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How CBO Analyzes Public-Private Risk Sharing in Insurance Markets

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At a Glance

In some insurance markets, the federal government and private insurance companies share the financial risk of covering insured parties. In this report, the Congressional Budget Office outlines how it analyzes three different forms of public-private risk sharing that are used to provide terrorism insurance, crop insurance, and flood insurance. The agency also describes how each form of risk sharing affects the federal budget.

- For **terrorism insurance**, the federal government assumes most of the catastrophic risk by reinsuring (that is, by supplying insurance for insurers) against the risk borne by private insurers. By reinsuring against only the catastrophic risks rather than bearing all the risk, the government decreases its budgetary costs. (Catastrophic risks stem from events that have a low probability of occurring but that are very consequential when they do occur.) The government is required to recover most or all of its outlays by assessing a tax on all commercial policyholders after a terrorist attack occurs.

- For **crop insurance**, the government and private insurers share in the gains and losses from the insurance policies. In general, budgetary costs can be lower when risks are shared than when the government bears all the risk. But in the federal crop insurance program, risk sharing increases budgetary costs because private insurers are allowed to selectively retain most of the premiums and the opportunity for gains on low-risk policies.

- For **flood insurance**, the government initially assumes all the risk associated with covering policyholders and then transfers some of it to private companies and investors by purchasing reinsurance and using catastrophe bonds (securities that allow the government to forgo scheduled payments of interest and principal, in part or in full, in the event of specified losses from floods). Because the government must pay market prices when it transfers the risk, that form of risk sharing increases expected budgetary costs.

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Notes

Unless this report indicates otherwise, all years referred to are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end.

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

The Congressional Budget Office has corrected and, for the sake of clarity, made other changes to this report since its original publication. Changes are listed at the end of the report.

How CBO Analyzes Public-Private Risk Sharing in Insurance Markets

Summary

In three federal programs providing terrorism, crop, and flood insurance, the government and private companies share the financial risk of covering policyholders. In this report, the Congressional Budget Office outlines its analysis of how financial risk is shared between the federal government and private insurance companies in those three programs and describes the budgetary effects of risk sharing in each case.

What Is the Government's Role in Insurance Markets?

Insurance markets in which the federal government plays a significant role are generally those involving risks that are very large or highly correlated (meaning that many policyholders can experience losses simultaneously, as with pension and deposit insurance). For risks that are small and diversifiable, as with auto and life insurance, for example, private insurers can spread risk across all policyholders and absorb losses by setting risk-based prices. Risk sharing happens when private firms and investors can only assume some of the risks, or when the government helps make coverage widely available by subsidizing rates. In some cases, risk sharing can have lower budgetary costs than relying on federal assistance after a catastrophic event.

How Is Risk Shared in the Government's Terrorism, Crop, and Flood Insurance Programs?

Although federal programs providing terrorism, crop, and flood insurance all involve sharing risk with private-sector companies, the risk sharing is structured differently in each program.[1] In the terrorism insurance program, the government reinsures private insurers against catastrophic risks; in the crop insurance program, the government and private insurers share premiums and

the gains and losses from policies; and in its flood insurance program, the government purchases reinsurance from private insurers.[2]

Terrorism Insurance: Federal Reinsurance of Catastrophic Losses. Established by the Terrorism Risk Insurance Act (TRIA) in 2002, the terrorism risk insurance program is administered by the Treasury. The program provides federal reinsurance for private insurers to limit their risk of large financial losses from acts of terrorism. Under TRIA, private insurers set the premiums and the terms of the primary insurance policies they sell to commercial firms and property owners.

Insurers bear much of the risk of losses on commercial policies from terrorist attacks because of the sizable deductibles they pay before the losses trigger the reinsurance and because of the copayments they make above the amount of the deductible. Lawmakers have gradually increased insurers' deductibles and copayments since TRIA was enacted. The government is responsible for initially covering the remainder of the losses. Under the law, the government charges no premiums for its reinsurance but is required to recoup most of its outlays for losses by assessing a tax on all commercial policyholders after a terrorist attack. The Treasury estimates that in calendar year 2022 the government would be required to recoup its outlays for losses up to nearly $43 billion; it would not be required to recoup outlays for losses above that amount. The program effectively leaves the government bearing the catastrophic risk, which is roughly the risk of losses greater than those caused by the terrorist attacks of September 11, 2001.

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1. The government also shares credit risk with the private sector in many programs, including mortgage finance, but this report focuses only on insurance. The report does not address federal health, life, or social insurance programs.

2. Reinsurance is insurance for insurance companies. It is a risk-sharing mechanism whereby insurance providers (called primary insurers) purchase policies from other insurers (called reinsurers) to insulate themselves, at least partly, from the risk of a major claims event. The primary insurers pay premiums to the reinsurer, and the reinsurer pays a claim to the primary insurer when claims from an event (or during a specified period) exceed some threshold (the primary insurer's deductible) specified in the reinsurance contract.

Crop Insurance: Coinsurance of Risks. In the crop insurance program, which is administered by the Federal Crop Insurance Corporation (FCIC), the government and private insurers share premiums and the gains and losses from policies. The government sets the premiums and provides substantial subsidies to the program's policyholders (agricultural producers), and private insurers sell and service the policies, including adjusting claims. The government reimburses the private insurers for a portion of their administrative and operating expenses. Those private insurers can choose the amounts of risk and premiums they share with the government and, by doing so, are likely to maximize their profits at the government's expense.

Flood Insurance: Federal Purchases of Reinsurance Policies. Administered by the Federal Emergency Management Agency (FEMA), the National Flood Insurance Program (NFIP) offers flood insurance in communities that voluntarily participate in the program and that meet certain requirements, such as minimum standards for building codes. The program manages its potential exposure to losses by purchasing reinsurance policies from private insurance companies and using securities that transfer catastrophic risk in capital markets. The government initially bears all the risk under the program and sets the premiums. Primary insurers market the policies to owners of residential and commercial properties and adjust claims but bear no risk.

Under the reinsurance contracts, reinsurers agree to reimburse the government for a share of catastrophic losses above a very high deductible, and capital market investors effectively do the same through the securities they purchase. Although this type of risk sharing has encouraged a bigger role for the private sector in the flood insurance market and reduced the variability of the NFIP's annual costs, it has an expected budgetary cost.

How Does Risk Sharing Affect the Budget?
The risk-sharing mechanisms in the terrorism, crop, and flood insurance programs each affect the federal budget (see Table 1). The government budgets for federal insurance programs on a cash basis, which measures the inflows from premiums and fees and the outflows for claims over a 10-year period. A federal insurance program's net effect on the budget is calculated as the difference between its cash inflows (from premiums, fees, and other income) and its cash outflows (primarily to pay claims for covered losses) when they occur.

- For terrorism insurance, risk sharing in the form of federal reinsurance causes budgetary costs to be lower than they would be if the government assumed all the risk. By shifting risk to private insurers through deductibles and copayments, the government reduces its projected outlays. Under current law, the government would recoup most of its outlays by assessing a tax on policyholders after a terrorist attack, though the government has not paid any claims, and such assessments have never been made.

- For crop insurance, risk sharing tends to make the budgetary cost higher than it would be if the program was wholly federal. That is because the risk sharing allows private insurers to retain the majority of premiums and gains (or losses) from low-risk policies while passing on most of the risk of losses from high-risk policies to the government.

- For flood insurance, risk sharing has an expected budgetary cost as measured on a cash basis. The government must pay private companies and investors an amount that includes market-based compensation for reinsuring risk, but the cost of that compensation is not passed on to NFIP policyholders.

The Government's Role in Insurance Markets
Well-functioning insurance markets can promote economic efficiency and improve policyholders' and policymakers' understanding of risks. By reimbursing policyholders for losses, insurance protects businesses and individuals and thus reduces the need for assistance from the government when major losses occur.

The government generally plays a significant role in insurance markets when the risks are very large or highly correlated. When risks are highly correlated, many policyholders may suffer losses simultaneously, so private insurers are often reluctant to make coverage widely available. In such cases, there can be a significant difference between the amount of losses people incur and the amount of losses covered by insurance because of incomplete insurance markets (that is, markets in which coverage is not widely available for all risks).

Governments play varying roles in insurance markets. In wholly private insurance markets, private insurers price and sell insurance policies, provide coverage to policyholders, and absorb all losses. Those markets, including auto and life insurance markets, are subject

Table 1.

Effects of Risk-Sharing Mechanisms on the Federal Budget

Type of Risk Sharing	Example of Federal Program	Budgetary Effects
The government reinsures private insurers' catastrophic risks.	Terrorism Risk Insurance Program	There can be a budgetary cost or savings, depending on the structure of the federal backstop. For the terrorism risk insurance program, CBO projects budgetary savings because federal outlays are lower than if there was no risk sharing, and taxes assessed after an attack would recoup most outlays along with some compensation for bearing risk.
The government and private insurers share risks through coinsurance agreements.	Federal Crop Insurance Program	Effects depend on who would receive premium income and bear the risk of losses in the absence of the risk sharing. In the federal crop insurance program, one specific aspect of risk sharing that increases the government's costs is that private insurers can retain the majority of the premiums and gains from low-risk policyholders while passing on the bulk of the risk of losses from high-risk policyholders to the government.
The government insurance program purchases private reinsurance.	National Flood Insurance Program	There are expected budgetary costs over the long term (measured on a cash basis) because private reinsurers require reinsurance premiums that fully compensate them for bearing risk.

