula that requires institutions with lower capital to pay higher rates, so lowering capital requirements would increase the premiums that the FDIC received. The estimated increase in the likelihood of bank failures would increase CBO's projections of payouts from the OLF by less than $1 billion over the 10-year budget projection period. That increase would, however, be largely offset by fees assessed on firms. The effect of lowering capital requirements on the FDIC's net spending—that is, the agency's payouts from the DIF and the OLF minus the premiums and fees the agency collects—would be close to zero over 10 years (see Table 2-1).

Although the agency's central estimate indicates that the net effect of lowering capital requirements on the budget is negligible, the uncertainty surrounding that projection means that the range of possible outcomes is wide. (For more discussion of that uncertainty, see Chapter 5.) If the effect on bank failure rates was greater than estimated and the effect on FDIC premiums smaller, lowering capital requirements could raise deficits over the next 10 years above the amounts projected in CBO's baseline by as much as $19 billion in all. If, however, the effect on bank failure rates was smaller and the increase in premiums larger, total deficits over the period could fall by as much as $20 billion.

Eliminating Orderly Liquidation Authority

Under the scenario in which orderly liquidation authority is eliminated, deficits through 2029 would be smaller than they are in CBO's baseline projections because, under current law, that authority is projected to increase the deficit. In those projections, the potential use of orderly liquidation authority, measured on a probability-weighted basis, adds approximately $14 billion to total deficits over the next 10 years.[5] The authority results in a net increase in deficits in the agency's projections because $20 billion is projected to be spent to resolve failing institutions, and only $6 billion is expected to be recuperated through assessments on financial institutions within the 10-year projection period.[6] Most of the $14 billion net cost would be offset by higher assessments after the projection period ended.

Eliminating orderly liquidation authority would do away with that $14 billion net cost altogether, reducing deficits by a corresponding amount. Repealing that authority would place additional risk on the deposit insurance system because an insured depository institution might be among the creditors that would suffer losses if a large financial institution failed, and if the losses were severe enough, that depository institution could fail.[7] The likelihood of such a chain of events is lower under current law because orderly liquidation authority would buffer creditors against the losses from the first failing institution in that scenario. The FDIC would, CBO projects, incur additional net costs through the deposit insurance program totaling about $1 billion over the next 10 years if orderly liquidation authority was eliminated; those additional costs are incorporated into the agency's projection of $14 billion in deficit reductions.

https://doi.org/10.1111/j.1540-6261.1988.tb03966.x; Frederick T. Furlong, "Changes in Bank Risk-Taking," *Economic Review*, Federal Reserve Bank of San Francisco (Spring 1988), pp. 45–56, https://tinyurl.com/yd6ll62m; and Michael Koehn and Anthony M. Santomero, "Regulation of Bank Capital and Portfolio Risk," *Journal of Finance*, vol. 35, no. 5 (December 1980), pp. 1235–1244, https://doi.org/10.1111/j.1540-6261.1980.tb02206.x.

5. For more information about how CBO estimates the direct budgetary effects of orderly liquidation authority and an example of an estimate of the effects of repealing it, see Congressional Budget Office, cost estimate for H.R. 10, the Financial Choice Act of 2017 (May 18, 2017), www.cbo.gov/publication/52738. The projected effects in this report differ slightly from those in that cost estimate because the estimates in this report are based on the agency's May 2019 baseline projections.

6. The $6 billion estimate is net of the estimated effects on income and payroll taxes. Changes in excise taxes affect private businesses' and households' taxable income and thus the tax revenues the federal government collects. See Congressional Budget Office, "The Role of the 25 Percent Revenue Offset in Estimating the Budgetary Effects of Legislation" (January 2009), www.cbo.gov/publication/20110; and Joint Committee on Taxation, *New Income and Payroll Tax Offsets to Changes in Excise Tax Revenues for 2018–2028*, JCX-8-18 (March 2018), https://go.usa.gov/xma9t.

7. FDIC payments are effectively capped by the size of the deposit insurance fund and the limits of its borrowing authority. As of December 31, 2018, the FDIC is authorized to borrow up to $201.8 billion from the Treasury. The maximum obligation limitation is based on a statutory formula and is updated annually. See Federal Deposit Insurance Corporation, *2018 Annual Report* (February 2019), p. 99, https://go.usa.gov/xyQZT.

Table 2-1.

Direct Budgetary Effects of Three Illustrative Policies, 2020 to 2029

Billions of Dollars

	Increase or Decrease (-) in Noninterest Outlays	–	Increase or Decrease (-) in Revenues	=	Total Increase or Decrease (-) in Deficits
Lower Capital Requirements by 1 Percentage Point	*		*		*
Eliminate Orderly Liquidation Authority	-20		-6		-14
Repeal the Ability-to-Repay Mortgage Rule	*		*		*

Source: Congressional Budget Office.

Values are cumulative over the 2020–2029 period.

Negative effects on revenues increase the deficit, offsetting decreases in the deficit stemming from reductions in outlays.

* = between -$500 million and zero.

Those estimates are highly uncertain and are directly affected by the projected probability and magnitude of events that trigger spending under orderly liquidation authority. If that probability or magnitude was to double, for example, the projected budgetary effects of repealing that authority would also double.

Repealing the Ability-to-Repay Rule for Mortgages

If the ability-to-repay rule was eliminated, the volume of mortgages would be 2 percent higher than if the rule remained in place. That added volume would increase the costs of resolving failing banks slightly, CBO estimates. The effect would be negligible through 2021, when a safe-harbor provision of the ability-to-repay rule that currently applies to a large segment of the mortgage market is set to expire. Thereafter, banks would issue more mortgages with characteristics that fell outside the parameters of the safe harbor. Those mortgages would pose greater risk of losses to the financial institutions that issue them, and as a result, the issuers' probability of failure would increase slightly, but only to the extent that they bear the risk instead of passing it on to mortgage insurers or other guarantors. Moreover, it is possible that the ability-to-repay rule causes private lenders to divert some of the high-risk business to mortgage programs run by the Federal Housing Administration, the Department of Veterans Affairs, and the Rural Housing Service that benefit from an explicit government guarantee. If so, the ability-to-repay rule raises the cost of those programs, offsetting reductions in the FDIC's costs that might stem from it. Eliminating the rule would thus increase the FDIC's costs but lower the costs of those other programs.

After accounting for the slight impact on volume and offsetting factors, CBO projects that eliminating the ability-to-repay rule would increase net spending, and thus deficits, by a minimal amount—less than $0.5 billion—over 10 years.

Like other projections in this report, the estimated effect of eliminating the ability-to-repay rule is subject to substantial uncertainty. Eliminating the rule may not affect net spending at all, or it may result in as much as $0.5 billion in increased net costs from 2020 to 2029. The estimates in this report extrapolate to the broader mortgage market the results from an academic study of the market effects of loans that were too large to qualify for exemption from the ability-to-repay rule under the temporary safe-harbor provision.[8] That method might overstate the effect of eliminating the ability-to-repay rule on segments of the market that are exempted from the rule until the expiration of that provision in 2021. Furthermore, the authors of that study did not account for any effect that the ability-to-repay rule's requirement that loans be properly documented might have had, so they might have underestimated the total effect of the rule.

A policy that stopped short of repealing the ability-to-repay rule—one that, for example, exempted large classes of mortgages from the ability-to-repay rule instead of

8. See Stephanie Johnson, John Mondragon, and Anthony DeFusco, "Regulating Household Leverage" (paper presented at the 2017 Annual Meeting of the Society for Economic Dynamics, Edinburgh, Scotland, June 22–24, 2017), https://ideas.repec.org/p/red/sed017/327.html.

repealing it altogether—would have budgetary effects that were in the same direction as those of the illustrative policy though they would be of a different magnitude. For example, if the temporary safe-harbor provision was extended beyond 2021 through either regulatory action by the Consumer Financial Protection Bureau or new legislation, the ability-to-repay rule would continue to apply to only a small portion of the mortgage market. The budgetary effect of such a policy would equal a large fraction of the effect of repealing the rule. Creating new safe-harbor provisions would affect the budget in the same direction, and the total size of the effect would depend on the fraction of the mortgage market made exempt from the rule by the new safe harbors.

CHAPTER

3

Effects of the Three Illustrative Policies on the Economy

In addition to directly affecting federal spending and revenues, the three illustrative policies would affect the economy. Under the conditions in the Congressional Budget Office's economic forecast, regulations tend to slow the growth of the economy. Those baseline economic conditions represent the conditions that the agency expects to prevail, on average; to construct that baseline, the agency weights positive and negative outcomes on the basis of their probability of occurring. Regulations also affect the economy by helping ward off events that disrupt financial markets and have negative economic consequences. The economic effects of the three illustrative policies, all of which would decrease regulation, can thus be grouped into two distinct categories: the effects on the economy that the policy would have under baseline economic conditions, and the effects on the likelihood and severity of financial crises.

Effects Under Baseline Economic Conditions

Each of the three illustrative policies would, under baseline economic conditions, affect the financial system differently. Lowering capital requirements would allow financial institutions to finance their assets less expensively. That policy would also reduce tax revenues by enabling banks to take on more debt, which receives preferential tax treatment compared with equity. Because orderly liquidation authority is a crisis management tool rather than a crisis prevention tool, it would affect the financial system primarily when institutions failed and it was invoked. But repealing that authority might affect behavior even when the financial system was relatively stable by changing the incentives for financial institutions to take risks. Those behavioral effects are ambiguous and offsetting; thus, CBO estimates that, on net, eliminating orderly liquidation authority would have no effect on risk-taking. Finally, repealing the ability-to-repay rule, which under current law discourages lending to higher-risk borrowers, would result in lenders' originating more risky mortgages.

In general, reducing financial regulation would increase returns on investments by lowering the costs of financing them. As long as the financial system is not in crisis, repealing the ability-to-repay rule and lowering capital requirements would thus boost the economy. Because CBO estimates that the effects of eliminating orderly liquidation authority on risk-taking (the primary means by which the policy would affect the economy during noncrisis times) would be offsetting, the agency projects that implementing that policy would have no effect on the economy under baseline conditions.

Lowering Capital Requirements

Lowering capital requirements would affect banks in three ways. Banks would be able to take on more debt, reducing their net cost of financing because of the preferential tax treatment that debt receives compared with equity financing. In addition, the subsidy that the deposit insurance system provides banks would increase. Finally, the value of the convenience that banks provide to depositors would rise.

Reduction in Tax Revenues. Lower capital requirements would allow depository institutions to rely more heavily on interest-bearing debt. Such debt, including bank deposits, receives a tax preference under current law because interest payments are generally deductible as a business expense. The 2017 tax act (Public Law 115-97) shrank that preference by lowering the top statutory tax rate on C corporations from 35 percent to 21 percent.[1] If financial institutions financed more of their assets with debt, which they would be able to do if capital requirements were lowered, they could deduct more interest

1. Although the 2017 tax act created a limit on the deduction for net interest expense, that limit is not likely to apply to financial institutions, whose interest income typically exceeds their gross interest expenses. The limitation on interest deductibility has the potential to improve financial and economic stability because it reduces the incentive for companies to finance their operations with debt; decreased reliance on debt financing might lower companies' risk of default.

from their gross income, lowering their tax liability. The effect of a 1 percentage-point reduction in capital and an equivalent increase in debt given a return on investment of 4 percent (before interest and taxes) and a corporate tax rate of 21 percent would be to decrease federal revenues by an amount equal to about 0.8 basis points of bank assets.[2] (A basis point is one one-hundredth of a percentage point.) Multiplied by the projected total value of assets in the banking system (approximately $17.5 trillion in 2018 and growing over the next 10 years), that effect would reduce tax revenues over the 10-year period by a total of as much as $18 billion.

Increase in the Value of Deposit Insurance. The lower the capital requirement is, the greater the benefit that federal deposit insurance provides to the bank, because it is priced below market value—that is, the amount a private entity would charge to insure deposits.[3] Deposit insurance lowers banks' financing costs by making depositors willing to accept lower interest rates than they might otherwise expect to keep their money at banks where they know it is safe. Offsetting the savings to banks stemming from those lower interest rates are the premiums that banks must pay to the Deposit Insurance Fund, which roughly match the expected value (that is, the probability-weighted average of all possible values) of deposit insurance but are less than the insurance's estimated market value (also referred to as fair value). That estimate depends on the capital requirement in place when the policy was implemented. The lower the banks' levels of capital were initially, the greater the market value of deposit insurance would be to begin with and the more sensitive that value would be to the change in capital that resulted from lowering capital requirements.

Although the budgetary effects of deposit insurance are measured in expected values, the market value of deposit insurance better measures its effect on borrowing rates.[4] That market value better represents how much the government's guarantee is worth to depositors and thus how much lower an interest rate they will accept on their deposits in exchange for keeping them at a bank where they are covered by deposit insurance.

If capital requirements fell by 1 percentage point, the market value of deposit insurance obligations would change by more than the expected value (see Table 3-1). On net, lowering capital requirements would increase the expected value of deposit insurance by 0.3 basis points per percentage-point change in the requirements and the market value by 3.3 basis points per percentage-point change, CBO estimates. The change in the expected value of deposit insurance premiums would be fully offset by an increase in premiums of 0.3 basis points, whereas only a fraction of the increase in market value would be offset by the higher premiums. The net effect on federal spending for the deposit insurance program would be near zero on an expected-value basis and 3.0 basis points on a market-value basis.

Those estimates represent averages across different types of institutions. The value of the subsidy might be greater for smaller banks because they are not able to access alternative sources of financing as easily as larger banks are and they therefore rely more heavily on insured deposits. Banks that take greater risks will also receive a larger subsidy. As a result, the financial and economic effects of lowering capital requirements would not be the same for all institutions or activities.

Increase in the Convenience Value of Deposits. For the convenience of being able to make deposits and withdraw their funds at any time, customers are willing to accept a lower interest rate from depository institutions

2. The calculation reflects the assessment that a small number of banks either would have no taxable income or would face limits on the tax deductibility of interest payments. CBO considers it an upper bound because not all banks would take full advantage of the tax deduction.

3. Deposit insurance can be priced below its market value and still cover deposit insurance payments in most years. The Federal Deposit Insurance Corporation explicitly aligns deposit insurance premium with losses that they expect to occur, on average. The market value of deposit insurance is greater than the amount of those average losses because investors in depository institutions, including depositors, are risk averse.

4. For an example of an option pricing model that translates expected-value costs into market values, see Michael Falkenheim and George Pennacchi, "The Cost of Deposit Insurance for Privately Held Banks: A Market Comparable Approach," *Journal of Financial Services Research*, vol. 24, nos. 2–3 (October 2003), pp. 121–148, https://doi.org/10.1023/B:FINA.0000003320.95646.5f. The authors use a "drift" parameter in the option pricing model to translate expected values into market values. Bank failure is treated similarly to how shareholders' exercising an option to sell the bank's assets to the FDIC would be treated, and all of the bank's future assets and liabilities are treated as random variables that are subject to the uncertainty arising from the performance of bank assets and changes in market interest rates.