Data source: Congressional Budget Office.

to government regulation only at the state level. Other insurance markets, such as the markets for deposit insurance and pension insurance, are wholly public in that the federal government provides coverage to beneficiaries without the involvement of any private insurers.[3] In some cases, however, the federal government and private insurers share the financial risk of covering insured parties. Such public-private risk sharing can make insurance affordable and widely available by encouraging private insurers to offer coverage for risks they otherwise would not have covered or to charge lower premiums for insurance coverage, which motivates more property owners and business owners to purchase policies.

Insurance can also encourage individuals and businesses to engage in activities that involve risk if they know they will be protected from some losses in the case of a bad outcome. That risk taking could be efficient or inefficient from an economic standpoint, depending on the type of risky activity that is undertaken and how

the insurance is priced. For example, underpriced flood insurance can lead to excessive real estate development in high-risk coastal areas, which increases losses from floods at taxpayers' expense.[4] Conversely, underpriced federal terrorism insurance supports continued business activities in areas perceived to be at high risk and thus helps preserve agglomeration economies. (Those economies arise from clusters of activities in an area to support more innovation and the exchange of new ideas, goods, and technologies.)

When the government operates insurance programs, it can sometimes reduce its exposure to risk by transferring some risk to private insurers. However, private companies require market-based compensation in exchange for accepting risk. In some cases, government insurance programs crowd out private insurance coverage when they charge premiums that are lower than private companies could charge to cover their expected losses and earn a profit.

Private Insurance Markets
In private insurance markets, policyholders make payments (called premiums) to insurance companies,

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3. This report does not address the government's social insurance or health insurance programs (such as Social Security, Medicare, and unemployment insurance). For a more detailed list of federal insurance programs, see Government Accountability Office, *Catalogue of Federal Insurance Activities,* GAO-05-265R (March 2005), www.gao.gov/products/A18878, and see *Fiscal Exposures: Federal Insurance and Other Activities That Transfer Risk or Losses to the Government*, GAO-19-353 (March 2019), www.gao.gov/products/gao-19-353.

4. Robert Meyer and Howard Kunreuther, *The Ostrich Paradox: Why We Underprepare for Disasters* (Wharton School Press, 2017), pp. 89–101, https://wsp.wharton.upenn.edu/book/ostrich-paradox/.

which in turn assume responsibility for losses above a threshold amount (called a deductible) specified in the policy. In some cases, insurers require policyholders to share in some of the losses above the deductible by making copayments. Premiums are typically set to cover the company's expected payouts on policies and their administrative and operating expenses, as well as to compensate shareholders for their financial investments in the company.

Shareholders will invest in insurance companies only in return for an expected profit that is commensurate with the riskiness of the coverage the company offers. Thus, insurance companies charge premiums that include compensation to shareholders for the risk that they might experience unexpected losses. Insurers invest their shareholders' funds in liquid financial assets (including stocks and bonds) to cover the potential costs associated with larger-than-expected claims on their policies. (Because the return on those assets is procyclical, meaning that returns generally increase when the economy expands and decrease when the economy slows, insurers' capital fluctuates, as does their willingness to assume risk.) Primary insurers that initially take on risk can transfer (or reinsure) some of the risk to other insurance companies (called reinsurers) that operate globally to efficiently diversify their risks. Primary insurers purchase private reinsurance to reduce their risk of catastrophic losses, which might threaten their solvency, and to limit the amount of capital they need to raise from shareholders.

Competition motivates private insurers to price their coverage on the basis of their expected costs when their risks are transparent and diversifiable. They try to set risk-based premiums (subject to the approval of state regulators), deductibles, and copayments that give policyholders an incentive to mitigate risk. (By contrast, federal insurance programs have weaker incentives to use risk-based pricing and sometimes are explicitly subsidized to make insurance more affordable.)

When insurers face risks that are hard to estimate, they are likely to limit coverage or charge much higher premiums than if they have good information about the risk.[5] And when the risk of losses cannot be diversified or is highly uncertain, insurers can either restrict coverage or choose not to offer coverage at prices that are attractive

to most people and businesses. For example, because insurers have limited information on which to base their premiums for the growing risk of cyber insurance, they have only been able to meet some of the demand for it.[6] Cyber insurance covers Internet-based risks and those related to information technology and privacy, including data theft, malware, and denial-of-service attacks (which flood a network or device with so many malicious requests that it cannot properly function). The cost of cyber coverage is typically several times that of coverage for other risks, and less coverage is available (that is, policy limits are lower).[7]

Insurance companies try to reduce their total exposure to risk by diversifying the policies they hold, but they nonetheless face the risk of higher-than-expected losses from factors that can trigger claims on many of their policies at once. For example, natural disasters can affect a wide geographic area and result in unusually large numbers of claims.

The Importance of Risk-Based Premiums. When insurance prices are tied to costs, they convey valuable information to policyholders, both households and businesses, about the risks they face, encouraging them to make more economically efficient choices. For example, when insurance companies offer lower premiums (or discounts) to homeowners who have a fire extinguisher and smoke alarms, the companies communicate the cost of fire risk to policyholders and encourage them to take steps to reduce that risk. Similarly, when property casualty companies offer businesses a discount on their insurance premiums in exchange for developing a continuation-of-operations plan to respond to natural disasters, they encourage them to prepare for such events.

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5.   Howard Kunreuther, Robin Hogarth, and Jacqueline Meszaros, "Insurer Ambiguity and Market Failure," *Journal of Risk and Uncertainty*, vol. 7, no. 1 (August 1993), pp. 71–87, https://doi.org/10.1007/BF01065315.

6.   Cyber insurance is usually sold as a stand-alone policy with lower coverage limits than other lines of insurance. Such explicit coverage is often referred to as affirmative coverage and is separate from other property and casualty coverage. Just under half of all U.S. firms purchase cyber insurance. The premium rate, which is the ratio of the premium to the coverage limit, is several times that of most other property and casualty risks. Insurers must also weigh the effects of "silent" coverage—the potential for some cyber event, such as widespread malware, to cause major losses by triggering coverages under other policy clauses, such as a clause covering business interruption. See Government Accountability Office, *Cyber Insurance: Insurers and Policyholders Face Challenges in an Evolving Market*, GAO-21-477 (May 2021), www.gao.gov/products/gao-21-477.

7.   U.K. Cabinet Office, *U.K. Cyber Security: The Role of Insurance in Managing and Mitigating the Risk* (prepared by Marsh, March 2015), https://tinyurl.com/3hbbr3y (PDF).

When risks are well understood and uncorrelated, private insurance efficiently pools risks, as auto insurance illustrates.[8] The likelihood of one policyholder generating a loss is largely unrelated to the likelihood that many other policyholders will generate losses at the same time. As a result, losses are spread over time in a predictable pattern rather than concentrated within a short period. Insurance companies also have access to demographic and geographic information, as well as information about people's driving history, which helps the companies understand the risks associated with insuring particular policyholders. Additionally, insurers can increase the premiums charged to individual policyholders if they generate a claim, motivating them to drive more safely. During the height of the coronavirus pandemic, some auto insurers refunded premiums because people were driving much less than in the past, which lowered the risk of accidents.

Sources of Imperfections in Insurance Markets.
Multiple factors contribute to market imperfections that limit the availability of private insurance. One condition for perfect competition is that exchanges are based on complete and accurate information that is known to buyers and sellers. Imperfect information can result in moral hazard and adverse selection. Insurance markets can also be incomplete when there is a large gap between the potential for insured losses and the available coverage because the risks are large, uncertain, and hard to diversify.

Moral hazard occurs when insurance lowers policyholders' incentives to engage in loss-mitigating behavior because the insurer will be responsible for most of the losses. Additionally, private insurance markets may face weak demand if households and businesses believe that the government will provide financial assistance in the event of a loss, regardless of their insurance coverage.

Adverse selection occurs when the pool of policyholders consists largely of individuals and businesses that are at relatively high risk of generating losses, rather than a mix of low- and high-risk policyholders. For example,

someone who expects to live longer than average might be more likely to purchase life insurance annuities, which provide annual payments in retirement. (The longer a person lives, the greater the payout from the annuity.) Thus, the pool of policyholders would have higher-than-average life spans.

Private insurers can take steps to limit moral hazard and adverse selection. One general strategy to lessen moral hazard and adverse selection is to tie premiums to experience, so that submitting a claim leads to higher rates for the policyholder. Another strategy is to cap the amount of coverage. Furthermore, insurance companies can reduce moral hazard by using deductibles and coinsurance (whereby policyholders share in a portion of losses above the deductible) and by offering discounts for mitigation measures (or including covenants that require them), such as installing fire extinguishers, smoke detectors, and security systems, which lower expected claims. To reduce adverse selection, risk-based pricing can be used to encourage low-risk potential customers to purchase insurance. Adverse selection can also be significantly mitigated when either governments or lenders mandate coverage, which lowers rates.

Private insurers may also limit coverage when the risks are potentially catastrophic and cannot be well diversified.[9] For example, pandemics can affect many countries at the same time and result in large losses. Since the 2003 outbreak of Severe Acute Respiratory Syndrome (SARS), most insurers have explicitly excluded pandemic-related risks from their business interruption

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8. Insurance can have high administrative costs. One study found that the industry's productivity is lagging behind that of other industries and that its cost performance has not improved in more than a decade. See Sylvain Johansson and others, *State of Property and Casualty Insurance 2020: The Reinvention Imperative* (McKinsey & Company, April 2020), https://tinyurl.com/5n7hmyer.