Table 3-1.

Expected-Value and Market-Value Estimates of the Effect That a 1 Percentage-Point Reduction in Banks' Capital Requirements Would Have on the Net Cost of Bank Failures

Basis Points

	Increase in Gross Cost of Bank Failures	–	Increase in Deposit Insurance Premiums	=	Total Effect on the Net Cost of Bank Failures to the Federal Government
Expected Value[a]	0.3		0.3		0
Market Value	3.3		0.3		3.0

Source: Congressional Budget Office.

The term *bank* is used here to refer to all depository institutions insured by the Federal Deposit Insurance Corporation, including savings associations as well as banks.

a. Expected value is the probability-weighted average of all possible outcomes.

than they would on an asset that did not have that convenience. Banks rely on deposits to fund a large portion of the assets that they do not finance with capital. If capital requirements were lowered, banks would increase all forms of debt, including deposits. The ability to pay a lower rate on more deposits is one benefit that financial institutions would receive from lowering capital requirements; in turn, they would be able to offer the liquidity of deposits to more customers. A recent study suggested that the liquidity that would result from lowering capital requirements would cut banks' financing costs by 0.3 basis points per percentage-point change in the minimum capital levels.[5]

Total Effects on Borrowing Costs for Businesses and Households. Together, those three effects would lower the cost of financing for banks (see Table 3-2). CBO estimates that reducing capital requirements by 1 percentage point would lower banks' financing costs by 4 basis points. Most of that reduction originates from the reduction in banks' tax liability and the higher value of deposit insurance. The reduction in financing costs thus represents the flip side of the direct budgetary effects of the illustrative policy: lower tax revenues and higher net payments from the Federal Deposit Insurance Corporation. The effect of a 1 percentage-point change in capital requirements on financing costs depends on the level of capital when the change was implemented; the effect diminishes the higher that capital level is because the market value of deposit insurance declines as capital levels increase.

The 4 basis-point reduction in banks' financing costs would, in CBO's assessment, be passed on to businesses and households as a 5 basis-point reduction in the interest rates that they pay to banks and other lenders. The reduction in consumers' borrowing costs is larger than that of banks' because to comply with liquidity requirements, banks must invest approximately 20 percent of their assets in risk-free securities on which they earn interest at the rates on Treasury securities of similar maturity. They must cover the difference between their own cost of financing and the Treasury rates by charging consumers rates higher than the Treasury rates on the remaining 80 percent of their assets.

Two competing possibilities could, however, result in lower capital requirements' having a different effect on borrowing costs. If banks can exert market power and retain some of the savings as profits, they might not pass their entire cost savings on to their borrowers. On the other hand, other lending institutions that are competing with banks might lower the rates that they charge businesses and households when, as a result of lower capital requirements, banks' costs fell; if they did not, activity

5. See Arvind Krishnamurthy and Annette Vissing-Jorgensen, "The Aggregate Demand for Treasury Debt," *Journal of Political Economy*, vol. 120, no. 2 (April 2012), pp. 233–267, https://doi.org/10.1086/666526. That study estimated that the discount on U.S. Treasury bonds compared with other bonds is 73 basis points, with as much as 46 basis points attributable to liquidity. CBO estimated the additional convenience value of lowering capital requirements by 1 percentage point on the basis of that estimate: The agency's estimate of 0.3 basis points is roughly 1 percent of 46 basis points, adjusted slightly downward to reflect the fact that only part of the debt that replaced capital would be in the form of deposits.

Table 3-2.

Estimates of the Effect That a 1 Percentage-Point Reduction in Capital Requirements Would Have on Banks' Financing Costs Through Three Different Channels

Basis Points

	Effect on Banks' Financing Costs
Decrease in Effective Tax Rates for Depository Institutions	-0.8
Increase in Market Value of Deposit Insurance	-3.0
Increase in Convenience Value for Depositors	-0.3
Total	**-4.1**

Source: Congressional Budget Office.

The term *bank* is used here to refer to all depository institutions insured by the Federal Deposit Insurance Corporation, including savings associations as well as banks.

Before the 2017 tax act was implemented, the lower effective marginal tax rates associated with a 1 percentage-point reduction in banks' capital requirements would have lowered financing rates by 1.5 basis points rather than by 0.8 basis points, and the total reduction in financing rates would have been about 5 basis points.

may shift toward the banking sector. Those two offsetting factors would, in CBO's estimate, cancel each other out.

CBO's estimate that consumers' borrowing costs would fall by 5 basis points if capital requirements were lowered by 1 percentage point is consistent with the range of estimates of relevant studies, after adjustments to account for the effects of the 2017 tax act.[6] The approaches used in those studies are all informed by the Modigliani and Miller theorem, which identifies conditions in which lower capital requirements would have no effect on consumers' borrowing costs.[7] (For further discussion of that theorem and of how the relevant studies address its implications, see the appendix.) Those studies' estimates of the total effect on financing costs of lowering capital requirements ranged from 2 basis points to 10 basis points per percentage-point change in required capital; the midpoint was about 6 basis points.

All of those studies predated the 2017 tax act, which substantially reduced the tax benefits resulting from lowering capital requirements. Because the law narrowed the gap between tax rates on debt and those on equity, CBO's estimate of the tax effect of lowering capital requirements in this report is less than it would have been under prior tax law.[8] To account for that change in law, CBO lowered all of the studies' estimates of the total effect by approximately 1 basis point, bringing the midpoint down from 6 basis points to about 5 basis points, which is CBO's estimate of the total effect.

By reducing consumers' borrowing costs, lowering capital requirements by 1 percentage point would drive the cost of capital down and the level of investment up, which would in turn raise gross domestic product (see Table 3-3). When the policy first took effect, it would increase overall demand in the economy, driving GDP up. That effect would dissipate over time, and GDP would rise more slowly but steadily because the higher investment would gradually boost the stock of productive capital, which in turn would increase the economy's capacity to produce goods and services.[9]

6. For a survey of studies offering such estimates, see Jean-Charles Rochet, *The Extra Cost of Swiss Banking Regulation*, White Paper (Swiss Finance Institute, February 2014), https://tinyurl.com/y5aze8bn.

7. See Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, vol. 48, no. 3 (June 1958), pp. 261–297, www.jstor.org/stable/1809766.

8. The 2017 tax act reduced the tax preference associated with debt. CBO estimates that under current law, the tax effects of lowering capital requirements by 1 percentage point would reduce financing costs by 0.8 basis points (see Table 3-2). CBO's estimate of the tax effect under prior tax law would have been 1.5 basis points; the discrepancy reflects the change in the statutory corporate rate from 35 percent under prior tax law to the current rate of 21 percent.

9. To determine how decreases in the cost of capital stemming from lower borrowing rates would affect investment, CBO used the same approach that it used to model the effects on investment of the lower capital costs resulting from changes in taxation. See Congressional Budget Office, "Key Methods That CBO Used to Estimate the Macroeconomic Effects of the 2017 Tax Act" (supplemental material for *The Budget and Economic Outlook: 2018 to 2028*, April 2018), www.cbo.gov/publication/53651.

Table 3-3.

Increase in Gross Domestic Product Projected to Stem From the Illustrative Policies Under Baseline Economic Conditions, 2020 to 2029

Billions of Dollars

	Lower Capital Requirements by 1 Percentage Point	Repeal the Ability-to-Repay Mortgage Rule
2020	0.4	0
2021	2.7	2.6
2022	2.3	5.9
2023	1.4	5.0
2024	1.1	2.8
2025	1.5	3.4
2026	1.9	4.6
2027	2.3	5.7
2028	2.8	6.8
2029	3.2	8.0

Source: Congressional Budget Office.

CBO estimates that the effects of eliminating orderly liquidation authority on risk-taking would be offsetting; thus, the agency projects that implementing that policy would have no effect on the economy under baseline conditions.

Estimates of the effects that lowering capital requirements would have on banks' financing costs are uncertain for several reasons. The parameters that measure the relationship between bank failure rates and the capital-to-asset ratio are uncertain, and estimates from academic studies span a wide range. Some studies suggest that the level of minimum capital is less important than other aspects of the financial system, such as rules that obligate banks to take "prompt corrective action" to remedy capital deficiencies and that require regulators to close banks whose ratios fall below critical thresholds.[10]

Another source of uncertainty is the historically high minimum level of capital that internationally active banks will be required to maintain when the international agreement known as the Basel III Accord is fully implemented. That agreement is one reason that capital ratios are, on average, higher than they were before the 2007–2009 financial crisis. Lowering capital requirements by 1 percentage point might lead to a proportionally smaller reduction in failure rates than statistical studies relying on historical data suggest because minimum capital levels at the time that change was implemented would be higher than they have been historically. That concern would be greater if the relationship between bank failures and capital exhibited some threshold effect—that is, if failure rates dropped to zero when capital was above a certain level—but it does not.

Furthermore, the effect that minimum capital requirements have on the level of capital that banks actually hold is uncertain. Many banks might not lower their capital in response to a drop in the minimum requirements. Also uncertain is the extent to which lower capital requirements might shift activity from unregulated sectors of the financial system into the banking system.

In addition to those sources of uncertainty, another aspect of CBO's estimates of economic effects to note is that they are based on tax policy under current law and on the current formula for setting deposit insurance premiums. If the formulas were changed to make deposit insurance premiums more sensitive to capital levels, the net effect that financial institutions' maintaining lower levels of capital had on spending would decrease. Similarly, changes in tax rates or in other provisions could also alter the size of that effect. The interest rates that businesses and households paid as a result of lowering capital requirements would change along with those tax and spending effects, although the degree to which banks pass their savings in financing costs on to customers is itself uncertain, even without discrepancies in those other effects.

Eliminating Orderly Liquidation Authority

In CBO's estimation, eliminating orderly liquidation authority would not have a significant effect on financing costs under baseline economic conditions because doing so would have offsetting effects on financial institutions' willingness to take risks. It is uncertain whether orderly liquidation authority under current law increases or decreases risk-taking. If the authority works as its proponents envision, it reduces financial institutions' willingness to take risks: Firms' stakeholders—the bondholders who fund a firm by buying its debt, for instance—understand that they are at risk of taking losses and require yields that compensate them for that risk. However, it is also possible that orderly liquidation authority increases firms' willingness to take risks by providing a mechanism that authorizes government assistance: If firms believe that the government will use the Orderly Liquidation

10. See Paul Kupiec, "Fixing Prompt Corrective Action," *Journal of Risk Management in Financial Institutions*, vol. 9, no. 3 (Summer 2016), pp. 207–223, https://tinyurl.com/ybex9um5.

Fund to reduce losses for stakeholders and that other financial institutions will pay for that intervention, they may take more risk than they would otherwise. The intent of the law is for the FDIC to pass the costs of exercising orderly liquidation authority on to the failing institution's stakeholders—by converting special debt securities into equity or by using some other means to reduce the institution's obligations to repay its creditors. But the FDIC might absorb the losses in the Orderly Liquidation Fund and then pass them on to other financial institutions in the form of assessments to replenish the fund.[11] Given those opposing perspectives on the effectiveness of orderly liquidation authority, it is unclear whether eliminating that authority would increase or decrease expectations of future government support.[12]

How the elimination of orderly liquidation authority would affect investors depends on their perception of the authority under current law. If investors and other market participants perceive that orderly liquidation authority gives regulators a credible mechanism to safely resolve a large failing financial institution without having the government absorb its losses, eliminating that authority might lead them to anticipate that the Congress would take expansive action when faced with the possibility of the collapse of a systemically important financial institution. As a result, they would expect the government to absorb more losses in a crisis if orderly liquidation authority no longer existed than it would under current law. In general, investors might expect that with fewer mechanisms in place to resolve financial distress, the Congress may be compelled in the midst of a crisis to authorize broad guarantees and payments to prevent financial institutions from failing.

If, instead, investors and other market participants perceive that orderly liquidation authority makes it so that the FDIC would absorb losses during crises that would otherwise fall on the institution's creditors and other stakeholders, their reaction to eliminating the authority would be very different. Such a perspective might reflect not only expectations about how orderly liquidation authority would be used under current law but also the expectation that the existence of the authority would facilitate additional government assistance in a crisis that would absorb private-sector losses. If investors and other market participants hold that perspective, they might anticipate that they would incur greater losses in the absence of orderly liquidation authority; thus, eliminating that authority might encourage them to be more vigilant in managing their exposure to risk.

The challenge facing investors in financial markets is ascertaining not just *whether* orderly liquidation authority would be used in a crisis but *how* it would be used. The authority allows policymakers to modify the obligations of troubled institutions whose failure would pose a risk to the financial system in order to ensure the institution did not fail. Working outside the bankruptcy system, policymakers could effectively turn bondholders and other creditors into equity owners by, for example, converting special debt securities that were designed to absorb losses under resolution to equity. If orderly liquidation authority had been established and invoked during the 2007–2009 financial crisis, policymakers might have been able to intervene to prevent the failure of Lehman Brothers. Furthermore, they may have been able to provide support to American International Group (AIG) and prevent its failure without its creditors being paid in full; instead, without that authority, the creditors were paid in full and did not bear any of the firm's losses.

It is possible, however, that policymakers would, in the midst of a crisis, hesitate to convert the special debt securities into equity or to take some other action that resulted in a failing firm's creditors incurring some of the firm's losses. Such hesitation could arise out of concern that intervention would have repercussions for other systemically significant firms. That is because if creditors incurred such losses on their investments in one institution, they might withdraw funding they provided to other financial institutions out of concern that they would incur similar losses on their investments in those other firms. For example, in 2008, the day after regulators took over the failing mortgage lender Washington

11. For the strategies that the FDIC and other regulators might use to place losses on private creditors, see Resolution of Systematically Important Financial Institutions: The Single Point of Entry Strategy, 78 Fed. Reg. 76614 (December 18, 2013), www.federalregister.gov/a/2013-30057.

12. A number of empirical studies have examined whether the expectation of future government assistance has increased or decreased since orderly liquidation authority was established by the Dodd-Frank Act. For an example of such a study, see Government Accountability Office, *Large Bank Holding Companies: Expectations of Government Support*, GAO-14-621 (July 2014), www.gao.gov/products/GAO-14-621. The authors of that study reported that "investors with whom we spoke said that FDIC's progress in developing its resolution process to implement [orderly liquidation authority] as an alternative to bankruptcy has caused them to significantly reduce their expectations of government support."

Mutual Bank and determined that its creditors would not be paid in full, another large bank, Wachovia, informed federal regulators that it would be unable to obtain the funds necessary to fulfill its obligations.[13] The possibility of that sort of contagion might make policymakers reluctant to allow creditors to suffer losses, and if that is the case, orderly liquidation authority might be used to provide funding to a failing firm but not to impose losses on creditors. In other words, policymakers might hesitate to use orderly liquidation authority to reallocate losses to bondholders if they thought doing so would worsen already strained market conditions. Because investors' expectations about policymakers' actions during a crisis are unclear, it is uncertain whether orderly liquidation authority under current law increases or decreases their risk-taking.

Repealing the Ability-to-Repay Rule for Mortgages

Eliminating the protections of the ability-to-repay rule would raise mortgage volumes under baseline economic conditions (after the expiration of the temporary safe-harbor provision) by an estimated 2 percent; most of that increase would be attributable to mortgages that no longer met the safe-harbor qualifications after 2021, when the exemption for mortgages eligible for purchase by Fannie Mae and Freddie Mac expires. The fraction of new mortgages issued each year with payment-to-income ratios that exceed the ability-to-repay rule's safe-harbor threshold has been lower since the rule was introduced in 2010 than it was in the early 2000s, and it has been much lower in recent years than it was in the years of loosened mortgage standards that immediately preceded the crisis. The estimated 2 percent increase represents about one-tenth of the volume of mortgages issued in the 1998–2003 period that the Consumer Financial Protection Bureau estimated would have fallen outside the safe-harbor parameters if the ability-to-repay rule had existed at the time.[14] CBO's 2 percent estimate is consistent with a recent academic study's findings on the effects of the ability-to-repay rule.[15] On the basis of recent studies of the relationship between the ratio of credit to GDP and the likelihood of financial crises, CBO estimated that a 2 percent change in mortgage volumes would result in a 1 percent increase in the risk of financial distress.[16]

This illustrative policy would have an effect on GDP similar to that of the policy that would lower capital requirements, but the magnitude of the effect would be slightly greater under this policy.[17] The increase in the volume of mortgages would drive up residential investment, which in turn would increase GDP. To estimate the magnitude of the effect of this policy on GDP, CBO modeled the effects of the estimated increase in the volume of mortgages on residential investment and GDP.[18]

The initial rise in GDP in CBO's projections for this illustrative policy results from the increase in overall demand owing to the higher level of residential

13. See Federal Deposit Insurance Corporation, *Crisis and Response: An FDIC History, 2008–2013* (2017), www.fdic.gov/bank/historical/crisis.

14. See Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 6407, 6536 (January 30, 2013), www.federalregister.gov/citation/78-FR-6407. The Consumer Financial Protection Bureau identified the years 1998 to 2003 as a period that was representative of relatively normal underwriting standards and that comprised different phases of the business cycle. It estimated that about 22 percent of mortgages issued in that period would have been subject to the heightened standards introduced by the ability-to-repay requirements.

15. See Stephanie Johnson, John Mondragon, and Anthony DeFusco, "Regulating Household Leverage" (paper presented at the 2017 Annual Meeting of the Society for Economic Dynamics, Edinburgh, Scotland, June 22–24, 2017), https://ideas.repec.org/p/red/sed017/327.html.

16. See Simon Firestone, Amy Lorenc, and Ben Ranish, *An Empirical Economic Assessment of the Costs and Benefits of Bank Capital in the US*, Finance and Economics Discussion Series Paper 2017-034 (Board of Governors of the Federal Reserve System, March 2017), Table 4, p. 21, https://doi.org/10.17016/FEDS.2017.034; and Moritz Schularick and Alan M. Taylor, "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crisis, 1870–2008," *American Economic Review*, vol. 102, no. 2 (April 2012), pp. 1029–1061, https://doi.org/10.1257/aer.102.2.1029.

17. Capital requirements could be lowered by more than 1 percentage point to have a greater effect on the economy. The three illustrative policies were not designed to have effects of the same magnitude; as illustrative policies, they are relevant for policies that would bring about similar changes of moderately different magnitudes.

18. CBO used its large-scale macroeconomic model to translate the change in mortgage volume into a change in residential investment. See Robert W. Arnold, *How CBO Produces Its 10-Year Economic Forecast*, Working Paper 2018-02 (Congressional Budget Office, February 2018), www.cbo.gov/publication/53537. To determine the effects on GDP, the agency incorporated the greater residential investment in its model of potential output. For a description of that model, see Congressional Budget Office, *How CBO Analyzes the Effects of Changes in Federal Fiscal Policies on the Economy* (November 2014), www.cbo.gov/publication/49494.

investment (see Table 3-3 on page 29). Although that effect dissipates, the value of owner-occupied housing services goes up gradually as the greater residential investment builds up the housing stock. Because eliminating the ability-to-repay rule would affect only the cost of mortgages and no other kinds of investments, the boost in investment would be much more focused than the increase in investment resulting from lowering capital requirements would be. Over the long run, the increase in services of owner-occupied housing would drive the increase in GDP under this scenario.

Effects on the Likelihood and Severity of Financial Crises

In addition to affecting the economy under baseline economic conditions, the illustrative policies would, in CBO's estimation, affect the likelihood and severity of financial crises and any subsequent recessions. CBO's baseline economic projections represent a weighted average of scenarios; that is, each scenario is weighted on the basis of its probability of occurring. The likelihood that no financial crisis would occur in a given year is estimated to be relatively high. Conversely, the probability that a financial crisis and the associated negative economic outcome would occur is estimated to be very low. Because CBO's deficit projections are based on the baseline economic projections, those deficit projections incorporate the low-probability scenarios that include a financial crisis. Thus, the changes in the likelihood and severity of crises resulting from the illustrative policies would affect the agency's deficit projections. To analyze the effects of the illustrative policies on the likelihood and severity of crises, CBO developed a benchmark projection for a financial crisis and estimated the likelihood of its occurring under current law. The agency then projected how the policies would change the likelihood and magnitude of that benchmark crisis.

A Financial Crisis Projection

In the past, when financial disruptions brought about recessions, a number of key economic indicators typically changed: GDP dropped rapidly, unemployment increased significantly, inflation slowed, asset prices fell, and interest rates on assets that carry little market risk (such as Treasury securities) dropped. To capture the wide-ranging effects of a financial crisis on the economy, CBO developed a benchmark projection that specified changes in each of those economic variables.

The agency's financial crisis projection is for a financial disruption that spills over to the general economy and leads to or exacerbates a recession—a rare occurrence in the United States. Most recessions do not originate with a financial disturbance, and not all financial disruptions cause economic recessions.[19] In CBO's baseline projections, which incorporate the possibility of recessions and other events that might cause GDP to drop substantially below its potential, the estimated likelihood of a financial disruption occurring that would significantly affect the economy is 1.5 percent per year.[20]

The probability that a financial crisis will occur in a given year is highly uncertain. To produce a sample large enough to estimate that probability, CBO relied on data from several countries dating back decades. The differences in circumstances and in the effectiveness

19. For example, the widespread failure of savings and loan associations in the late 1980s has been classified by many studies as a financial crisis, but it is not clear that it was a primary cause of the 1991 recession. Although the savings and loan crisis might have contributed to the recession, most economists believe that it played a smaller role than other factors. Whether a crisis in the financial sector spills over into the wider economy is not a binary proposition: The potential effects of such a crisis on GDP and other economic variables fall along a spectrum, from minor to very severe. But developing distinct projections to capture all points along that spectrum is impractical, so CBO chose to model a crisis whose effects were severe and then assign it a low probability.

20. CBO's estimate of 1.5 percent is consistent with the incidence of moderate to extreme crises in data from Christina D. Romer and David H. Romer, "New Evidence on the Aftermath of Financial Crises in Advanced Countries," *American Economic Review*, vol. 107, no. 10 (October 2017), pp. 3072–3118, https://doi.org/10.1257/aer.20150320. The authors of that study analyzed prevailing financial conditions in several countries over six-month periods and categorized them as either normal or an episode of distress; such episodes were given one of five ratings on the basis of the magnitude of the event—credit disruption, minor, moderate, major, or extreme. The authors then examined how that magnitude determined the severity of a crisis's economic aftermath. To compare the agency's estimates with those data, CBO treated a continuous set of six-month periods of elevated distress ratings as one event and categorized it by the highest rating of the periods included. In CBO's baseline, the probability of a crisis in the short term is projected to be less than 1.5 percent to reflect the currently stable financial conditions. That probability rises to the long-term average of 1.5 percent over three years in the projections. Another study estimates the current likelihood of crisis (defined slightly differently) as 1.09 percent. See Federal Reserve Bank of Minneapolis, *The Minneapolis Plan to End Too Big to Fail* (December 2017), https://tinyurl.com/y3flrgat.

of policy between those times and places and the United States today imbues the estimate with uncertainty. Consequently, the probability that a financial disruption that would damage the economy will occur might be substantially lower or higher than the estimated 1.5 percent. In turn, the effects of the illustrative policies on the economy and federal budget—which are dependent on the policies' effect on that likelihood—could be smaller or larger than projected.

Policy can affect whether a financial disruption spills over into the broader economy. High capital requirements are intended to make it so that if a large institution fails, the remaining financial institutions will be more resilient than they would be without such requirements. Similarly, resolution authorities can help prevent concerns about individual institutions from spreading to the entire financial system and becoming a full-blown crisis. Such policies reduce the likelihood that a disruption in the financial sector would severely hinder overall economic activity.

CBO's benchmark crisis projection is modeled on the 2007–2009 financial crisis and its aftermath (see Figure 3-1). At the start of 2008, during the early stages of that crisis, the economy contracted at a relatively slow pace, but as the crisis intensified, the pace of that contraction sharply increased. During the recession from December 2007 to June 2009, GDP fell significantly below its potential (that is, CBO's estimate of the maximum sustainable output of the economy), causing the output gap (the difference between actual and potential GDP, expressed as a percentage of potential GDP) to widen to nearly –6 percent.[21] Meanwhile, the unemployment rate increased from about 5 percent to 10 percent, the Treasury's short-term interest rates dropped to near zero, and inflation slowed significantly.

To construct its benchmark crisis projections, CBO made two adjustments to its estimates of the changes in the economy that followed the 2007–2009 crisis. First, it removed the effects of the legislation passed in response to the crisis, including the American Recovery and Reinvestment Act (ARRA). In CBO's assessment, those programs reduced the severity of the recession that accompanied the crisis. But because CBO's benchmark projections are based on current law, the crisis projections reflect how a future crisis would unfold if the Congress did not pass any emergency legislation to try to mitigate its effects. CBO therefore made the recession and its effects on the economy in the agency's projections more severe than those following the 2007–2009 crisis by adjusting the economic effects recorded during that crisis using its own estimates of the effects of ARRA and outside analysts' estimates of the effects of other legislation.[22] That adjustment increased the drop in GDP relative to its potential in the crisis projection by approximately 3 percentage points. In other words, GDP would have fallen 3 percent further below potential GDP had it not been for the post-crisis legislation, and the output gap would have been –9 percent of potential GDP instead of –6 percent.

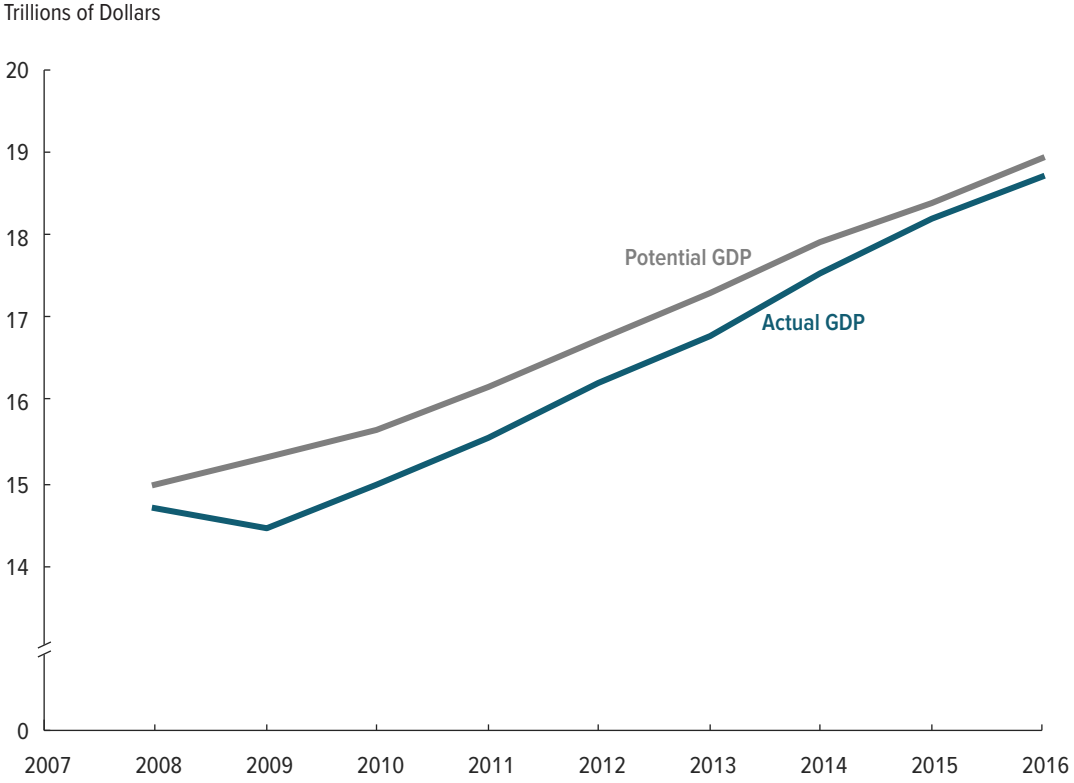
The second adjustment reduced the severity of the crisis in the projection to reflect changes made to the law since 2008. The Dodd-Frank Act introduced orderly liquidation authority and created new tools to resolve financial disruptions, including detailed plans for rapidly responding to such disruptions and special debt securities that can absorb losses under resolution (sometimes by being converted into equity). However, the law also placed restrictions on the Federal Reserve's authority to lend money to any borrower in unusual and exigent circumstances. The 2017 tax act, by contrast, eliminated a provision that allowed financial institutions that incurred losses during a financial crisis to use those losses to claim refunds of taxes paid in previous years, and as a result, financial crises might be more severe in the future. On net, those legislative changes will most likely reduce the severity of future crises; however, none of the new tools have been tested, and their effectiveness is highly uncertain. For example, it is possible that policymakers would be reluctant to impose losses on creditors for fear of generating a run on other institutions. Despite that uncertainty, to account for the effect of legislation

21. This estimate is based on CBO's current estimates of potential GDP for those years, which are lower than the estimates published before and during the financial crisis.

22. See Congressional Budget Office, *Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2013* (February 2014), www.cbo.gov/publication/45122; Jason Furman "The Fiscal Response to the Great Recession: Steps Taken, Paths Rejected, and Lessons for Next Time" (paper presented at the Brookings Institution conference on Responding to the Global Financial Crisis, Washington, D.C., September 11–12, 2018), https://tinyurl.com/y6tk4ugw; and Alan S. Blinder and Mark Zandi, *How the Great Recession Was Brought to an End* (Moody's Analytics, July 2010), https://tinyurl.com/8ce5cbn (PDF, 561 KB).

Figure 3-1.

Actual and Potential GDP During and After the Financial Crisis of 2007 to 2009



In 2009, at the height of the recession precipitated by the 2007–2009 financial crisis, actual GDP dropped 6 percent below its potential.

Source: Congressional Budget Office.

Potential GDP is CBO's estimate of the maximum sustainable output of the economy.