9. The federal tax code and private-sector accounting standards do not permit insurers to recognize insured losses until those losses have been incurred. As a result, a timing mismatch arises between the insurers' income and the associated losses from catastrophic events, which makes capital less efficient when held against catastrophic events. See Kent Smetters and David Torregrosa, *Financing Losses From Catastrophic Risks*, Working Paper 2008-09 (Congressional Budget Office, November 2008), pp. 12–13, 19–20, www.cbo.gov/publication/20400; Scott E. Harrington and Greg Niehaus, "Government Insurance, Tax Policy, and the Affordability of Catastrophe Insurance," *Journal of Insurance Regulation*, vol. 19, no. 4 (Summer 2001), pp. 591–612; and David F. Bradford and Kyle D. Logue, "The Influence of Income Tax Rules on Insurance Reserves," in Kenneth A. Froot, ed., *The Financing of Catastrophic Risk* (University of Chicago Press, 1999), pp. 275–306, www.nber.org/books-and-chapters/financing-catastrophe-risk.

coverage.[10] As a result, when commercial businesses faced shutdown orders from the government during the coronavirus pandemic, their lost income and operating expenses were not insured. In contrast, business interruption coverage remains widely available to cover lost income when a business or property suffers physical damage from a fire, hurricane, or flood.

Federal Insurance Programs

Unlike private insurers, federal insurance programs (and the risk-sharing mechanisms they use) have principal goals unrelated to making a profit. The government might operate an insurance program because a certain type of private insurance coverage does not exist or is not widely available, or because the government seeks to provide coverage at lower prices than private insurers are willing to offer. In some federal insurance programs, the government uses risk sharing to reduce its exposure to risk, to make its annual losses less volatile, or to encourage private insurance companies to participate in an insurance market.

The federal government offers insurance against a range of risks, including floods, crop failures, terrorist attacks, and failures of financial institutions and private-sector pension plans. The government has an interest in supporting the development of insurance markets for two main reasons. In some sectors of the economy, insurance coverage can reduce uncertainty about the recovery from an unforeseen adverse event by reimbursing policyholders for losses, making the economy more resilient. That social benefit of insurance helps businesses maintain solvency and the benefits of employer-employee matches in labor markets in the face of undiversifiable risks.

In addition, a public-private insurance program can reduce the likelihood of costly federal assistance in the wake of a catastrophe. If losses were not widely covered by private insurance, the government might feel compelled to intervene after a catastrophe by providing supplemental disaster assistance using procedures outside the

normal budgetary process. (For example, the government has historically made payments to individuals and businesses following natural disasters or other unexpected adverse events.) Thus, widely available coverage reduces demand for supplemental disaster assistance.

Pricing in Federal Insurance Programs. The government can attempt to cover the risk its insurance programs face by charging policyholders premiums that are high enough to cover the cost of losses, which are estimated using methods that account for the differing probabilities of various outcomes.[11] Although private insurers generally rely on risk-based pricing to help control losses (by offering discounts to policyholders who take steps to lessen or prevent losses), the government is much less reliant on it. The government may depart from risk-based pricing for two reasons. One reason is that it may seek to make insurance affordable, which often results in explicitly subsidizing coverage.[12] Even when the government seeks to cover the costs of an insurance program, it may set rates on an average-cost basis or set rates that cover only broad categories of risk, which may result in low-risk policyholders subsidizing high-risk ones. A second reason is that the government may not have the information necessary to set risk-based prices because of a lack of data. When prices are not risk-based, losses may occur because of a lack of cost-effective risk mitigation.

The National Flood Insurance Program, for example, has historically operated at a deficit because the government has charged premiums that are too low to meet the program's expected costs.[13] Some flood insurance policies are explicitly subsidized, and others—which the NFIP formerly estimated to be "full risk" policies—have been

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10. Business interruption insurance typically covers only losses that result from physical property damage. See Robert Hartwig, Greg Niehaus, and Joseph Qiu, "Insurance for Economic Losses Caused by Pandemics," *The Geneva Risk and Insurance Review*, vol. 45, no. 2 (September 2020), pp. 134–170, https://doi.org/10.1057/s10713-020-00055-y; and Carolyn Kousky, "Management: Catastrophic Risk Transfer in a Post-Pandemic World," in *Challenges and Opportunities in the Post-COVID-19 World* (World Economic Forum, Insight Report, May 2020), pp. 40–43, https://tinyurl.com/k24ufv9z.

11. The use of risk-based premiums, deductibles, and copayments can be considered risk-sharing mechanisms in which the federal government shares risk with policyholders. However, the focus of this report is on the government's risk sharing with private insurance providers, not with policyholders.

12. An alternative approach would be to provide income-based vouchers that target assistance while retaining risk-based pricing to encourage mitigation. See Howard C. Kunreuther and Erwann O. Michel-Kerjan, *At War With the Weather: Managing Large-Scale Risks in a New Era of Catastrophes* (MIT Press, 2009), https://tinyurl.com/2b8v4ywn.

13. Government Accountability Office, *Flood Insurance: Comprehensive Reform Could Improve Solvency and Enhance Resilience*, GAO-17-425 (April 2017), www.gao.gov/products/gao-17-425; and Congressional Budget Office, *The National Flood Insurance Program: Financial Soundness and Affordability* (September 2017), www.cbo.gov/publication/53028.

implicitly subsidized, which the program is now trying to correct.[14] Through its system for rating risks, Risk Rating 2.0, the NFIP is moving toward a pricing method that assesses the risk of each insured building on the basis of its individual characteristics instead of using flood zones as the primary indicator of risk. The new method accounts for flood risk from a broader range of sources than the old method and uses additional variables to assess risk, such as the types and characteristics of the bodies of water nearest to the insured building. Risk Rating 2.0 also relies on a more detailed set of structural and engineering characteristics to determine risks. Those changes will raise premiums for roughly three-quarters of the NFIP's policies. Premiums will decrease for the remaining one-quarter of policies, in part because those policies were, in effect, cross-subsidizing the others.[15]

When the NFIP faces shortfalls, it is authorized to borrow up to $30.4 billion from the Treasury to pay claims. In 2017, lawmakers canceled $16.0 billion of the NFIP's debt after the program reached its borrowing limit because of expensive claims from Hurricanes Harvey, Irma, and Maria. That was the only time the NFIP's debt was forgiven, and it currently owes the Treasury $20.5 billion.[16]

Exposure to Market Risk. In its insurance programs, the government is exposed to market risk when claims are correlated with the performance of the economy.[17] For example, the Pension Benefit Guaranty Corporation (PBGC) is exposed to market risk because claims on its pension insurance programs are very sensitive to the performance of the economy. Companies that offer pension plans are more likely to fail when the economy is performing poorly. In addition, the extent to which pension plans are underfunded tends to increase during economic downturns because the value of plans' stock portfolios is highly correlated with the state of the economy.[18] Similarly, financial institutions are more likely to fail during economic downturns, especially during or after a financial crisis, and thus the Federal Deposit Insurance Corporation's (FDIC's) Deposit Insurance Fund faces larger claims during periods of economic stress.

The FDIC's and PBGC's programs create the risk that deficits will be larger than expected when the economy is weak (as well as the possibility that they will be smaller than expected when the economy is strong). That risk is passed on to government stakeholders—both beneficiaries of government programs and taxpayers—for whom, as investors, it would have a cost.[19]

Risk Sharing in Insurance Markets

Public-private risk sharing in insurance markets takes three forms, with varying degrees of federal involvement. In the first form, which is used for terrorism insurance, the federal government acts as the reinsurer against private insurers' catastrophic risk and allows the private insurers to set the terms of the policies. In the second form, which is used for crop insurance, the government and private insurers share the risk of gains and losses on policies—that is, they coinsure losses—and the government sets the terms of the policies. In the third form, which is used for flood insurance, the government transfers some of its own risk to the private sector and sets the terms of the policies. In all three forms, private insurers service the policies (that is, they sell them to customers and adjust claims). The federal terrorism, crop, and flood insurance programs are all forms of property and casualty insurance.[20] Most other federal insurance programs do

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14. Lawmakers are phasing out some of the explicit subsidies. For more information, see Congressional Budget Office, *Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding* (April 2019), www.cbo.gov/publication/55019, and *The National Flood Insurance Program: Financial Soundness and Affordability* (September 2017), pp. 24–25, www.cbo.gov/publication/53028.

15. Under Risk Rating 2.0, annual premium increases are still constrained by law to between 5 percent and 18 percent for primary, single-family residences. See Diane P. Horn, *National Flood Insurance Program: The Current Risk Rating Structure and Risk Rating 2.0,* Report R45999, version 13 (Congressional Research Service, April 4, 2022), https://go.usa.gov/xeDCt.

16. Diane P. Horn and Baird Webel, *Introduction to the National Flood Insurance Program (NFIP)*, Report R44593, version 50 (Congressional Research Service, October 14, 2022), pp. 27–28, https://go.usa.gov/xeDjK.

17. Market risk is a component of financial risk that remains even with a well-diversified portfolio and is correlated with macroeconomic conditions. Private investors charge a risk premium for bearing market risk.

18. Wendy Kiska, Jason Levine, and Damien Moore, *Modeling the Costs of the Pension Benefit Guaranty Corporation's Multiemployer Program,* Working Paper 2017-04 (Congressional Budget Office, June 2017), www.cbo.gov/publication/52749.

19. Congressional Budget Office, *Measuring the Cost of Government Activities That Involve Financial Risk* (March 2021), www.cbo.gov/publication/56778.