GDP = gross domestic product.

enacted since 2008, CBO decreased the drop in GDP relative to potential GDP by one-quarter, reducing the output gap from nearly –9 percent of potential GDP to –6.7 percent.

In CBO's benchmark crisis projections, two years after the crisis begins, real GDP (that is, nominal output adjusted to remove the effects of inflation) is more than 6 percent lower than it is in the agency's baseline economic forecast (see Table 3-4). In addition, the unemployment rate is more than 4 percentage points higher, reflecting the effects of the crisis on labor markets. Inflation and interest rates fall below the baseline forecast by about the same amounts as they did in the wake of the 2007–2009 crisis. The drop in U.S. GDP stemming from the crisis in the benchmark projection is similar to the slowdowns that other countries have experienced following financial crises, which, according to one recent study, have ranged from 4 percent to 10 percent.[23]

Although the severity of the benchmark crisis is similar to those that other countries have experienced, the severity of future crises and their effects on the budget are highly uncertain. One major source of uncertainty relates to the persistence or permanence of economic effects.

23. The drop in GDP in CBO's financial crisis projection is also consistent with the data collected by Christina Romer and David Romer, who estimate that under moderate crises, GDP falls by 6 percent. See Christina D. Romer and David H. Romer, "New Evidence on the Aftermath of Financial Crises in Advanced Countries," *American Economic Review*, vol. 107, no. 10 (October 2017), pp. 3072–3118, https://doi.org/10.1257/aer.20150320.

Table 3-4.

Difference Between Estimates of Key Economic Variables Under Baseline Economic Conditions and During a Financial Crisis

	2020 (Year 1)	2021 (Year 2)	2022 (Year 3)	2023 (Year 4)	2024 (Year 5)	2025 (Year 6)	2026 (Year 7)	2027 (Year 8)	2028 (Year 9)	2029 (Year 10)
Under Baseline Economic Conditions										
Real GDP (Trillions of 2012 dollars)	19.4	19.7	20.1	20.4	20.8	21.1	21.5	21.9	22.3	22.7
Nominal GDP (Trillions of dollars)	22.3	23.1	24.0	24.9	25.9	26.9	27.9	29.0	30.1	31.3
Unemployment Rate (Percent)	3.7	4.2	4.6	4.8	4.8	4.8	4.8	4.8	4.7	4.7
Interest Rate on 3-Month Treasury Bills (Percent)	3.2	3.2	3.2	3.0	2.8	2.7	2.7	2.8	2.8	2.8
During a Crisis										
Real GDP (Trillions of 2012 dollars)	19.1	18.6	18.8	19.2	19.9	20.5	21.2	21.9	22.3	22.7
Nominal GDP (Trillions of dollars)	21.9	21.8	22.3	23.0	24.2	25.5	26.7	28.2	29.3	30.4
Unemployment Rate (Percent)	4.5	7.9	9.2	8.5	7.2	6.1	4.9	4.8	4.7	4.7
Interest Rate on 3-Month Treasury Bills (Percent)	1.8	0	0	0	0	0	0.3	1.3	2.0	2.4
Difference Between Crisis and Baseline Economic Conditions										
Real GDP (Percent)	-1.6	-5.6	-6.2	-6.0	-4.3	-2.9	-1.5	-0.1	0	0
Nominal GDP (Percent)	-1.7	-6.0	-7.2	-7.6	-6.4	-5.3	-4.2	-2.8	-2.8	-2.8
Unemployment Rate (Percentage points)	0.8	3.7	4.5	3.7	2.4	1.3	0.1	0	0	0
Interest Rate on 3-Month Treasury Bills (Percentage points)	-1.4	-3.2	-3.2	-3.0	-2.8	-2.7	-2.5	-1.5	-0.8	-0.4

Source: Congressional Budget Office.

The crisis values are for a crisis that begins in 2020. Real values are nominal values that have been adjusted to remove the effects of inflation.

GDP = gross domestic product.

It is possible that financial crises permanently reduce GDP; indeed, the underlying trend of GDP growth declined following the 2007–2009 crisis. However, in CBO's view, that slowdown in GDP growth originated with labor market and technological trends that began before the recession.[24] The crisis in the agency's benchmark projection therefore does not permanently dampen real GDP.

Projections of interest rates are another major source of uncertainty. In the crisis projection, interest rates drop rapidly and persistently, as they did during and after the 2007–2009 crisis. Interest rates on Treasury securities tend to be low during a financial crisis, a pattern that is reinforced by the fact that the U.S. dollar is the world's reserve currency and that investors tend to buy U.S. Treasury securities during financial turmoil. If a financial crisis led to a crisis of confidence in the dollar and in the commitment of the U.S. Treasury to meet its obligations, then long-term interest rates could rise instead of fall.[25]

A crisis could occur in any year. The crisis projections presented in this report reflect the assumption that GDP would deviate from the values in CBO's baseline projections by the same amount in each year of the crisis, regardless of when it began (see Figure 3-2). The estimated effects on economic variables of the probability of a crisis under current law are calculated as the sum

24. See Robert Shackleton, *Estimating and Projecting Potential Output Using CBO's Forecasting Growth Model*, Working Paper 2018-03 (Congressional Budget Office, February 2018), www.cbo.gov/publication/53558; and Congressional Budget Office, *Revisions to CBO's Projection of Potential Output Since 2007* (February 2014), www.cbo.gov/publication/45150.

25. Although if that occurred, to counter the rise in long-term rates, the Federal Reserve might start a program to purchase long-term Treasury securities that was similar to the quantitative easing programs implemented in the aftermath of the 2007–2009 crisis.

of the estimated effect of the likelihood of a crisis that started in that year and in each of the preceding years of the 2020–2029 period. For example, the possibility of a financial crisis lowers projected GDP in 2025 by 40 basis points (see Table 3-5). The 40 basis points is the sum of the estimated effect on GDP in projections for six different scenarios in which a crisis starts in a different year from 2020 to 2025. If the crisis started in 2020, it would be in its sixth year by 2025. The economy would already be recovering in that year, and the GDP lost is estimated to be 2.9 percent. That outcome has a 1.5 percent probability of occurring, and 1.5 percent multiplied by a GDP loss of 2.9 percent yields an expected GDP loss of about 4 basis points under the scenario in which a crisis started in 2020. The same calculation must be made for scenarios in which a crisis began in the other five years: The expected GDP loss stemming from a crisis that began in 2021 is 6 basis points; in 2022, 9 basis points; in 2023, 9 basis points; in 2024, 8 basis points; and in 2025, 2 basis points. The sum of those estimates, 40 basis points, is the expected value of the loss in GDP in 2025 resulting from financial crises. Repeating that calculation for all years in the 10-year projection period results in an average loss in GDP of 25 basis points each year from 2019 to 2028 and an estimated loss of 42 basis points in 2028, the last year of the period. Similar calculations could be made for other macroeconomic variables, including inflation, interest rates, and unemployment.

Effects of the Illustrative Policies on the Crisis Projection

Although each of the three policy changes could affect both the likelihood and severity of the crisis, CBO focused on the primary effect of each policy. The agency projected the effects of lower capital requirements and loosened mortgage regulations by estimating how much those policies would, by affecting the level of risk in the system, raise the likelihood of the benchmark crisis. It projected that eliminating the FDIC's orderly liquidation authority—a tool that could be used to mitigate and contain the effects of a crisis—would raise the severity of a crisis one-third of the time.

Lowering Capital Requirements. Capital requirements that were 1 percentage point lower than they are under current law would, CBO estimates, raise the likelihood of a financial crisis by 20 percent—from the 1.5 percent per year incorporated in CBO's baseline projections to 1.8 percent per year. In the agency's projections, lowering capital requirements increases the likelihood of a financial crisis by the same factor as it raises the failure rates of individual banks.[26] CBO's estimate of a 20 percent increase in the likelihood of a crisis is in the range suggested by other studies of the effects of capital requirements on bank failure rates.[27]

The increased likelihood of a crisis raises the estimates of the economic effects of a financial crises proportionally (see Table 3-6 on page 39). Because lowering capital requirements by 1 percentage point is estimated to increase the likelihood of a crisis by 20 percent, the policy would increase the probability-weighted economic effects of financial crises by 20 percent as well. For example, the estimated effect of crises on GDP that is incorporated into baseline conditions is 25 basis points, and under the illustrative policy, that effect is estimated to be 20 percent (or about 5 basis points) higher—30 basis points.

Estimates of the effect that lowering capital requirements would have on the likelihood of a crisis are uncertain for many of the same reasons that estimates of direct budgetary effects of the policy are uncertain. The academic literature offers a wide variety of estimates for parameters measuring the relationship between bank failure and levels of capital. In addition, there is significant uncertainty about how financial markets overall might shift activities to and from nonbank institutions to adapt to changes in capital requirements. Lowering capital requirements could reduce the tendency of the financial sector to shift activities to the less regulated segments of the financial system, which would offset at least some of the increase

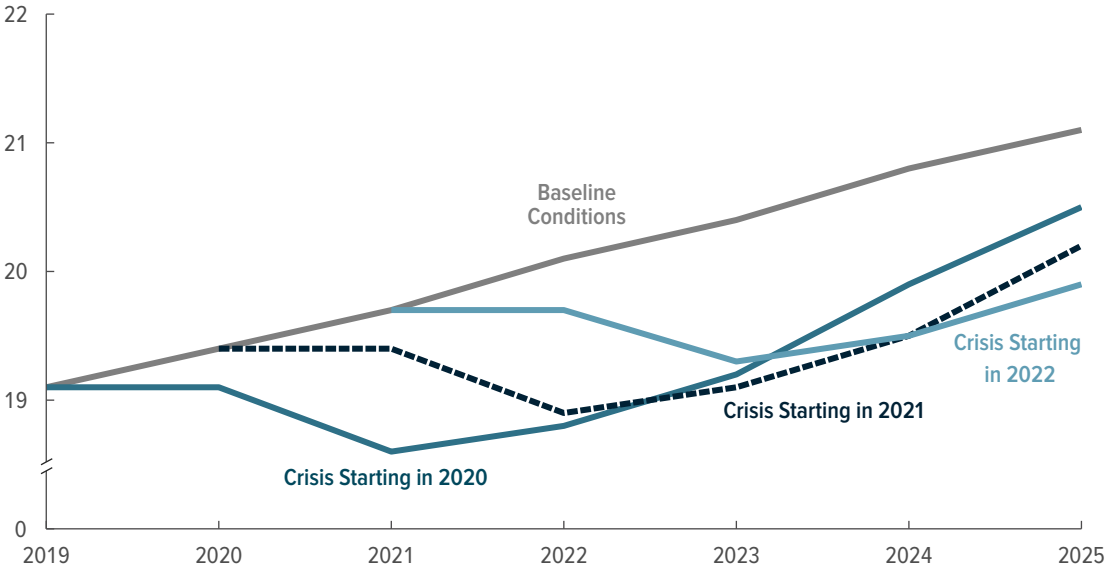
26. The likelihood of a crisis goes up by the same percentage as expected failure rates because financial crises occur when there are many failures. That relationship is supported by two different forms of analysis: a Monte Carlo analysis and analysis using a vendor portfolio risk model by Credit Suisse Financial Products called CreditRisk+. The Monte Carlo analysis used the same option pricing model used to estimate the market value of deposit insurance. For that analysis, 10,000 random simulations of the banking system were conducted, and when total bank failures, weighted by the size of the bank, exceeded a threshold value, a crisis was considered to have occurred. That approach to simulating crises was similar to methods used in other studies. See Simon Firestone, Amy Lorenc, and Ben Ranish, *An Empirical Economic Assessment of the Costs and Benefits of Bank Capital in the US*, Finance and Economics Discussion Series Paper 2017-034 (Board of Governors of the Federal Reserve System, March 2017), https://doi.org/10.17016/FEDS.2017.034.

27. Ibid.

Figure 3-2.

CBO's Projections of Real GDP Under Baseline Economic Conditions and During Financial Crises

Trillions of 2012 Dollars



Source: Congressional Budget Office.

CBO's baseline projections incorporate the agency's estimate that there is a 1.5 percent probability that a financial crisis occurs in any given year. The other projections illustrate the path of GDP under scenarios in which a crisis starts in the year indicated.

Real values are nominal values that have been adjusted to remove the effects of inflation.

GDP = gross domestic product.

in the risk of a crisis estimated to stem from the implementing policy.

Eliminating Orderly Liquidation Authority. Orderly liquidation authority has never been used because no failing institution has threatened the stability of the system since the authority was put in place in 2010. Although financial regulators cannot predict the details of bank failures ahead of time, they have nevertheless developed plans and guidance for how orderly liquidation authority might be used in a crisis.

The law directs financial regulators to use orderly liquidation authority only if other mechanisms are insufficient to restore financial stability. Bankruptcy remains the preferred option to resolve a failing institution under current law and would be the only option remaining if orderly liquidation authority was eliminated. Currently, orderly liquidation authority can be used only if two-thirds of the members of the Federal Reserve Board, the Secretary of the Treasury, and either the Chairman of the FDIC or the Chairman of the Securities and Exchange Commission (depending on what type of institution is involved) determine that the financial institution's failure would have serious adverse effects on financial stability in the United States and that no viable alternative is available to prevent that failure. In CBO's assessment, those conditions would not be met in most financial crises, but if they were met, orderly liquidation authority could significantly reduce the severity of any economic downturn that followed.

By exercising orderly liquidation authority and supplying financing during the period in which claims on the failing institution were being resolved (a procedure often referred to as debtor-in-possession financing), the FDIC might help restore financial stability. Large financial institutions that were failing might have difficulty securing a private source of financing, particularly in a time of widespread financial distress; AIG encountered such difficulties in September 2008. Accordingly, eliminating orderly liquidation authority might make it less likely that regulators could contain a crisis once it began. The impact of eliminating orderly liquidation authority (if

Table 3-5.

Estimates of the Effects That a Financial Crisis Would Have on Real GDP in 2025

First Year of Crisis	Number of Years in 2025 Since Crisis Began	Estimated Loss of Real GDP in 2025 (Percent)	Probability-Weighted Loss of GDP in 2025 (Basis points)
2020	6	-2.9	-4
2021	5	-4.3	-6
2022	4	-6.0	-9
2023	3	-6.2	-9
2024	2	-5.6	-8
2025	1	-1.6	-2
Total	n.a.	n.a.	**-40**

Source: Congressional Budget Office.

Real values are nominal values that have been adjusted to remove the effects of inflation.

CBO's estimate of the effects that a financial crisis would have in 2025 is a weighted average of the probabilities of a crisis occurring in each year from 2020 to 2025. If the crisis started in 2020, it would be in its sixth year by 2025, and the economy would be recovering: Real GDP would be 2.9 percent below its potential, CBO estimates. The agency estimates that the probability of a crisis beginning in 2020 (or in any other year) is 1.5 percent, and 1.5 percent multiplied by the estimated GDP loss of 2.9 percent yields an expected GDP loss of about 4 basis points. CBO calculated the expected GDP loss for each of the other five years and added those expected losses together to produce the probability-weighted estimate of a loss of GDP of 40 basis points in 2025.

GDP = gross domestic product.

no emergency legislation was enacted after a crisis began) could be to lengthen—and make much more severe—any economic downturn that followed a financial crisis.

CBO's assessment that orderly liquidation authority could restore stability in some cases is based solely on that mechanism's supplying a source of financing and not on its other aspects. In addition to providing a financing source, orderly liquidation authority gives the FDIC considerably more flexibility to manage the failure of a covered institution than the bankruptcy process provides. Bankruptcy law restricts how different classes of creditors are treated; for example, although it requires that all creditors in the same class receive equal treatment, it enforces a hierarchical system in which senior creditors receive priority and get paid before more junior ones. Under orderly liquidation authority, the FDIC has flexibility to deviate from those requirements, and that flexibility might have mixed effects on its ability to contain a crisis. Although the FDIC could use the flexibility to stabilize markets, it is also possible that a resolution that deviated from standard procedures could create uncertainty and cause instability where it would not otherwise exist. A policy that limited orderly liquidation authority instead of repealing it would have similar effects on the FDIC's ability to restore stability, though depending on which provisions the policy changed, those effects could be much less significant. Policies that curtailed or restricted the use of the Orderly Liquidation Fund as a source of financing would, on the basis of CBO's central estimates, have larger effects than policies that limited the FDIC's ability to work outside the bankruptcy requirements.

In two-thirds of financial crises, CBO estimates, regulators could under current law rely on tools other than orderly liquidation, and struggling institutions could secure private funding to resolve the crisis. Those options include implementing detailed plans for rapidly resolving financial distress and converting special debt securities into equity if necessary to restore an institution's solvency. In the remaining one-third of crises, which are more severe and have only a 0.5 percent chance of occurring in any given year (that is, one-third of the 1.5 percent likelihood that a crisis of any degree would occur), those tools would, in CBO's estimation, be insufficient, and the crisis would be longer and more severe without having orderly liquidation authority (see Figure 3-3). That fraction matches the fraction of crises in which, according to one study, "there are large impediments to normal financial intermediation throughout virtually all of the financial system"—conditions in which it would

Table 3-6.

How the Increase in the Likelihood and Severity of a Crisis That Resulted From Lowering Capital Requirements Would Affect CBO's Projections of Key Economic Indicators

Basis Points

	Under Current Law	Under Lower Capital Requirements	Effect of Lowering Capital Requirements
Real GDP	-25	-30	-5
Nominal GDP	-34	-40	-7
Consumer Price Index	-9	-10	-2
GDP Price Index	-9	-10	-2
Unemployment Rate	16	19	3
Interest Rate on 3-Month Treasury Bills	-17	-20	-3
Interest Rate on 10-Year Treasury Notes	-10	-12	-2

Source: Congressional Budget Office.

The term *bank* is used here to refer to all depository institutions insured by the Federal Deposit Insurance Corporation, including savings associations as well as banks.

Values are annual averages for the 2020–2029 period. Real values are nominal values that have been adjusted to remove the effects of inflation.

CBO's estimates of the effects that the possibility of a financial crisis has on key economic variables under current law were calculated on the basis of the agency's estimate that the probability of a crisis in any given year is 1.5 percent. The agency estimates that if banks' capital requirements were lowered by 1 percentage point, the likelihood of such a crisis would rise to 1.8 percent. To account for that 20 percent increase in the likelihood of a crisis, CBO increased its probability-weighted estimates of the effects of a crisis under the illustrative policy by 20 percent. For example, the possibility of a crisis reduces real GDP by 25 basis points under the baseline economic forecast, so the effect is 20 percent larger—that is, a decrease in GDP of 30 basis points—under the scenario in which capital requirements are lower. CBO's estimate of the crisis effect of lowering capital requirements on real GDP is the difference between the effect of the possibility of a crisis under current law and the effect of the increased possibility of a crisis under the illustrative policy—about 5 basis points.

GDP = gross domestic product.

be very difficult to find private financing for a bankruptcy that would affect the entire financial system and thus orderly liquidation authority would be useful in facilitating resolution.[28]

The economic effects for the subset of cases in which there is no effective tool other than orderly liquidation authority to quickly and comprehensively resolve the crisis would be much more significant than those of the other two-thirds of crises (see Table 3-7). The loss in GDP and the increase in unemployment rates are estimated to be twice as large as they are in the benchmark crisis projection, and changes in interest rates and inflation are also greater. CBO's estimate of the magnitude of effects of the more severe crisis compared with those of other crises is based on recent studies, which found that a major crisis affects the economy twice as much as less severe crises.[29]

In the most severe one-third of possible crises, which have a 0.5 percent chance of occurring in any given year, CBO estimates that eliminating orderly liquidation authority would double the GDP loss of the crisis. Thus, under baseline economic conditions, the probabilistic effect of eliminating orderly liquidation authority is equal to a 0.5 percent probability multiplied by the

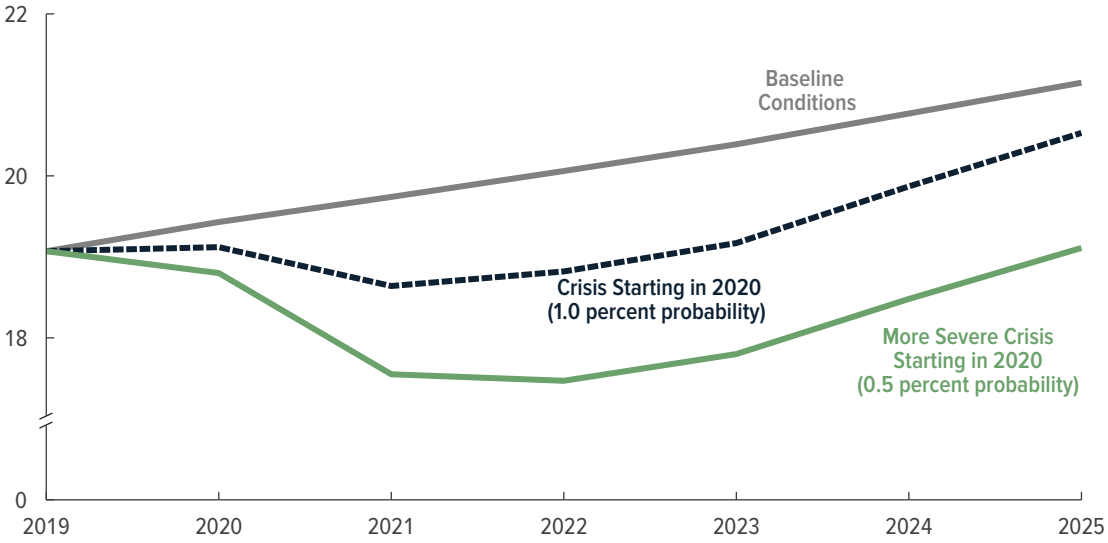
28. The estimated probability of 0.5 percent suggests that such a crisis would occur only once every 200 years. The quoted study is Christina D. Romer and David H. Romer, "New Evidence on the Aftermath of Financial Crises in Advanced Countries," *American Economic Review*, vol. 107, no. 10 (October 2017), pp. 3072–3118, https://doi.org/10.1257/aer.20150320.

29. See Christina D. Romer and David H. Romer, "New Evidence on the Aftermath of Financial Crises in Advanced Countries," *American Economic Review*, vol. 107, no. 10 (October 2017), pp. 3072–3118, https://doi.org/10.1257/aer.20150320; Martin Brooke and others, *Measuring the Macroeconomic Costs and Benefits of Higher UK Bank Capital Requirements*, Financial Stability Paper 35 (Bank of England, December 2015), http://tinyurl.com/y5fepa84; and Timotej Homar and Sweder van Wijnbergen, *On Zombie Banks and Recessions After Systemic Banking Crises*, Discussion Paper 10963 (Centre for Economic Policy Research, November 2015), http://tinyurl.com/y2kfc7af.

Figure 3-3.

CBO's Projections of Real GDP Under Baseline Economic Conditions and During Financial Crises If Orderly Liquidation Authority Was Eliminated

Trillions of 2012 Dollars



Eliminating orderly liquidation authority would lead to a more severe crisis one-third of the time, CBO estimates.

Source: Congressional Budget Office.

If orderly liquidation authority was eliminated, CBO estimates, there would be a one-in-three chance that a subsequent crisis would be more severe than if it remained in place: The probability of a crisis in any given year would remain 1.5 percent, so the likelihood that a more severe crisis would occur would be 0.5 percent.

Real values are nominal values that have been adjusted to remove the effects of inflation.

GDP = gross domestic product.

impact of doubling the decline in GDP from 6 percent to 12 percent. In the other two-thirds of possible cases, which have an annual likelihood of 1 percent, eliminating orderly liquidation authority would not lead to a more severe crisis, so there is no additional economic effect.

Those estimates are highly uncertain because they rely on several other estimates, including the economic projections specified for the severe crisis scenario, the probability that orderly liquidation authority would make a crisis less severe than it might be otherwise, and the assessment that the authority has no net effect on the likelihood of a crisis (because its effects on financial institutions' risk-taking are offsetting). Changing those estimates could make the projected effects of eliminating orderly liquidation authority on GDP much more severe or, at the other extreme, cause them to be positive (that is, eliminating the mechanism could boost GDP rather than lower it). The projected effects of orderly liquidation authority on economic variables are directly proportional to the estimated likelihood of its use. That is, if the authority was projected to reduce the severity of a crisis once every 400 years, on average, instead of once every 200, the projected effects on the economy would be one-half as large.

Moreover, the more severe crisis scenario highlights the limitations of an analysis that does not consider the effects of future legislation. This analysis compares a scenario in which orderly liquidation authority as established under current law is used to resolve a crisis with a scenario in which that authority has been eliminated and there is no new policy in place that can be used to respond to the crisis. An alternative comparison would be between the current-law scenario and a scenario that accounts for whatever legislation the Congress might enact in response to a future crisis. Reacting to a future crisis with legislation enacted after it began would have both advantages and disadvantages. One advantage is

Table 3-7.

Difference Between Estimates of Key Economic Variables Under Baseline Economic Conditions and During a Severe Financial Crisis

	2020 (Year 1)	2021 (Year 2)	2022 (Year 3)	2023 (Year 4)	2024 (Year 5)	2025 (Year 6)	2026 (Year 7)	2027 (Year 8)	2028 (Year 9)	2029 (Year 10)
Under Baseline Economic Conditions										
Real GDP (Trillions of 2012 dollars)	19.4	19.7	20.1	20.4	20.8	21.1	21.5	21.9	22.3	22.7
Nominal GDP (Trillions of dollars)	22.3	23.1	24.0	24.9	25.9	26.9	27.9	29.0	30.1	31.3
Unemployment Rate (Percent)	3.7	4.2	4.6	4.8	4.8	4.8	4.8	4.8	4.7	4.7
Interest Rate on 3-Month Treasury Bills (Percent)	3.2	3.2	3.2	3.0	2.8	2.7	2.7	2.8	2.8	2.8
During a Severe Crisis										
Real GDP (Trillions of 2012 dollars)	18.8	17.5	17.5	17.8	18.5	19.1	19.7	20.5	21.1	21.8
Nominal GDP (Trillions of dollars)	21.6	20.4	20.4	21.0	22.0	23.0	24.0	25.2	26.4	27.6
Unemployment Rate (Percent)	5.2	11.6	13.8	13.2	11.9	10.8	9.4	8.5	8.1	7.6
Interest Rate on 3-Month Treasury Bills (Percent)	1.4	0	0	0	0	0	0	0	0	0
Difference Between Severe Crisis and Baseline Economic Conditions										
Real GDP (Percent)	-3.2	-11.1	-12.9	-12.7	-11.0	-9.6	-8.3	-6.6	-5.3	-4.0
Nominal GDP (Percent)	-3.4	-12.0	-14.8	-15.7	-15.1	-14.6	-14.1	-13.1	-12.4	-11.7
Unemployment Rate (Percentage points)	1.5	7.4	9.2	8.4	7.1	6.0	4.5	3.7	3.4	2.8
Interest Rate on 3-Month Treasury Bills (Percentage points)	-1.7	-3.2	-3.2	-3.0	-2.8	-2.7	-2.7	-2.8	-2.8	-2.8

Source: Congressional Budget Office.

The crisis values are for a crisis that begins in 2020. Real values are nominal values that have been adjusted to remove the effects of inflation.

GDP = gross domestic product.

that such legislation might address problems that cannot be foreseen but will be evident once a crisis is under way. But such legislation would probably be less timely and less targeted to troubled institutions than implementing orderly liquidation authority would be.

Repealing the Ability-to-Repay Rule for Mortgages. Loosening mortgage standards would raise the likelihood of a crisis by a little more than 1 percent, CBO estimates, from 1.5 percent to 1.52 percent.[30] That increased likelihood results in a 0.5 basis-point increase in the projected drop in GDP. The size of that projected effect is one-tenth the size of that of the illustrative policy that would lower capital requirements, reflecting the significantly smaller effect on the likelihood of a crisis that repealing the ability-to-repay rule is estimated to have. (The illustrative policies were not intended to have effects of the same magnitude.) Although relatively small, the estimates are highly uncertain because they rely on estimates of the following relationships, which are themselves uncertain: the effect of changes in the ability-to-repay rule on mortgage volumes, the response of residential investment to higher mortgage activity, and the effect of the increased volume of riskier mortgages on the likelihood of a financial crisis. Because the ability-to-repay rule is relatively new, the literature studying it is sparse, adding to the uncertainty.

30. That projection is based on statistical models used in recent studies that relate the likelihood of financial instability to the volume of credit. See Moritz Schularick and Alan M. Taylor, "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crisis, 1870–2008," *American Economic Review*, vol. 102, no. 2 (April 2012), pp. 1029–1061, https://doi.org/10.1257/aer.102.2.1029.

CHAPTER

4

Budgetary Consequences of the Policies' Economic Effects

Policies that loosened financial regulation would have two distinct sets of economic effects, each of which would produce its own macroeconomic feedback. Under baseline economic conditions, such policies would boost the economy and thus would generally reduce the deficit. But they would also raise the likelihood and severity of a financial crisis; the decrease in gross domestic product, increase in unemployment, and financial losses that accompany such a crisis would in turn lower revenues and raise noninterest spending. That is because a crisis would have significant consequences for U.S. households, many of which would experience such hardships as bankruptcy, foreclosures, or lost income. As a result of those hardships, federal income tax revenues would drop and spending on safety-net programs would increase, resulting in budget deficits that were higher than those projected under baseline economic conditions, in which the financial system is not in crisis.[1]

Macroeconomic Feedback Under Baseline Economic Conditions

Under baseline economic conditions, two of the illustrative policies—lowering capital requirements and repealing the ability-to-repay rule—would boost GDP. Lowering capital requirements would boost GDP by increasing output in all sectors and industries, because if capital requirements were lower, the cost of investing in a very broad range of investments would also be lower. The projected effect on the budget is based on the rules of thumb that the Congressional Budget Office estimates to translate changes in GDP produced by fiscal policy into budgetary effects.[2]

In contrast to lowering capital requirements, repealing the ability-to-repay rule would raise output in two specific areas: residential investment and services of owner-occupied housing, a component of consumption. Initially, the increases in those sectors would raise GDP above potential GDP. In the long run, however, some of the rise in residential investment would lead to offsetting reductions in other investment, consumer spending, and net exports, restoring the relationship between GDP and potential GDP to baseline levels. To project the budgetary effects of the increase in housing services, CBO used the effective tax rate on income from owner-occupied housing. The projected effects on revenues are therefore much smaller than those that would be generated using CBO's rules of thumb for a general rise in GDP.