20. Property and casualty insurance protects individuals, employers, and businesses against loss of property, damages, or other liabilities. It includes coverage for homeowners, renters, and automobiles for individuals and commercial enterprises, liability insurance, workers' compensation, and business interruption insurance.

not involve risk sharing with private insurers, although risk sharing is common in federal credit programs.[21]

The Government as Insurer of Last Resort: The Terrorism Risk Insurance Program

In the form of risk sharing used in the terrorism risk insurance program, the federal government serves as a reinsurer by providing a backstop for the catastrophic losses of private insurance companies (primary insurers) that offer commercial property and casualty insurance. That backstop guarantees the availability and affordability of private insurance coverage for losses stemming from terrorist attacks (see Figure 1).

Private insurers bore most of the financial losses suffered by commercial properties and firms from the terrorist attacks on September 11, 2001, but they were reimbursed for most of those losses through their contracts with private reinsurance companies. Following that event, reinsurers virtually stopped writing new contracts covering risk from terrorism, shifting almost all the risk of large losses from terrorist attacks back to primary insurers. In turn, primary insurers sharply reduced the availability and increased the price of terrorism coverage for businesses and commercial properties. In response, lawmakers enacted the Terrorism Risk Insurance Act in 2002 to ensure the continuity of a market for terrorism insurance and thus to bolster commercial construction and other jobs in some high-risk areas.[22] TRIA was initially intended as a temporary measure to provide catastrophic federal reinsurance for risks from terrorism, and that reinsurance was offered without charge. The persistence of risks from terrorism led to several reauthorizations of the program, which is now authorized through December 31, 2027. To date, no claims have been paid under the terrorism risk insurance program.

In 2016, the Treasury clarified that TRIA's coverage also includes cyberterrorism.[23] However, such coverage does

not extend to attacks carried out by criminal groups or nation-states, which are excluded from TRIA's definition of terrorism.

How Risk Is Shared Under TRIA. Under TRIA, private insurers share risk through their deductibles and copayments, and the federal government shares risk by reinsuring against losses. In addition, policyholders share risk in the form of potential taxes assessed to recover some of the government's reinsurance payments after a terrorist attack.

TRIA requires all property and casualty insurers to offer terrorism coverage to their commercial policyholders. The government then provides reinsurance to those private insurers by agreeing to reimburse them for a portion of their terrorism-related losses up to a $100 billion cap on aggregate losses—the limit on combined public and private liability after a terrorist attack. Neither private insurers nor the government would be liable for losses above that amount, so policyholders would not be fully reimbursed if losses exceeded it. Under current law, private insurers (and their policyholders) are responsible for all losses below the "aggregate retention amount"—the average of insurers' deductibles over the previous three years—which the Treasury estimated to be $42.7 billion in calendar year 2022 (see Figure 2).[24] That responsibility would involve direct payments to policyholders and, depending on the magnitude of losses, might also take the form of tax payments to the government.

Private insurers do not pay premiums to the federal government for reinsurance under TRIA, but in the event of a terrorist attack, they are responsible for paying claims to policyholders up to an initial deductible—currently set at 20 percent of each insurer's prior-year premiums for all lines of insurance covered by TRIA—and then a 20 percent copayment for losses above the deductible. The government then pays the remainder of the losses until the $100 billion aggregate loss cap is reached. (As shown in Figure 2, the government's outlays depend not only on the size of the losses but on the allocation of losses among insurers and their individual deductibles.)

If private insurers' collective deductibles and copayments do not exceed the aggregate retention amount, the government assesses a tax in the form of a surcharge on the

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21. Under the Price-Anderson Act, the federal government also shares some risk with the nuclear power industry. The act caps the industry's total liability, though the limit can increase over time, and established a nuclear industry mutual or self-insurance pool to cover losses above the primary insurance layer. See Mark Holt, *Price-Anderson Act: Nuclear Power Industry Liability Limits and Compensation to the Public After Radioactive Releases*, Report IF10821, version 4 (Congressional Research Service, February 5, 2018), https://go.usa.gov/xeDj2.

22. Baird Webel, *The Terrorism Risk Insurance Act (TRIA)*, Report IF11090, version 6 (Congressional Research Service, February 10, 2022), https://go.usa.gov/xeDjr.

23. In the United Kingdom, terrorism insurance covers losses from cyberattacks that result in material damage and business interruption.

24. Through postevent assessments (taxes) on policyholders, the government recoups any reinsurance payments for claims less than the aggregate retention amount. See Perry Beider and David Torregrosa, *Federal Reinsurance for Terrorism Risk and Its Effect on the Budget*, Working Paper 2020-04 (Congressional Budget Office, June 2020) www.cbo.gov/publication/56420.

Figure 1.

Risk Sharing in the Terrorism Risk Insurance Program
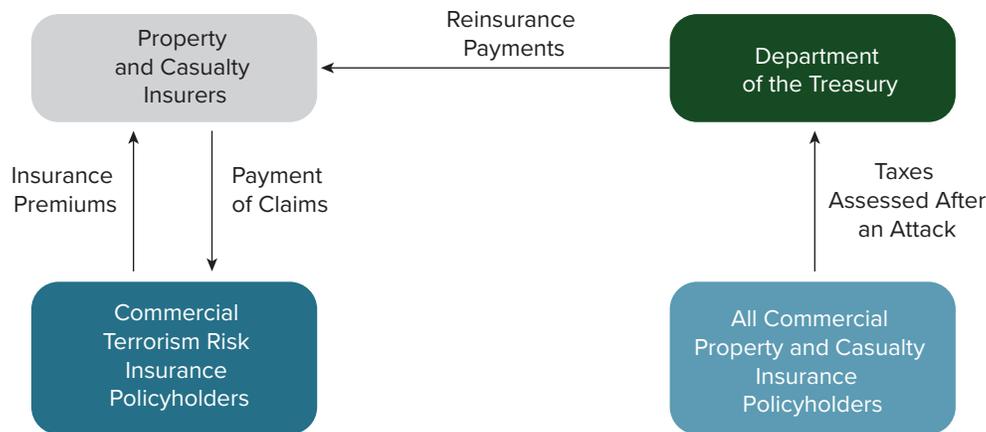
Data source: Congressional Budget Office.

premiums paid by policyholders of commercial property and casualty insurance, including those without terrorism coverage. The tax would be set to recoup 140 percent of the gap between the insurers' payments and either total insured losses or the retention amount, whichever is less. However, that payment and recoupment process has never been used, because there has not been a qualifying terrorist attack to trigger the program's backstop. After a very large attack, policymakers might be hesitant to require the collection of the requisite amount of taxes from all commercial policyholders, including those without terrorism insurance, by the deadlines currently specified by law, especially if the economy was weak.

The two illustrative scenarios in Figure 2 show the allocation of initial costs from hypothetical terrorist attacks in 2022 causing $50.4 billion in insured losses (attacks about as costly as those on September 11, 2001). In one scenario, the terrorist attacks are localized and involve small groups of insurers; in the other, attacks are widespread and involve larger groups of insurers.[25]

- In the localized attacks, $19.2 billion of the insured losses would be paid by insurers because of their deductibles and copayments; of the $31.2 billion covered by federal outlays, the Treasury would be required to recoup $23.5 billion but not the remaining $7.7 billion above the aggregate retention amount.

- By contrast, in the more widespread attacks, insurers' deductibles and copayments would require them to pay $37.1 billion, and federal outlays would cover $13.3 billion. The Treasury would be required to recoup $5.6 billion but not the remaining $7.7 billion. The government's unrecouped outlays are the same in both scenarios.[26]

TRIA's Effects on Insurance Markets. Since its inception, TRIA has helped make terrorism insurance widely available and kept premiums low. Because the federal government bears the catastrophic risk and demands no upfront compensation for doing so, terrorism risk premiums constituted only 3 percent of the total amount of premiums charged for property and casualty insurance in 2021. The relatively low additional cost is one important

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25. Panel A depicts losses that are spread among a group of insurers with collective deductibles of $11.45 billion (about 25 percent of the industry total). The losses are spread among the insurers unevenly—that is, in proportions that do not closely match insurers' market shares. Specifically, at least one affected insurer with a relatively small share of the losses does not reach its deductible unless total losses are $34.35 billion or more. Panel B depicts losses that are spread more evenly among a larger group of insurers: Specifically, the deductibles add up to $34.35 billion (80 percent of the industry total), and all insurers meet their deductibles if insured losses are $57.25 billion or more.

26. For any given amount of insured losses from a terrorist attack, the government's unrecouped outlays are the same in all scenarios in which insurers' collective payments are below the aggregate retention amount. But if losses from a terrorist attack amounted to $100 billion, for example, unrecouped federal outlays would be lower if the attack affected a relatively large number of insurers rather than relatively few insurers (as shown in Panel B in Figure 2) because the insurers would pay more than the aggregate retention amount.

Figure 2.

Allocation of Potential Insured Losses From Terrorism in 2022 Under Two Scenarios

Billions of 2022 Dollars

A. Losses Affecting Relatively Few Insurers
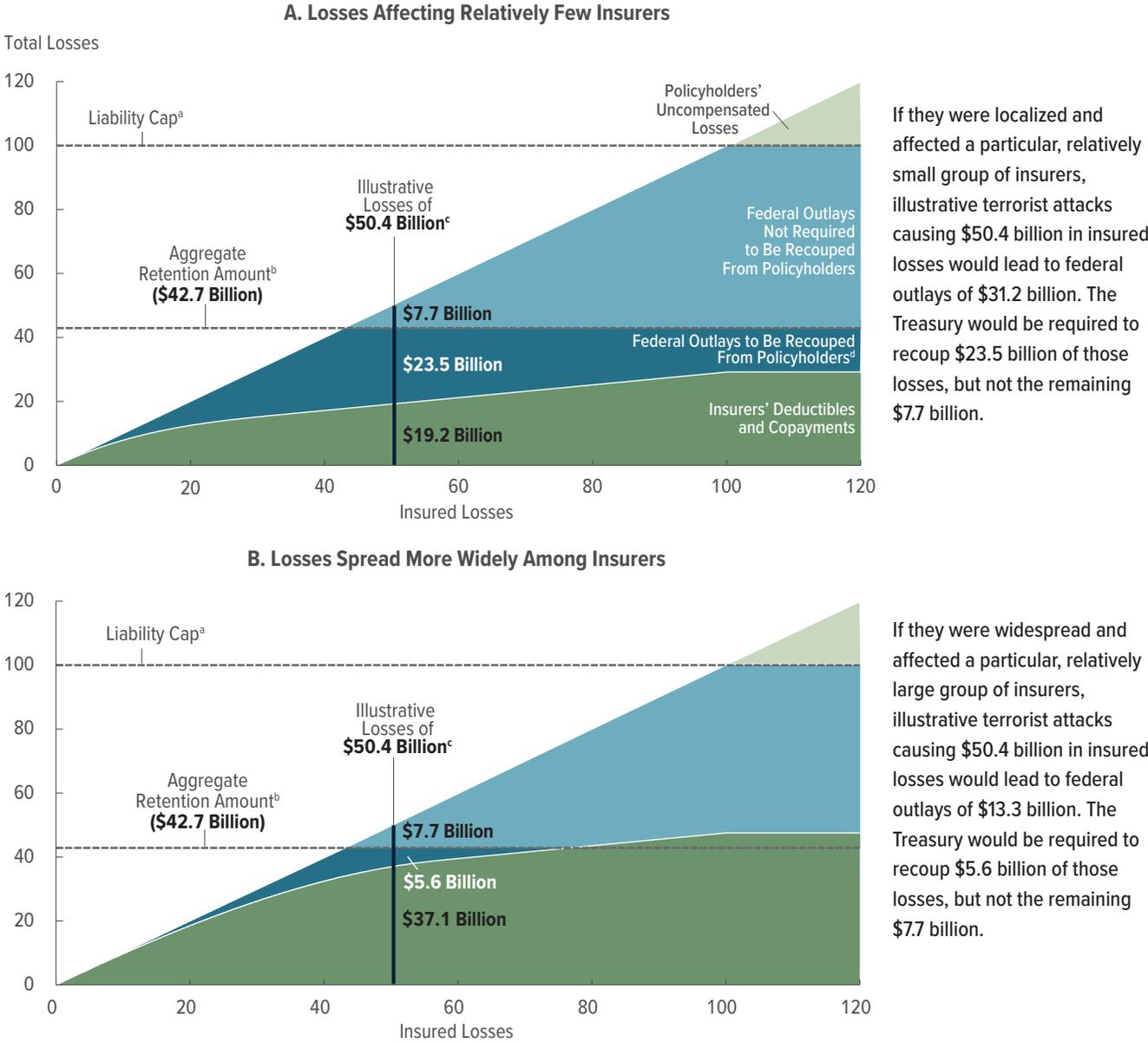
If they were localized and affected a particular, relatively small group of insurers, illustrative terrorist attacks causing $50.4 billion in insured losses would lead to federal outlays of $31.2 billion. The Treasury would be required to recoup $23.5 billion of those losses, but not the remaining $7.7 billion.

B. Losses Spread More Widely Among Insurers

If they were widespread and affected a particular, relatively large group of insurers, illustrative terrorist attacks causing $50.4 billion in insured losses would lead to federal outlays of $13.3 billion. The Treasury would be required to recoup $5.6 billion of those losses, but not the remaining $7.7 billion.

Data source: Congressional Budget Office. See www.cbo.gov/publication/57615#data.

The two panels of the figure show the allocations of losses under two scenarios of insurers' exposure to risk. (Terrorist attacks may cause losses to policyholders of some insurers but not others; and among the affected insurers, the losses may be proportionally larger for some than for others.) Panel A shows the allocations of losses for attacks of different sizes that affect an illustrative set of insurers with collective deductibles of about one-quarter ($11.45 billion) of the aggregate retention amount. Panel B shows the allocations for attacks of different sizes that affect insurers with collective deductibles of four-fifths ($34.35 billion) of the aggregate retention amount. Attacks causing larger total losses are likely to involve more insurers; however, for any total loss, the government's initial outlays and subsequent tax assessments are larger in Panel A because insurers' deductibles and copayments are smaller.

Both panels reflect the 20 percent copayment rate of private insurers and the aggregate retention amount, which the Treasury estimated to be $42.7 billion in calendar year 2022. They also reflect an assumption that each individual insurer is small and, thus, that the curves representing insurers' total deductibles and copayments are smooth.

a. The limit on combined public and private liability after a terrorist attack.

b. The average of private insurers' deductibles over the previous three years. Private insurers (and their policyholders) are responsible for all losses below that amount.

c. The amount of losses from hypothetical terrorist attacks in 2022 that would be about as costly (adjusted for inflation) as those on September 11, 2001.

d. The government is required to recover most or all of its outlays by assessing a tax on all commercial policyholders after a terrorist attack.

factor that has led around 90 percent of all firms to purchase coverage.[27]

As more time has passed without a major terrorist attack, the federal government has taken steps to shift more risk to the private sector. Each time TRIA was reauthorized by the Congress, more risk was shifted to private insurers, whose ability to bear risk had increased because of an increase in their net worth and improvements in the models used for quantifying the risk of terrorism. Lawmakers shifted risk to insurers by increasing the amount of their deductibles and copayments, and to policyholders by increasing the amount of postevent taxes that could be assessed.[28] However, private insurance companies are still responsible for a relatively small proportion, 20 percent, of total covered losses above the amount of their deductibles, which leaves the federal government to bear most of the catastrophic risk.

Broader Applications of the TRIA Risk-Sharing Framework. Lawmakers are considering whether to use the framework of risk sharing under TRIA as a model for pandemic insurance.[29] The coronavirus pandemic has demonstrated the gap in insurance coverage for business interruption stemming from a pandemic. Insurers cannot easily diversify such risks, which pose concerns about their solvency, and have generally excluded them from coverage since the SARS epidemic that originated in Asia in 2003 and spread to more than two dozen nations.

In the absence of insurance coverage for business interruption stemming from pandemics, lawmakers responded to the coronavirus pandemic by establishing the Paycheck Protection Program, which has provided federal guarantees of loans to small businesses. The Small Business Administration reports that more than 11 million loans were approved, totaling about $800 billion, by almost 5,500 lenders.[30] CBO anticipates that most of those loans will ultimately be forgiven, as expected when the program was established.[31]

Coinsurance of Gains and Losses in the Federal Crop Insurance Program

The Department of Agriculture's federal crop insurance program helps agricultural producers limit the risk associated with low crop yields, lower-than-expected revenues, or both. When farmers purchase insurance from the Federal Crop Insurance Corporation, they can choose among many types of policies to customize the coverage to their specific needs. The federal government is responsible for most aspects of the program's design, including subsidizing, regulating, and reinsuring the policies, but private insurance companies sell and service the crop insurance policies to agricultural producers and share in some resulting gains and losses through a reinsurance agreement.

Lawmakers established the program in 1938 as part of the response to the Great Depression. Attempts by private insurers to market similar policies had met with little success.[32] In 1980, lawmakers added explicit premium subsidies to the program and expanded the commodities covered, in part to reduce postdisaster supplemental assistance.

Premium Subsidies and Reimbursements for Operating Expenses. In the federal crop insurance program, private insurance companies sell policies to

27. When weighted by insurers' premiums, coverage is closer to 80 percent. See Department of the Treasury, Federal Insurance Office, *Report on the Effectiveness of the Terrorism Risk Insurance Program* (June 2022), pp. 18–26, https://tinyurl.com/yfennv2b (PDF).

28. For an analysis of policy options, see David Torregrosa, Perry Beider, and Susan Willie, *Federal Reinsurance for Terrorism Risk in 2015 and Beyond*, Working Paper 2015-04 (Congressional Budget Office, June 2015), www.cbo.gov/publication/50171.

29. Pandemic Risk Insurance Act of 2021, H.R. 5823, 117th Congress, https://go.usa.gov/xeRdb; and Pandemic Risk Insurance Act of 2020, H.R. 7011, 116th Congress (2020), https://go.usa.gov/xeDjt. For analysis of a potential federal role in pandemic insurance, including using other risk-sharing approaches, see Howard Kunreuther and Jason Schupp, *Evaluating the Role of Insurance in Managing Risk of Future Pandemics*, Working Paper 28968 (National Bureau of Economic Research, June 2021), www.nber.org/papers/w28968; and Lloyd Dixon and Jamie Morikawa, *Improving the Availability and Affordability of Pandemic Risk Insurance* (RAND Corporation, 2021), https://tinyurl.com/4mve39zd.

30. Firms were eligible for more than one loan. See Small Business Administration, *Paycheck Protection Program (PPP) Report: Approvals Through 05/31/2021* (May 2021), https://go.usa.gov/xeDD5 (PDF).

31. As of October 17, 2022, 92 percent of the program's loans (representing 96 percent of the total loan value) have been fully or partially forgiven. See Small Business Administration, "Forgiveness Platform Lender Submission Metrics, October 17, 2022" (Version 42, October 2022), https://tinyurl.com/2twuv9yv.