Eliminating orderly liquidation authority would have offsetting effects on behavior under baseline economic conditions; CBO's central estimate is that the macroeconomic feedback to the budget that would stem from implementing that illustrative policy would be zero.

Macroeconomic Feedback Stemming From Changes in the Likelihood and Severity of Financial Crises

The projections of macroeconomic feedback stemming from the changes in the likelihood and severity of a crisis are, like the crisis projections, modeled after the post-2008 experience. Although the 2007–2009 crisis did not significantly raise deficits through the direct costs of deposit insurance or financial rescue programs, it indirectly raised deficits by causing tax revenues to decline precipitously and safety-net spending to skyrocket. Tax revenues declined as a percentage of GDP because capital

1. As discussed in Chapter 3, CBO's economic forecast incorporates the possibility that a crisis could occur. The forecast values are probability-weighted averages of different scenarios, including high-probability scenarios with no financial crisis and very low-probability scenarios with a financial crisis. In this section, estimates are measured in relation to a scenario with no financial crisis.

2. See Congressional Budget Office, "How Changes in Economic Conditions Might Affect the Federal Budget" (interactive workbook, January 2019), www.cbo.gov/publication/54934.

gains, personal income, and taxable corporate profits all fell. As deficits rose and the economy shrank, the nation's debt-to-GDP ratio increased.

The budget projections for financial crises starting in 2020 cover two outcomes: the benchmark financial crisis and a more severe crisis (see Table 4-1). Measured as shares of GDP, noninterest outlays would be higher and revenues would be lower than they are in CBO's baseline projections in both crises. As a result of greater spending on income-support programs such as the Supplemental Nutrition Assistance Program and unemployment insurance, noninterest outlays as a share of GDP would be an average of 0.8 percentage points higher over the 2020–2029 period in the less severe crisis than they are in the agency's baseline projections. In the more severe crisis, such outlays would be 2.5 percentage points higher than they are in CBO's baseline projections. (The rise in nominal spending would be smaller than the increase in the spending-to-GDP ratio because GDP would be smaller under a crisis than it would be under baseline economic conditions.)

In the budget projections for the financial crises, revenues as a share of GDP drop significantly, as they did after 2008. Revenues amounted to more than 18 percent of GDP in 2007, but after the financial crisis, they fell to less than 15 percent in 2009, 2010, and 2011. On the basis of that experience, CBO estimates that for every percentage point that GDP fell below its potential, revenues as a percentage of GDP would fall 0.3 percentage points below the baseline level. That relationship was incorporated into CBO's projections of tax receipts under the financial crises. Accordingly, over the 2020–2029 period, revenues as a percentage of GDP are an average of 0.7 percentage points lower in the projections for the benchmark crisis than they are in CBO's baseline budget projections; in the projections for the more severe crisis, they are an average of 2.0 percentage points lower than they are in the baseline projections. (Again, the percentage decline in revenues measured in nominal dollars would be greater than those percentage changes in both cases.) Those effects are projected to be partly offset by lower interest payments. Interest payments are projected to fall because interest rates are expected to drop in any future crisis, as they did in 2008.[3] The net effect is to increase deficits and debt as percentages of GDP.[4]

Lowering Capital Requirements

Under baseline economic conditions, the rise in GDP that is projected to result from lower capital requirements would generate additional tax revenues, but that increase would be more than offset by the decrease in revenues stemming from the shift in financing from equity to debt; the net effect of that feedback is to increase deficits (see Table 4-2). The policy's effect on future crises produces additional macroeconomic feedback. Because lowering capital requirements would increase the likelihood of a financial crisis by 0.3 percentage points per year, the policy would also increase the expected effects of financial crises on deficits (see Table 4-3 on page 47).

Estimates of the macroeconomic feedback under baseline economic conditions and of the feedback stemming from the policy's effects on future crises are highly uncertain. Using a range of plausible parameters, CBO estimates that the feedback under noncrisis economic conditions could reduce total deficits for 2020 to 2029 by as much as $8 billion or increase deficits by as much as $31 billion; CBO's central estimate is that the macroeconomic feedback stemming from lowering capital requirements would increase deficits by a total of $14 billion over the 2020–2029 period. The main sources of uncertainty in the estimate are the parameter measuring how much banks' having less capital affects their financing costs and estimates about how lower financing costs affect the economy. In addition, the feedback estimate is sensitive to current tax parameters, which were changed at the end of 2017.

The macroeconomic feedback stemming from the policy's effect on future crises could increase deficits over the 2020–2029 period from anywhere between $6 billion and $144 billion, according to CBO's analysis using a range of estimates from the academic literature for parameters measuring the baseline likelihood of a financial crisis and the sensitivity of bank failure rates to capital levels. The agency's central estimate of that

3. Interest rates would not drop if there was a significant loss of confidence in the value of the federal government's debt.

4. The higher trajectory of the debt-to-GDP ratio reflects both the increased federal borrowing in the numerator and the slower growth of nominal GDP in the denominator.

Table 4-1.

Budget Projections Under Baseline Economic Conditions and During Financial Crises

Percentage of Gross Domestic Product

	2020 (Year 1)	2021 (Year 2)	2022 (Year 3)	2023 (Year 4)	2024 (Year 5)	2025 (Year 6)	2026 (Year 7)	2027 (Year 8)	2028 (Year 9)	2029 (Year 10)
Revenues										
Baseline economic conditions	16.6	16.7	16.8	17.0	17.3	17.4	17.9	18.2	18.2	18.3
Crisis	16.2	15.3	15.3	15.6	16.3	16.7	17.5	18.2	18.2	18.3
More severe crisis	15.8	13.9	13.6	13.9	14.7	15.1	16.0	16.8	17.0	17.4
Noninterest Outlays										
Baseline economic conditions	18.6	18.7	19.1	19.0	18.8	19.1	19.4	19.5	20.0	19.5
Crisis	18.8	19.9	20.9	20.7	20.1	20.1	19.8	19.5	19.9	19.5
More severe crisis	18.9	21.3	23.0	22.9	22.3	22.2	21.9	21.4	21.6	20.8
Interest Outlays										
Baseline economic conditions	2.1	2.3	2.4	2.6	2.7	2.7	2.8	2.8	2.9	3.0
Crisis	2.0	1.8	1.6	1.6	1.6	1.6	1.7	1.8	2.1	2.3
More severe crisis	1.9	1.7	1.5	1.3	1.2	1.1	1.0	1.0	0.9	0.9
Deficit (-)										
Baseline economic conditions	-4.0	-4.2	-4.7	-4.5	-4.2	-4.5	-4.3	-4.0	-4.7	-4.2
Crisis	-4.5	-6.4	-7.2	-6.8	-5.4	-5.0	-4.0	-3.1	-3.8	-3.5
More severe crisis	-5.0	-9.2	-10.8	-10.4	-8.8	-8.1	-6.9	-5.6	-5.5	-4.3
Debt										
Baseline economic conditions	79.5	81.0	83.0	84.8	85.9	87.2	88.5	89.4	90.8	91.8
Crisis	79.9	83.7	88.2	92.2	94.6	96.5	97.4	97.4	98.0	98.3
More severe crisis	80.5	87.1	95.2	102.7	108.5	113.5	117.4	119.9	122.1	123.1

Source: Congressional Budget Office.

The values for a crisis and a more severe crisis are for a crisis that begins in 2020.

range is a $37 billion increase in deficits in those years. (That estimate is much closer to the low end of the range of outcomes because the values in the literature for the sensitivity of bank failure rates to capital levels are concentrated near the low end of the range, which is bound by zero, and skew upward.) Those estimates are particularly sensitive to underlying parameters. In addition, the estimates would substantially change under different projections of the economy following a financial crisis. Moreover, the estimate depends on the level of capital under the baseline. A decrease in capital of the same magnitude (1 percentage point) would have a larger effect if the baseline capital level was lower and a smaller effect if the baseline capital level was higher.

Eliminating Orderly Liquidation Authority

Eliminating orderly liquidation authority would have budgetary consequences because doing so would lead to the possibility that the economic and budgetary consequences of a financial crisis might be larger than they would be with that authority in place. Outside of financial crises, the illustrative policy would produce no macroeconomic feedback, but if a financial crisis occurred, the policy is projected to have negative consequences for the economy in at least some cases. CBO estimates that one-third of crises would be severe enough that the drop in GDP caused by the crisis and the budgetary consequences of that drop would be significantly larger than they would be under current law. The probability that such a crisis would occur in any given year is 0.5 percent.

Table 4-2.

Macroeconomic Feedback Under Baseline Economic Conditions, 2020 to 2029

Billions of Dollars

	Lower Capital Requirements by 1 Percentage Point	Eliminate Orderly Liquidation Authority[a]	Repeal the Ability-to-Repay Mortgage Rule
Effects on Revenues			
From change in financing mix	-18	0	0
From increase in gross domestic product	4	0	1
Total	-14	0	1
Effects on Outlays			
Noninterest outlays	1	0	0
Interest outlays	-1	0	0
Total	0	0	0
Increase or Decrease (-) in the Deficit	**14**	**0**	**-1**

Source: Congressional Budget Office.

a. CBO estimates that the effects of eliminating orderly liquidation authority on risk-taking would be offsetting; thus, the agency projects that implementing that policy would have no effect on the economy under baseline conditions.

Estimates of the macroeconomic feedback that eliminating orderly liquidation authority would produce if a crisis occurred are highly uncertain, but on the basis of parameter values from the literature, CBO estimates that such feedback could reduce total deficits from 2020 to 2029 by as much as $24 billion or increase them by $302 billion; the agency's central estimate is that the policy would increase deficits in those years by a total of $128 billion. If eliminating the authority decreased the likelihood of a crisis and had no effect on the severity of crises that did occur, the policy would reduce the deficit. However, if eliminating orderly liquidation authority made a crisis more severe than it otherwise would have been, the policy could increase deficits by more than CBO's central estimate of $128 billion. In addition, the projections are highly sensitive to the specifics of the crisis.

Repealing the Ability-to-Repay Rule for Mortgages

Under baseline economic conditions, the increase in GDP resulting from repealing the ability-to-repay rule would lead to relatively little new taxable income because the additional GDP would be concentrated in services of owner-occupied housing, and the effective tax rate on gross income generated by those services is much lower than the rate on other types of income. Most of the additional GDP associated with owner-occupied housing is in the form of depreciation and imputed "rent," neither of which generate any federal tax revenues.[5] But some of the gross income associated with housing output is taxed, including rental income and the net interest that investors in mortgages receive. Although mortgage interest generates taxable income to those who receive it, households that pay that interest can deduct it from their taxable income when they itemize deductions on their returns. That deduction offsets the revenue gains from the increase in housing services. Under CBO's projections of effective marginal tax rates and income shares, each additional dollar of housing output would result in 4 cents in additional tax revenues—significantly less than the increase in revenues that would result from a

5. See Nicole Mayerhauser and Marshall Reinsdorf, "Housing Services in the National Economic Accounts" (Bureau of Economic Analysis, September 2007), https://go.usa.gov/xmNZQ.

Table 4-3.

Macroeconomic Feedback Stemming From the Illustrative Policies' Effects on the Likelihood and Severity of Financial Crises, 2020 to 2029

Billions of Dollars

	Lower Capital Requirements by 1 Percentage Point	Eliminate Orderly Liquidation Authority	Repeal the Ability-to-Repay Mortgage Rule
Effects on Revenues	-66	-141	-3
Effects on Outlays			
Noninterest outlays	1	7	0
Interest outlays	-31	-21	-2
Total	-30	-14	-1
Increase in the Deficit	**37**	**128**	**2**

Source: Congressional Budget Office.

To estimate the budgetary effects of the illustrative policies, CBO weighted the likelihood of a crisis under the different policies. The estimated effects of lowering capital requirements and of repealing the ability-to-repay rule on the budget are based on the increase in the probability of a crisis that is generated by those policy changes, multiplied by the budgetary effects of a crisis.

broad-based increase in output.[6] Eliminating the ability-to-repay mortgage rule raises the likelihood of a financial crisis only slightly, so relatively little macroeconomic feedback stems from the policy's effect on future crises.

The estimates of macroeconomic feedback resulting from repealing the ability-to-repay rule are uncertain. Using alternative values for parameters from the literature, CBO estimates that the feedback produced outside of a financial crisis could reduce total deficits over the 2020–2029 period by as much as double its central estimate of about $700 million, or such feedback could even increase deficits. CBO's estimates of the macroeconomic feedback stemming from the policy's effect on the probability of future crises based on alternative parameter values from the literature range from zero to an approximately $5 billion increase in total deficits over the 2020–2029 period. The uncertainty in estimates of that crisis feedback is driven by uncertainty in the baseline likelihood of a financial crisis and in the effect that eliminating the ability-to-repay rule would have on the likelihood of a crisis in the future. The uncertainty in estimates of the feedback under noncrisis conditions comes primarily from uncertainty in the estimate of the ability-to-repay rule's effect on mortgage volumes, which determines its effects on tax revenues, the economy, and bank failure rates. Finally, estimates of the effect of repealing the ability-to-repay rule are sensitive to how tax provisions related to owner-occupied housing interact with the ability-to-repay rule.

6. For CBO's estimates of the effective marginal tax rates on owner-occupied housing, see Congressional Budget Office, "Tax Parameters and Effective Marginal Tax Rates" (January 2019), www.cbo.gov/about/products/budget-economic-data#10. Certain provisions of the 2017 tax act, which are scheduled to expire at the end of 2025 under current law, temporarily changed the marginal tax rates on owner-occupied housing. The estimated marginal tax rate of 4 percent is an average of the projected rates over the 2020–2029 period (including six years, 2020 to 2025, in which the provisions are in effect and four years, 2026 to 2029, in which they are not). Under the temporary provisions, tax deductions for mortgage interest are limited, and fewer households are expected to claim such deductions because the increase in the standard deduction is projected to substantially reduce the fraction of households that itemize deductions on their returns. As a result, the effective marginal tax rate on income from owner-occupied housing for 2020 to 2025 is projected to be approximately 9 percent, whereas for 2026 to 2029, it is projected to be –5 percent.

CHAPTER

5

Sensitivity of the Results to the Parameters Used in This Analysis and to Provisions of Tax Law

As noted throughout this report, the projections of the effects of the illustrative policies are highly uncertain because they rely on estimates of probabilities of rare events and on parameters representing how policies might affect outcomes such as bank failures and financial crises. (For an overview of the many sources of uncertainty, see Table 5-1.) The parameters represent the Congressional Budget Office's central estimates, but research from academics, regulators, and other practitioners has produced a wide range of plausible estimates. Each chapter of this report has discussed the uncertainty of the projections and how it arises from the uncertainty of the parameters used to generate the projections. To summarize and contrast the sensitivity of the projections of the illustrative policies' effects, this chapter does the following:

- Identifies key parameters and the sources of uncertainty around them,
- Provides high and low alternatives (based on a review of the academic literature) to CBO's central estimate for each of those parameters, and
- Presents recalculated projections using those alternative parameters.

Those alternative projections provide a wide range of estimates of the direct budgetary effects and macroeconomic feedback of two of the illustrative policies: lowering capital requirements and eliminating orderly liquidation authority. The range of estimates for the third policy, repealing the ability-to-repay rule for mortgages, is relatively narrow because the outside research underlying that analysis is limited and grapples with only some of the relevant parameters. CBO has developed an interactive tool that allows users to change the values for key parameters and see how those changes affect the projections.[1]

1. See the supplemental materials posted along with this report on CBO's website (www.cbo.gov/publication/55586).

Another source of uncertainty in the estimates are the interactions that the illustrative policies would have with features of the income tax system. For example, the corporate tax rate and deductibility of interest affect the relationship between capital requirements and the financing costs of banks. Most academic studies of the illustrative policies predate the 2017 tax act, which significantly changed the features of the corporate and individual income tax systems, adding uncertainty to analysis that relies on those studies. By highlighting the sensitivity of the results to features of the tax system, this chapter illustrates that uncertainty.

An Overview of the Models and Parameters Used in This Analysis

Each of the three illustrative policies affects the budget through a sequence of causal relationships, all of which are characterized by uncertainty. CBO determines values for various parameters and uses financial and economic models to capture that relationship (see Figure 5-1). To produce ranges of estimates of the budgetary effects of the policies that encompass most (but not all) possible outcomes, CBO used the combination of values for all underlying parameters that produced the highest result and then the combination that produced the lowest result. It may therefore seem as though the high and low outcomes in the ranges represent highly unlikely cases. However, this sensitivity analysis examines the sensitivity of the central estimates to only a few selected parameters for which it was possible to quantify high and low alternatives; it does not account for the many other assessments, implicit and explicit, that underlie the broader study of the budgetary effects of changes in financial regulation policies.

High and low alternative values were chosen for each parameter on the basis of the range of estimates in the academic literature (see Table 5-2 on page 52). The values that CBO used for this study were not always the midpoint between the high and low alternatives. In some cases, CBO's central estimate was closer to the lowest

Table 5-1.

Sources of Uncertainty in Estimates of the Effects of Three Illustrative Policies

		Macroeconomic Feedback to the Budget:	
	Direct Budgetary Effects	Under Baseline Economic Conditions	From Changes in the Likelihood and Severity of Crises
Lower Capital Requirements	The effect of lower capital on banks' failure rates; The effect of lower capital on the premiums banks pay to the Federal Deposit Insurance Corporation	The degree to which financing costs will be reduced; The proportion of savings that banks would pass through to customers in the form of lower interest rates; The effect of lower financing costs on the economy	The baseline estimate of the likelihood of a financial crisis; The effect of banks' having less capital on that likelihood; The effects of a financial crisis on the economy and thus on the deficit
Eliminate Orderly Liquidation Authority	The likelihood and severity of episodes of financial distress that might trigger the use of orderly liquidation authority	The effect of orderly liquidation authority on risk taking	The likelihood and severity of episodes of financial distress that might trigger the use of orderly liquidation authority; The effect of orderly liquidation authority on risk taking; The effect of orderly liquidation authority on the severity of a financial crisis
Repeal Ability-to-Repay Mortgage Rule	The effect of ability-to-repay rule on volume of mortgages originated that fall outside of safe harbor; The effect of higher volumes of risky mortgages on banks' failure rates	The effect of ability-to-repay rule on volume of mortgages originated that fall outside of safe harbor; The effect of higher overall mortgage volumes on residential investment	The effects of a financial crisis on the economy and thus on the deficit; The effect of higher volumes of risky mortgages on the likelihood of a financial crisis

Source: Congressional Budget Office.

value than the highest. That is because although a few studies might provide high outlier estimates, most estimates cluster around a relatively low value. For example, the distribution of estimates for the relationship between banks' levels of capital and their risk of failure is highly skewed. The median estimate, around which most of the studies' estimates fell, is that a 1 percentage-point decrease in capital levels increases the failure rate by 20 percent. But a few studies estimated that the failure rate increased by as much as 60 percent.

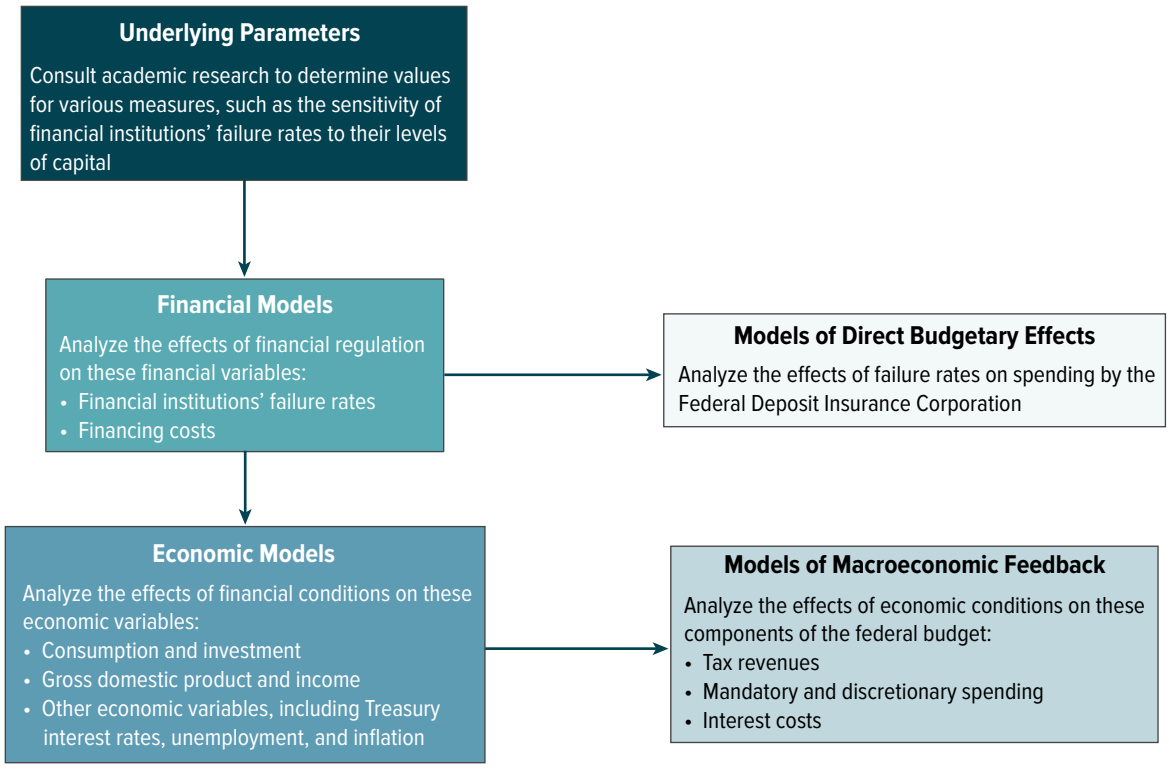
Sensitivity of the Estimates of the Direct Effects on Spending and Revenues

The values that CBO used for underlying parameters had a significant effect on some of the agency's estimates of how the illustrative policies would affect spending and revenues. The estimated effect on federal spending of lowering capital requirements could be either positive or negative, depending on how much deposit insurance premiums increased in relation to the costs of resolving bank failures. If premiums rose substantially but failure costs remained the same, spending over the 2020–2029 period would decrease, on net, by $20 billion, CBO estimates. Alternatively, if premiums did not change but failure costs rose more sharply than CBO's central estimate of that increase, lowering capital requirements could add as much as $19 billion to total spending over the 2020–2029 period.

The range of estimates of the effect of repealing the ability-to-repay rule on spending is far more narrow, both because CBO's central estimate of the effect on deficits over the 2020–2029 period is small and because the relevant academic literature is limited. By contrast, the uncertainty in the estimate of the direct budgetary effects of eliminating orderly liquidation authority is large because the estimates of the likelihood of a financial disruption that might trigger its use are not precise in the

Figure 5-1.

CBO's Process for Modeling the Effects of Financial Regulation



Source: Congressional Budget Office.

academic literature and because exactly how the authority would be used if such a disruption occurred is highly uncertain.

Sensitivity of the Estimates of Macroeconomic Feedback

The range of estimates of macroeconomic feedback, under baseline economic conditions and stemming from changes in the likelihood and severity of crises, is relatively large for two of the illustrative policies: lowering capital requirements and eliminating orderly liquidation authority (see Figure 5-2 on page 53 and Figure 5-3 on page 54). Those projections are highly dependent on estimates of the likelihood of a crisis under current law. In the case of lowering capital requirements, the estimates of the macroeconomic feedback are also significantly affected by estimates of the relationship between banks' levels of capital and rates of failure.

Lowering Capital Requirements

Under baseline economic conditions, the macroeconomic feedback stemming from lowering capital requirements is somewhat uncertain, though it is projected to increase deficits in all instances. If the effect of banks' capital levels on the risk of bank failure is greater than CBO's central estimate, the feedback from lowering capital requirements would be greater than CBO projects. That might be the case if lower capital requirements allowed depository institutions to place more risk on the deposit insurance system and to gain a greater advantage in financing costs than CBO projects. Under baseline economic conditions, that larger reduction in financing costs would increase gross domestic product and reduce deficits more than CBO projects.

The range of uncertainty for the estimates of the macroeconomic feedback effects stemming from the effects on future crises of lowering capital requirements is wide. CBO's central estimate is not in the center of that range;

Table 5-2.

Comparison of CBO's Estimates of Key Parameters With Others' Estimates

Percent

Parameter	Lowest Estimate	CBO's Estimate	Highest Estimate	Source of Uncertainty or Variability
Likelihood of a Financial Crisis in Any Given Year	1.0	1.5	2.0	Limited relevant historical data
Change in Bank Failure Rate for Each Percentage-Point Change in Capital	5	20	60	Differences in estimates from academic studies
Change in Deposit Insurance Premium Rate for Each Percentage-Point Change in Capital (Basis points)	0	0.3	1.0	Potential changes in the Federal Deposit Insurance Corporation's formula for premium rates
Effect on Tax Liability of a 1 Percentage-Point Increase in Debt (Basis points)	0	-0.8	-1.5	Potential changes in tax law
Effect of Orderly Liquidation Authority on Likelihood of a Financial Crisis	-10	0	10	Offsetting effects of orderly liquidation authority on risk-taking behavior
Percentage of Financial Crises That Would Be More Severe If Orderly Liquidation Authority Was Eliminated	0	33.3	50.0	Uncertainty about how eliminating the orderly liquidation authority might affect the dynamics of a financial crisis
Change in Bank Failure Rate If the Ability-to-Repay Rule Was Eliminated	0	1	2	Uncertainty about which loans would be made if rule was eliminated
Effective Tax Rate on Services From Owner-Occupied Housing	-5	4	10	Scheduled changes in tax law (The provisions of the 2017 tax act that changed the effective rate are scheduled to expire in 2026 under current law.)

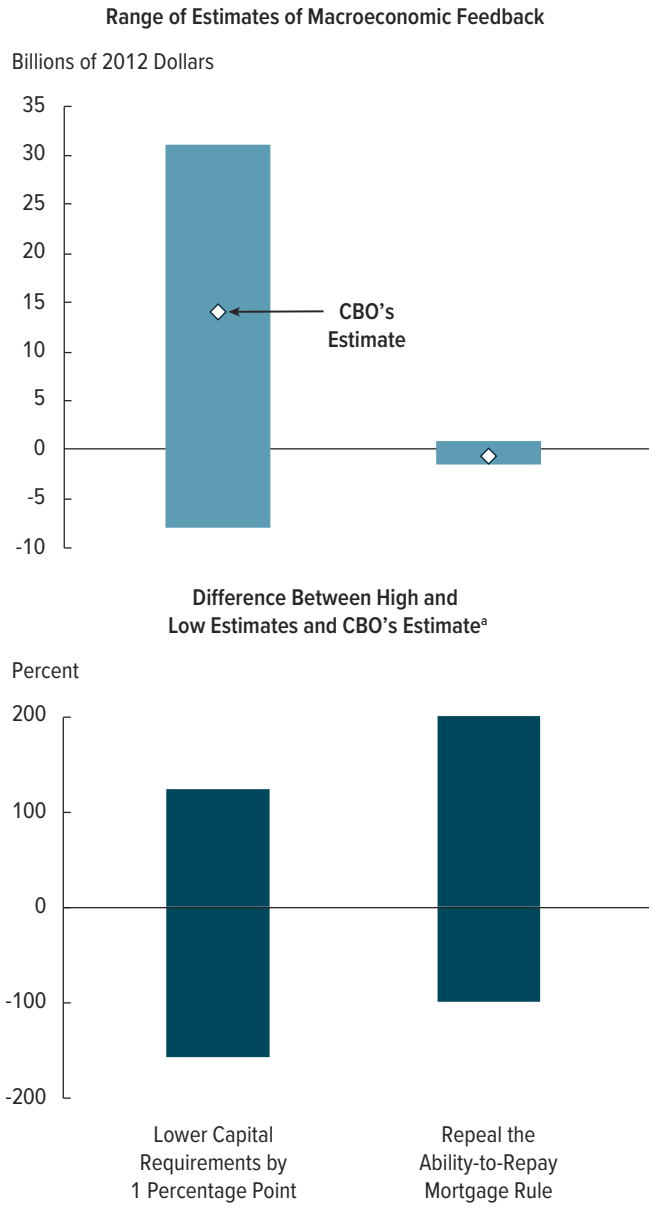
Source: Congressional Budget Office.

it is much closer to the low end of the range of estimates from the academic literature than it is to the high end. Some of the uncertainty in the estimate of the feedback from the policy's effect on future crises arises from the uncertainty of the likelihood of a crisis under current law. That likelihood, estimated to be 1.5 percent annually, is uncertain in part because it is based on historical data from many countries and eras in which financial markets and policies differed substantially from those that prevail in the United States today. If the likelihood of a crisis was 2 percent annually, which is one-third higher than CBO estimates, then the baseline cost of financial crises—and thus the projected feedback from lowering capital requirements—would be one-third higher as well. That occurs because the projections of a policy's effects during a crisis are calculated by multiplying the probability of a crisis by the estimates of the effect that such a crisis would have on the economy if one occurred. The sensitivity of failure rates to banks' levels of capital thus affects the projections of the effects under baseline economic conditions and during a crisis in offsetting ways. CBO's central estimate is not near the midpoint of the range of estimates of the effect of a 1 percentage-point decrease in capital requirements on the likelihood of a crisis because that range is bound by zero on the low end and skews upward in the literature.