32. Stephanie Rosch, *Federal Crop Insurance: A Primer*, Report R46686, version 2 (Congressional Research Service, February 18, 2021), p. 37, https://go.usa.gov/xeDDt.

agricultural producers and service them, but the gov-
ernment sets the annual premiums for those policies
and pays a substantial portion of the premium costs on
behalf of the agricultural producers. Additionally, private
insurers are reimbursed for a portion of their administra-
tive and operating expenses; the reimbursement amounts
depend on the type of insurance policies they sell and
service.[33]

The federal government sets premiums with the goal
of matching total premiums with the expected losses
associated with crop insurance policies.[34] The FCIC seeks
to adjust premiums to reflect differences in risks among
producers and across geographic regions.[35]

The government subsidizes producers' purchases of crop
insurance by varying amounts. Premium subsidies, which
are the portion of the premium costs the government
pays on behalf of policyholders, are set as a percentage of
the policy premiums and can range from 38 percent to
100 percent. Generally, those subsidies are proportion-
ally larger for policies that cover a smaller proportion of
losses or larger parcels of land.[36] The subsidies may give
the policyholders less incentive to take measures to man-
age their risks, such as diversifying the crops they plant.

The government subsidizes premiums for agricultural
producers to achieve high participation and coverage
levels, which reduces the need for other forms of federal
assistance after losses. Historically, when agricultural
producers have suffered significant uninsured losses,
the government has given them supplemental financial

assistance. For example, the Bipartisan Budget Act of
2018 provided $2.4 billion for production losses in the
previous year that were not covered by crop insurance,
and the 2019 Additional Supplemental Appropriations
for Disaster Relief Act provided $3.0 billion to cover
crop, tree, bush, and vine losses from natural disasters in
2018 and 2019.[37]

**How Risk Is Shared in the Federal Crop Insurance
Program.** Through a cooperative financial agreement
known as the Standard Reinsurance Agreement, the
government shares with private insurers some of the pre-
miums and the risk it would otherwise face in a wholly
federal program of crop insurance.[38] The provisions for
the risk sharing are complex, but the main principle is
simple. Under that agreement, the government makes
net payments to the private insurers when there are
gains—that is, when premiums exceed claims for each
insured crop (see Figure 3). Conversely, the private insur-
ers make net payments to the government when there are
losses (that is, when claims exceed premiums). Because
the government tries to set premiums to match the long-
run expected cost of the claims, those gains and losses do
not drive the cost of the program.

The program gives insurers the choice of allocating
policies between two funds (essentially, separate risk
pools)—the Commercial Fund for low-risk policies and
the Assigned Risk Fund for high-risk policies—that share
risk differently.[39] Insurers can make that choice in a way
that is most profitable for them. They seek to retain the
policies that they expect to be profitable and pass the
others to the government. Insurers use the Commercial
Fund to retain larger shares of the premiums and risk on
policies that are more likely to be profitable. They have
discretion over how much risk they bear for those poli-
cies and the share of the premiums (at least 35 percent)

33. Government subsidies to approved insurance providers for
administrative and operating expenses range from 12 percent to
21.9 percent of premiums depending on the type of insurance
policies sold. Those subsidies exceed $1 billion each year
and averaged about 20 percent of federal spending on crop
insurance from 2007 through 2016. See Isabel Rosa, *Federal
Crop Insurance: Delivery Subsidies in Brief*, Report R45291,
version 5 (Congressional Research Service, August 20, 2018),
https://go.usa.gov/xeDDd.

34. By law, a policy's premium may not rise by more than 20 percent
from year to year.

35. In a 2015 study, the Government Accountability Office found
that risks were not fully priced in some areas. See Government
Accountability Office, *Crop Insurance: In Areas with Higher Crop
Production Risks, Costs Are Greater, and Premiums May Not Cover
Expected Losses*, GAO-15-215 (February 2015), www.gao.gov/
products/gao-15-215.

36. Federal Crop Insurance Act, 7 U.S.C. § 1508(i)(1); and
Stephanie Rosch, *Federal Crop Insurance: A Primer*, Report
R46686, version 2 (Congressional Research Service, February 18,
2021), pp. 22–23, https://go.usa.gov/xeDDt.

37. Megan Stubbs and Jim Monke, *FY2019 Supplemental
Appropriations for Agriculture*, IF11245 (Congressional Research
Service, June 7, 2019), www.crs.gov/Reports/IF11245.

38. Congressional Budget Office, *Options to Reduce the Budgetary
Costs of the Federal Crop Insurance Program* (December 2017),
p. 6, Box 1, www.cbo.gov/publication/53375; and Department
of Agriculture, Risk Management Agency, "2022 Standard
Reinsurance Agreement" (July 1, 2021), https://tinyurl.com/
mubb8389.

39. For more information, see Randy Schnepf, *Federal
Crop Insurance: Background*, Report R40532, version
34 (Congressional Research Service, August 13, 2015), https://
go.usa.gov/xeDWm; and Dennis A. Shields, *Renegotiation of the
Standard Reinsurance Agreement (SRA) for Federal Crop Insurance*,
Report R40966 (Congressional Research Service, August 12,
2010), https://tinyurl.com/vr289rf6 (PDF).

Figure 3.

Risk Sharing in the Federal Crop Insurance Program
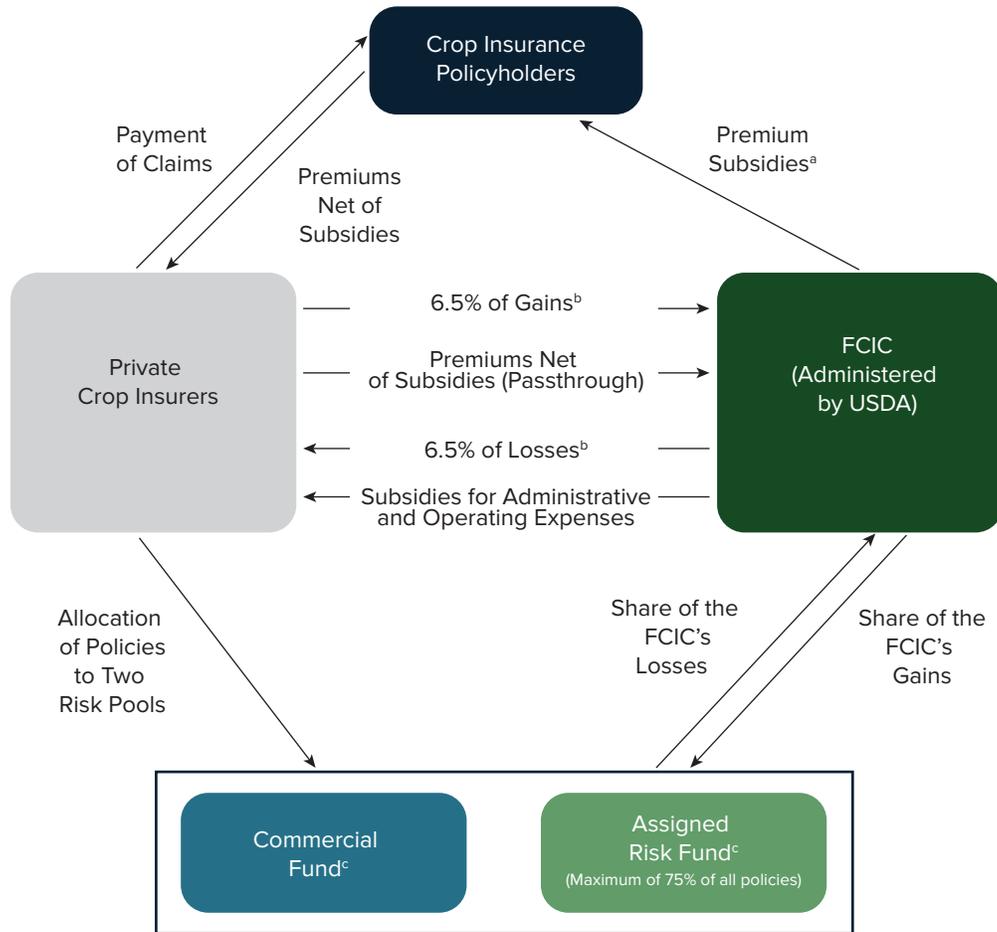
Data source: Congressional Budget Office.

FCIC = Fedral Crop Insurance Corporation; USDA = Department of Agriculture.

a. The subsidies are not paid directly to policyholders. Instead, policyholders pay lower premiums to private crop insurers.

b. This percentage represents the nationwide share of cumulative gains (when premiums exceed claims) or losses (when claims exceed premiums) on insurers' retained policies.

c. The government retains most of the risk for policies allocated to the Assigned Risk Fund, and private insurers generally retain more of the risk for policies allocated to the Commercial Fund. The funds represent two different risk pools, and insurers decide which insurance policies are allocated to each pool.

they retain. They use the Assigned Risk Fund to retain smaller shares of the premiums (20 percent) and risk on policies that are less likely to be profitable.

The allocation of gains and losses in each fund varies, which affects the cost of the program and the willingness of private insurers to participate.

- First, the allocation depends on each insurer's loss or gain—specifically, the loss ratio (the ratio of claims paid to total premiums)—so that the larger each insurer's losses or the greater its gains, the larger the share of losses or gains the government retains (see

Figure 4). That system reduces the volatility of insurers' returns and increases the volatility of the program's federal cost.

- Second, in the Assigned Risk Fund, insurers retain less than 25 percent of the gains (that is, when loss ratios are less than 1) and less than 10 percent of the losses (that is, when loss ratios are greater than 1).