Interactions between the effects of lowering capital requirements and the tax preference for debt further add to the uncertainty in the estimates. Lower capital will reduce revenues as long as debt receives some tax preference. Before the enactment of the 2017 tax act, the tax preference for debt was much greater than it is under current law. The amount of revenues lost in a crisis would depend on the amount of debt that received a tax preference at that time. In addition, limitations on the ability to claim deductions for capital losses would reduce the effect of a crisis on tax revenues. Uncertainty around investors' expectations about future tax law creates uncertainty in the estimates.

Figure 5-2.

Sensitivity of CBO's Estimates of the Illustrative Policies' Macroeconomic Feedback Under Baseline Economic Conditions, 2020 to 2029



Source: Congressional Budget Office.

The ranges are based on estimates from the relevant academic literature.

CBO estimates that the effects of eliminating orderly liquidation authority on risk-taking would be offsetting; thus, the agency projects that implementing that policy would have no effect on the economy—and therefore result in no macroeconomic feedback—under baseline conditions.

a. Percentage differences between alternative estimates and CBO's estimate are calculated as the alternative estimate minus CBO's estimate, divided by the absolute value of CBO's estimate.

Eliminating Orderly Liquidation Authority

The relevant literature suggests a wide range of values for the parameter that accounts for the fraction of crises that would be mitigated by orderly liquidation authority, and the value of that parameter significantly affects the projection of the macroeconomic feedback that would result from eliminating that authority. For example, if the estimate of the fraction of financial crises that would be less severe because of orderly liquidation authority was increased to one-half from CBO's central estimate of one-third, the projected increase in deficits would be significantly larger; by contrast, if the estimate was reduced to zero, there would be no macroeconomic feedback and thus no corresponding increase in deficits.

The available evidence suggests that the effects of orderly liquidation authority on risk-taking are offsetting; thus, CBO's central estimate of the economic effects of eliminating that authority under baseline economic conditions is zero. However, concluding that eliminating orderly liquidation authority would increase or decrease risk-taking under baseline economic conditions and incorporating a parameter to account for that change would significantly alter the projections. For example, if eliminating orderly liquidation authority decreased the likelihood of a crisis by 10 percent (that is, lowered the probability that a crisis would occur in any given year from 1.5 percent to 1.35 percent), the projected feedback stemming from the policy's effects on future crises would result in a $99 billion increase in deficits over the 2020–2029 period instead of a $131 billion increase.

Under most combinations of parameters, the feedback from the effect on future crises of eliminating orderly liquidation authority increases deficits. But if eliminating that authority decreased the likelihood of a crisis and had no effect on the severity of crises that did occur, implementing the illustrative policy would reduce deficits over the 2020–2029 period by a total of $18 billion.

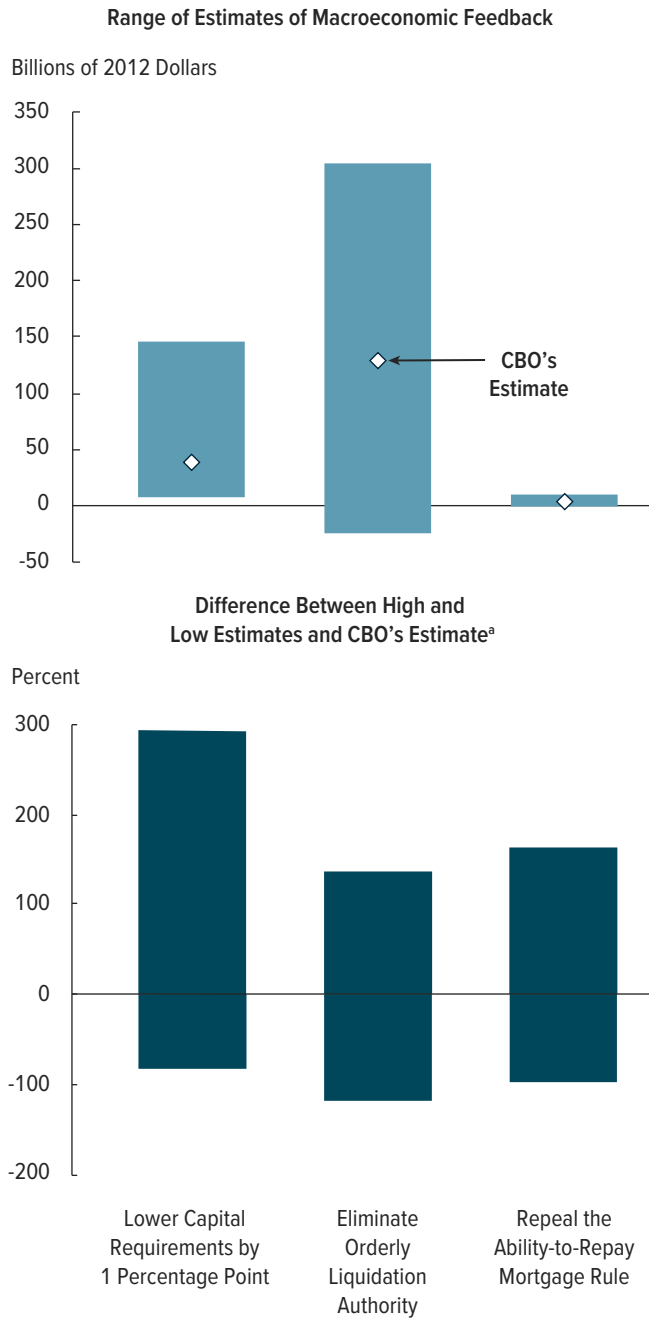
Repealing the Ability-to-Repay Rule for Mortgages

The uncertainty in estimates of macroeconomic feedback from repealing the ability-to-repay rule stems mainly from these unknown variables:

- The magnitude of the increase in the volume of new mortgages that would result from implementing the policy,

Figure 5-3.

Sensitivity of CBO's Estimates of the Macroeconomic Feedback Stemming From the Illustrative Policies' Effects on the Likelihood and Severity of Financial Crises, 2020 to 2029



Source: Congressional Budget Office.

The ranges are based on estimates from the relevant academic literature.

a. Percentage differences between alternative estimates and CBO's estimate are calculated as the alternative estimate minus CBO's estimate, divided by the absolute value of CBO's estimate.

- How the increased mortgage activity would affect the economy and the probability of a financial crisis, and
- The tax consequences of an increase in economic activity owing to greater mortgage activity.

Under plausible parameters, the feedback associated with crises could range from zero to double CBO's central estimates of such feedback.

Another source of uncertainty in the estimates of the effect of repealing the ability-to-repay rule is the variability of households' expectations about the tax consequences of mortgage borrowing. Precisely how households perceive tax law, respond to changes in it, and form expectations about future tax law is unclear and thus contributes to the uncertainty in the estimates of repealing the ability-to-repay rule.

Assessing the sensitivity of the feedback to different expected tax rates allowed CBO to quantify a range of uncertainty around different tax consequences. Estimates of the macroeconomic feedback from eliminating the ability-to-repay rule are sensitive to the effective marginal tax rate on owner-occupied housing. The effective tax rate changes from a positive value to a negative value beginning in 2026 in CBO's baseline projections because many of the provisions of the 2017 tax act pertaining to the individual income tax expire at the end of 2025. Those provisions are estimated to have raised the effective tax rate on owner-occupied housing for the 2018–2025 period to almost 10 percent. The effective tax rate drops back down to about –5 percent in 2026 after those provisions expire and remains there through the rest of the projection period.

Appendix: The Cost of Capital Requirements and the Modigliani and Miller Theorem

Studies estimating the effect of capital requirements on financing costs differ in how they incorporate the lessons of Franco Modigliani and Merton Miller's classic theorem.[1] That theorem lays out conditions in which the total value of a company's liabilities—its debt and equity together—depends solely on the total value of its assets, regardless of its allocation of debt and equity.

According to the theorem, lower capital requirements would not reduce financing costs—at least not under the theoretical conditions assumed by the authors for their analysis. If a reduction in capital requirements led a bank to finance 1 percent more of its assets with debt instead of equity, its total financing cost would stay the same because of two offsetting effects. First, the bank would face a lower cost of financing on that 1 percent because investors in the bank require a higher rate of return on equity than on debt. Second, the cost of financing the remaining 99 percent of assets would go up. That is because the total risk would be unchanged, but equity would account for less of that risk, leaving debt less buffered from any losses. The higher cost on the 99 percent of financing would exactly offset the lower cost on the other 1 percent.

The offset is not likely to be exact in the real world because actual conditions deviate from Modigliani and Miller's theoretical conditions. Modigliani and Miller do not, for example, account for the tax preference that debt receives. Interest and other payments to debt holders are tax deductible, whereas payments to equity holders, such as dividends and capital gains, are not. Under current law, the effective tax rate on equity income is approximately 10 percentage points higher than the effective tax rate on income from debt. Another example of real-world conditions deviating from Modigliani and Miller's conditions is deposit insurance, because its value depends on the allocation of equity and debt.

Some analysts estimating the effect of capital requirements on financing costs essentially ignore the implications of the Modigliani and Miller theorem. They assume that the effect of a change of 1 percentage point in the minimum ratio of capital to assets on banks' financing costs would equal the difference between the return on equity and the return on debt on the affected 1 percent and that there would be no change in the cost of the remaining 99 percent to offset that change.

Other analysts use a statistical approach. They treat the extent of the offsetting effect as a parameter to be estimated with statistical analysis. They generally do not try to relate that parameter to any particular factor—such as the preferential tax treatment of debt. On average, statistical studies have found the offsetting effect to be equal to about 50 percent of the difference between the return on equity and the return on debt on the affected 1 percent. (The offset ranges from 36 percent to 100 percent in academic studies.)

For this report, the Congressional Budget Office used an adding-up approach to determine the level of deviation from the Modigliani and Miller theorem. The agency measured deviations stemming from three conditions that differ from those underlying the theorem: preferential tax treatment of debt, the value of deposit insurance,

1. See Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, vol. 48, no. 3 (June 1958), pp. 261–297, http://www.jstor.org/stable/1809766.

and deposit convenience.[2] If capital requirements were lowered and an institution increased its reliance on interest-bearing debt, the preferential tax treatment of debt would generate savings for that institution. The lower the capital requirement is, the greater the benefit that federal deposit insurance provides to the bank, because the insurance is priced below market value—that is, the amount a private entity would charge to insure deposits. Finally, lower capital requirements allow banks to offer the liquidity of deposits to more customers who are willing to accept a lower rate on their deposits for that convenience. The estimates made using the adding-up approach were similar to those produced by the statistical approach and smaller than those of studies that assumed no offset.

The adding-up approach makes the analysis of tax and spending effects consistent with the analysis of banks' financing costs. It also incorporates the effect of the 2017 tax act in a way that would not be possible using a statistical approach because such an approach does not account for how changes in the tax code or deposit insurance system might affect the offset. The ability to account for such changes is especially important for the analysis in this report, which reflects the assumption that most of the effect of lowering capital requirements on lending rates stems from the value of deposit insurance and the preferential tax treatment of debt. Those two factors account for over 80 percent of the total effect on lending rates (see Table 3-2 on page 28).

The predominance of the effects of the value of deposit insurance and preferential tax treatment of debt on financing costs has significant implications for a benefit-cost analysis of capital requirements, although such an analysis is beyond the scope of this report. Such an analysis would provide a full inventory of the benefits and costs of alternative policies, and it would distinguish benefits and costs, which are defined as gains and losses to society as a whole, from transfers, which are a gain for one party but a loss for another. The budgetary effects studied in this report are transfers and do not represent a societal benefit or cost in and of themselves.

However, policies that raised spending or reduced revenues would increase deficits, so to balance the budget, policies that reduced deficits—policies that would most likely be costly to society—would be necessary. A sound benefit-cost analysis would consider the effect of those offsetting policies somehow, even though they are not specified. Deficit-reducing policies implemented to offset increases in spending or reductions in revenues could have negative effects on the economy if they took the form of higher taxes, or they could require forgoing the benefits of spending programs if they took the form of cuts in spending.[3]

2. For a similar approach, see Anil Kashyap, Jeremy C. Stein, and Samuel G. Hanson, "An Analysis of the Impact of 'Substantially Heightened' Capital Requirements on Large Financial Institutions," (draft, Harvard Business School, May 2010), http://tinyurl.com/y6epvsjm. The authors characterized their own projections as an "upper bound." They did not consider the effect of deposit insurance and assumed a 35 percent corporate tax rate, a 7 percent interest rate on bank deposits, and a 100 basis-point convenience premium (which was higher than the estimate of the premium provided by the main study that they cite for that value). This report reflects an estimate of the value of the preferential tax treatment of debt that is based on the 21 percent statutory tax rate introduced by the 2017 tax act, an interest rate on deposits of 4 percent based on the historical average rate of return on commercial bank assets, and a convenience value of 46 basis points for bank deposits, which is the value of liquidity of safe assets estimated by Arvind Krishnamurthy and Annette Vissing-Jorgensen in "The Aggregate Demand for Treasury Debt," *Journal of Political Economy*, vol. 120, no. 2 (April 2012), pp. 233–267, https://doi.org/10.1086/666526.

3. One way to incorporate budgetary effects of changes in capital requirements in benefit-cost analysis is to exclude from the analysis any effect on lending rates that originates with a government transfer. Such an approach would apply a "social Modigliani and Miller theorem." See John H. Cochrane, "Toward a Run-Free Financial System," in Martin Neil Baily and John B. Taylor, eds., *Across the Great Divide: New Perspectives on the Financial Crisis* (Hoover Press, 2014), pp.197–249, https://tinyurl.com/y57dydc6; and Anat R. Admati and others, *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity Is Not Expensive*, Working Paper 2065 (Stanford Graduate School of Business, October 2013), https://tinyurl.com/y5oa36r6.

List of Tables and Figures

Tables

Figures

About This Document

This report was prepared at the request of the Chairwoman of the House Committee on Financial Services. In keeping with the Congressional Budget Office's mandate to provide objective, impartial analysis, the report makes no recommendations.

Michael Falkenheim wrote the report with guidance from Sebastien Gay. Aaron Betz, Paul Burnham, Devrim Demirel, Ed Gamber, John Kitchen, Mark Lasky, Andrew Laughlin, Michael McGrane, Jaeger Nelson, John Seliski, Claire Sleigh (formerly of CBO), Delaney Smith, Jeff Werling, and Susan Willie contributed to the analysis. Christopher Adams, David Burk, Kim Cawley, Nathaniel Frentz, Kathleen Gramp, Junghoon Lee, Avi Lerner, John McClelland, Sam Papenfuss, Sarah Puro (formerly of CBO), Stephen Rabent, Mitch Remy, Chayim Rosito, and Molly Saunders-Scott provided useful comments. Kevin Perese prepared for publication the computer code used to generate the estimates in the report.

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CBO continually seeks feedback to make its work as useful as possible. Please send any comments to communications@cbo.gov.

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Director
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