- Third, for policies allocated to the Commercial Fund, the shares of gains or losses retained by the government also vary by state, and the risk is distributed such that insurers share more of the gains but less of the losses. For example, in most states,

insurers retain over 95 percent of the gains when loss ratios are between 65 percent and 95 percent, but they retain less than 50 percent of the losses. However, insurance companies receive a smaller proportion of gains and a larger proportion of losses in the five states in which crop insurance has historically been the most profitable (Illinois, Indiana, Iowa, Minnesota, and Nebraska).

Adverse selection raises the cost of risk sharing to the government and is only partially offset by requiring private insurers to share 6.5 percent of their cumulative gains and losses from both funds with the government. In most years, private insurance providers have earned gains on their crop insurance portfolios and, thus, have conveyed a portion of those gains to the government.

Components of the Government's Total Cost of Providing Crop Insurance. The crop insurance program's total cost to the government comprises premium subsidies, sharing of the gains and losses, administrative and operating expenses, and the difference between total premiums and claims paid. In crop year 2021, the program's net cost was $8.4 billion (see Figure 5). That cost was mostly made up of $8.8 billion in premium subsidies for agricultural producers and $1.5 billion in subsidies to insurance providers for administrative and operating expenses. Those costs were somewhat offset by total premiums' exceeding total claims by $5.2 billion; however, the FCIC paid $3.2 billion of that amount to insurance providers for their share of the gain.

The risk-sharing provisions of the crop insurance program can result in a very uneven distribution of gains and losses.[40] Over the 2010–2021 period, the risk-sharing agreements resulted in the private insurers' receiving most of the gains. Of the $20.8 billion in net gains, the private insurers' share was $18.1 billion; the government's share was $2.7 billion. Sharing in gains and losses does not always result in a cost to the government. Because of widespread and severe droughts in 2012,

private insurance companies paid $1.3 billion to the FCIC to share in its losses.

The Crop Insurance Program's Effects on Insurance Markets. In 2019, insurers sold more than 2 million policies covering crops worth more than $100 billion, or nearly 30 percent of the value of U.S. agricultural production.[41] Over 100 commodities were covered, along with livestock and dairy products, and insurance take-up and the level of coverage varied widely. Producers purchased insurance for more than 90 percent of the planted acres of corn, cotton, and soybeans, and for 85 percent of the acreage for wheat, but much less for other crops. Because the program is tied to the amount of crops produced, the benefits of the crop insurance program tend to flow to the largest producers.[42]

Reinsurance Policies Purchased by the National Flood Insurance Program
The Federal Emergency Management Agency's National Flood Insurance Program serves two general purposes: to offer affordable flood insurance for properties in communities that participate in the program and to promote floodplain management. The NFIP operates in communities that voluntarily participate in the program and that meet certain requirements, such as minimum standards for building codes. For purposes of setting premiums, FEMA historically has identified multiple flood zones, each representing a different exposure to the risk from floods. Mortgage lenders require owners of properties with federally insured mortgages in each of the two riskiest zones to purchase flood insurance. However, compliance with that requirement is not well enforced.[43] Most NFIP insurance policies are sold and serviced by private insurers, but those companies bear none of the

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40. The dates of crop years are different for different crops. See Department of Agriculture, Office of Inspector General, *Federal Crop Insurance Corporation/Risk Management Agency's Financial Statements for Fiscal Years 2021 and 2020*, Audit Report 05401-0013-11 (November 2021), pp. 19, 23–27, https://tinyurl.com/huj5wa8t; and Department of Agriculture, Risk Management Agency, "Crop Year Government Cost of Federal Crop Insurance Program" (April 2022), https://tinyurl.com/3wsdx48z (PDF).
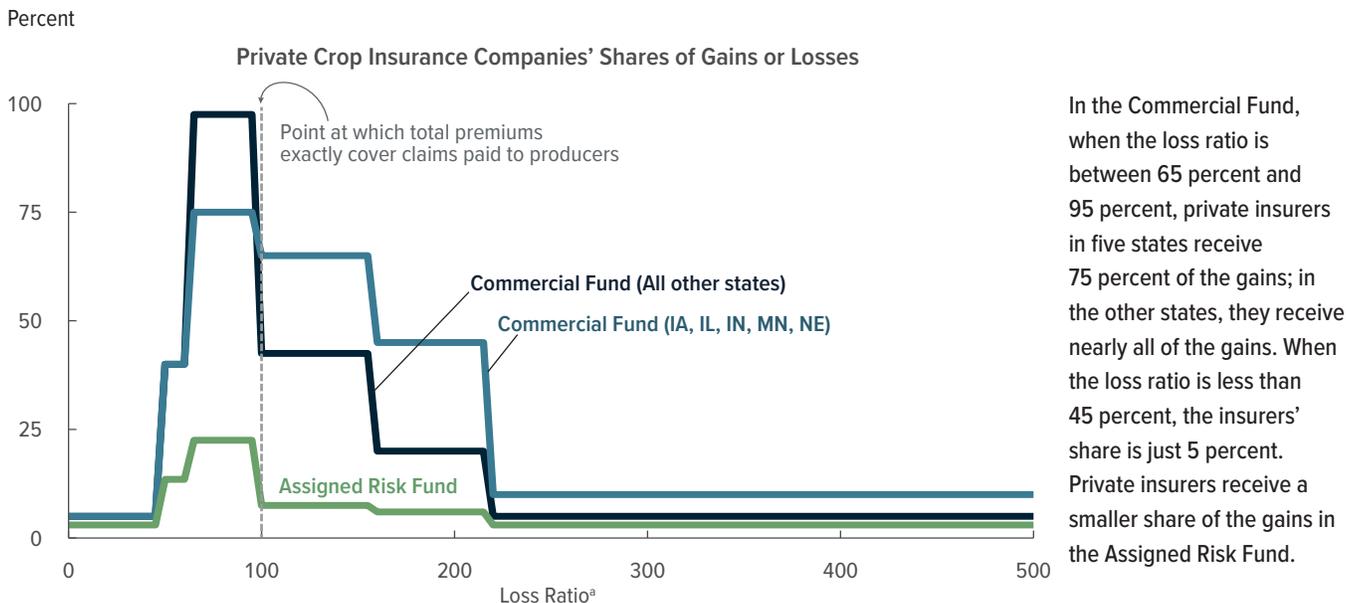
41. Stephanie Rosch, *Federal Crop Insurance: A Primer*, Report R46686, version 2 (Congressional Research Service, February 18, 2021), pp. 1–2, https://go.usa.gov/xeDBT.

42. Anton Bekkerman, Eric J. Belasco, and Vincent H. Smith, *Where the Money Goes: The Distribution of Crop Insurance and Other Farm Subsidy Payments* (American Enterprise Institute, January 9, 2018), https://tinyurl.com/9trxmyck.

43. Diane P. Horn and Baird Webel, *Introduction to the National Flood Insurance Program (NFIP)*, Report R44593, version 50 (Congressional Research Service, October 14, 2022), pp. 10–12, https://go.usa.gov/xeDjK. Several behavioral tendencies may help explain why individuals do not insure against floods or why they cancel their flood insurance; see Howard Kunreuther, "Improving the National Flood Insurance Program," *Behavioural Public Policy*, vol. 5, no. 3 (July 2021), pp. 318–332, https://tinyurl.com/atmjp8jr.

Figure 4.

Risk Sharing Under the Current Standard Reinsurance Agreement, by Fund and Loss Ratio

Percent

Private Crop Insurance Companies' Shares of Gains or Losses

Point at which total premiums exactly cover claims paid to producers

Commercial Fund (All other states)

Commercial Fund (IA, IL, IN, MN, NE)

Assigned Risk Fund

Loss Ratio[a]

In the Commercial Fund, when the loss ratio is between 65 percent and 95 percent, private insurers in five states receive 75 percent of the gains; in the other states, they receive nearly all of the gains. When the loss ratio is less than 45 percent, the insurers' share is just 5 percent. Private insurers receive a smaller share of the gains in the Assigned Risk Fund.

Data source: Congressional Budget office, using data from the Department of Agriculture's Risk Management Agency. See www.cbo.gov/publication/57615#data.

The federal government's share of gains and losses equals 1 minus the share of gains and losses of private insurers. The government retains most of the risk for policies allocated to the Assigned Risk Fund, and private insurers generally retain more of the risk for policies allocated to the Commercial Fund. The funds represent two different risk pools, and insurers decide which insurance policies are allocated to each pool.

A loss ratio of 100 represents the point at which the total premiums exactly cover the claims paid to producers. Less than 100 means that total premiums exceed the claims paid out, and greater than 100 means that the claims paid exceed total premiums.

IA = Iowa; IL = Illinois; IN = Indiana; MN = Minnesota; NE = Nebraska.

a. The loss ratio is a percentage defined as claims paid divided by premiums collected.

risk associated with paying claims.[44] If the NFIP's premiums and reserves are insufficient to pay all claims, the program can borrow from the Treasury, subject to legal limits.

Lawmakers created the program in 1968 in response to the costly postdisaster relief the government provided

following Hurricane Betsy in 1965. Private insurers had withdrawn coverage after experiencing large losses from the Mississippi floods of 1927 and 1928. For 40 years thereafter, virtually no coverage was offered. Today, the NFIP has more than 5 million policies in place providing $1.3 trillion worth of coverage. Coverage is limited to $250,000 for single-family properties and $100,000 for a property's contents.

How Risk Is Shared in the NFIP. The NFIP shares risk with the private sector by purchasing reinsurance from private companies and using securities to transfer risk to private investors.
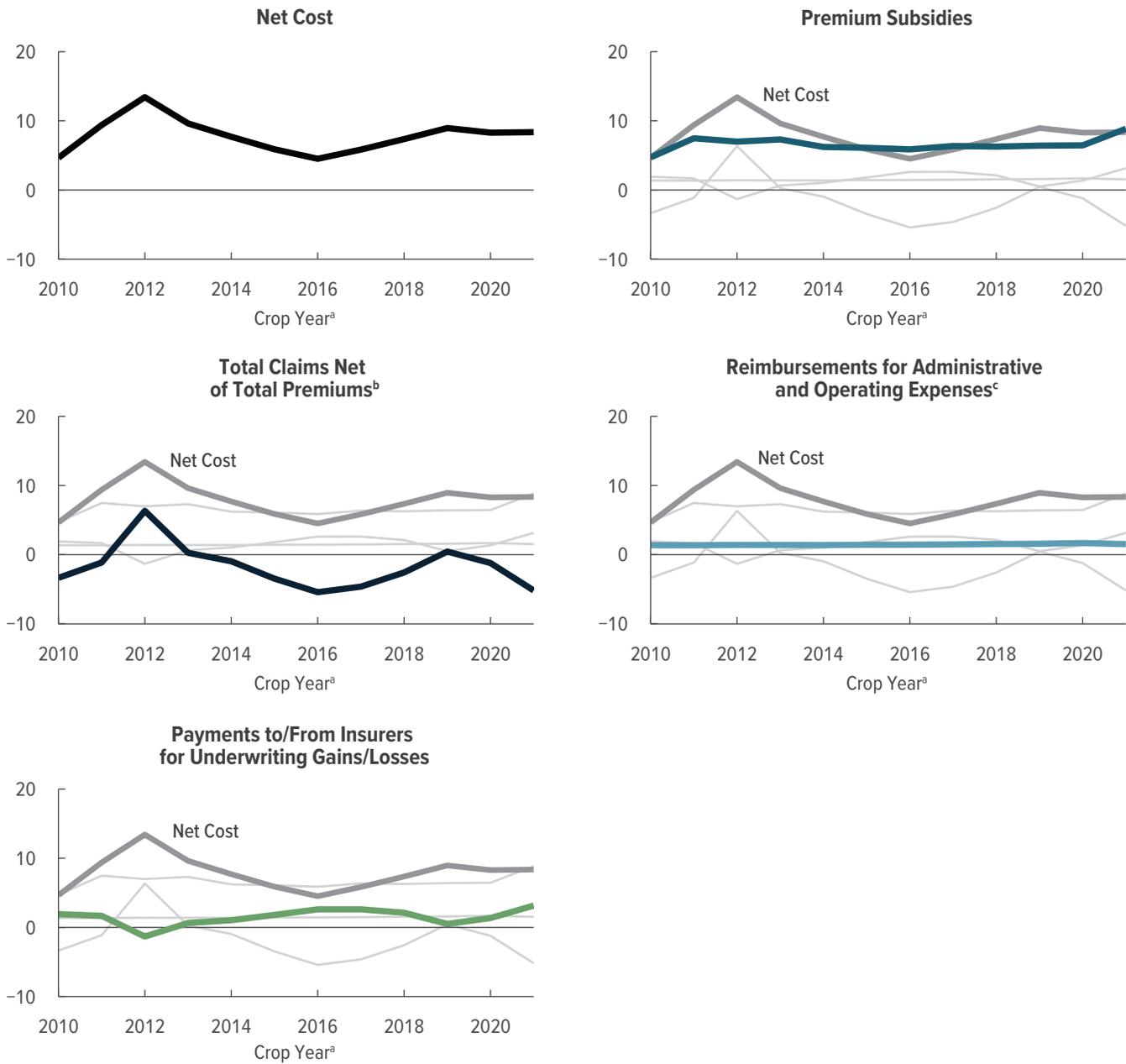
Reinsurance Purchases. For most of its existence, the NFIP bore all the risk of its coverage, but lawmakers approved risk sharing with private reinsurance firms in the past decade. (The reinsurers are global firms that specialize in diversifying catastrophic risk and are separate from the insurers who market policies and

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44. The Biggert-Waters Flood Insurance Reform Act of 2012 included provisions that allow wholly private flood insurance policies to meet the mandatory purchase requirement. Those policies are generally marketed to more expensive properties that want greater coverage than the NFIP provides. The private flood insurance market is a small fraction of the size of the NFIP. See Diane P. Horn and Baird Webel, *Private Flood Insurance and the National Flood Insurance Program,* Report R45242, version 12 (Congressional Research Service, December 21, 2021), https://go.usa.gov/xeDKE; and Carolyn Kousky and others, *The Emerging Private Residential Flood Insurance Market in the United States* (University of Pennsylvania, Wharton Risk Management and Decision Processes Center, July 2018), https://tinyurl.com/48xsmyse (PDF).

CBO has changed this page since the report was originally published. Changes are listed at the end of the report.

Figure 5.

Composition of the Federal Crop Insurance Program's Net Cost, Crop Years 2010 to 2021

Billions of 2022 Dollars

Net Cost

Premium Subsidies

Net Cost

**Total Claims Net
of Total Premiums**[b]

Net Cost

**Reimbursements for Administrative
and Operating Expenses**[c]

Net Cost

**Payments to/From Insurers
for Underwriting Gains/Losses**

Net Cost

Data source: Congressional Budget office, using data from the Department of Agriculture's Risk Management Agency. See www.cbo.gov/publication/57615#data.

Payments from the government to private insurers for their share of the gains (underwriting gains) when premiums exceed claims are a cost to the program. Payments from the insurers to the government for their share of losses (underwriting losses) when claims exceed total premiums reduce the program's cost. (The large losses in 2012 are attributable to a widespread and severe drought in that year.)

The program's costs are partially offset by premiums that agricultural producers pay for insurance coverage. In crop year 2021, the Department of Agriculture received $14.3 billion in premiums. That amount includes both the producer-paid premiums and the premium subsidies.

a. The crop year is the calendar year in which the crop is harvested.

b. Net gains/losses equal total premiums minus total claims. When premiums exceed claims, there are gains that reduce the cost of the crop insurance program. Claims are thus mainly responsible for the variation in the program's cost.

c. The Federal Crop Insurance Corporation makes payments to private insurance providers to reimburse them for some administrative and operating expenses associated with delivering the crop insurance program.

adjust claims for the NFIP.) The Biggert-Waters Flood Insurance Reform Act of 2012 and the Homeowner Flood Insurance Affordability Act of 2014 authorized the NFIP to purchase reinsurance from private companies. Accordingly, the NFIP has transferred some of its risk by purchasing reinsurance policies every year since 2017. The NFIP pays for the purchases by giving up some of the premiums that it collects.

The NFIP's reinsurance contracts are similar to those that private insurers enter into to lessen their exposure to natural disasters. Under the reinsurance contracts, private reinsurers agree to reimburse the program for a share of total program losses above an agreed-upon deductible, which is typically large (see Figure 6). Although the details of each reinsurance contract vary, they have all covered a share of the losses between $4 billion and $10 billion stemming from a single flooding event. The policies collectively have potential payouts to the NFIP of $1.0 billion to $1.5 billion a year from a single flood, and FEMA has paid annual premiums to private insurers ranging from $150 million to $235 million for the reinsurance policies (see Table 2). The number of reinsurers participating increased from 25 in 2017 to 32 in 2021 before decreasing to 28 in 2022; an increase in the number of participants helps to limit the exposure of individual firms. (The reinsurance contracts have no effect on the private insurers who service the NFIP policies because those insurers bear no risk under the program.)

In 2017, claims from Hurricane Harvey totaled $9 billion, triggering a payment of just over $1 billion (the maximum amount payable under the contracts) from the private reinsurers to the NFIP on that year's reinsurance policy.[45] As of September 2022, no other flood has caused enough insured damage to trigger a payment to the NFIP under the reinsurance contracts. In general, reinsurance can help reduce a federal insurance program's payout after a catastrophe occurs and thus helps smooth costs over time.

Because the government must pay a fair market price to purchase reinsurance, those purchases are not likely to reduce the government's costs of operating the NFIP over time. In its baseline projections, which reflect the assumption that current laws governing federal taxes and spending generally remain unchanged, CBO anticipates that the NFIP will pay premiums to private reinsurers

that are at least as high as the payouts it will receive from the reinsurance policies, plus a return on the reinsurers' capital. Otherwise, private reinsurers would not enter into the contracts.

Catastrophe Bonds. In 2018, the NFIP began taking additional steps to transfer risk to private financial firms and to promote private-sector participation in flood-risk management by using securities, called catastrophe bonds, issued in capital markets. Those bonds allow the government to forgo scheduled payments of interest and principal, in part or in full, in the event of specified flood losses. After a covered event, those forgiveness provisions would enable the NFIP to use the money that would have otherwise been paid to bondholders to pay catastrophe-related flood claims. Bond purchasers are compensated for those provisions by receiving a higher interest rate before disasters strike.[46]

As an alternative to traditional reinsurance contracts, catastrophe bonds provide a few advantages to the NFIP.[47] The bonds avoid the risk that the private reinsurer might default (called counterparty risk); they have a longer duration than standard reinsurance policies (typically three years), and they allow diversification of risk in larger capital markets that can more easily bear losses.[48] Each of those attributes might increase the capacity of the NFIP to absorb losses without borrowing from the Treasury. Catastrophe bonds are attractive to investors because their returns are not correlated with

45. Federal Emergency Management Agency, "National Flood Insurance Program's Reinsurance Program" (updated September 14, 2022), https://tinyurl.com/yckw7kuv.
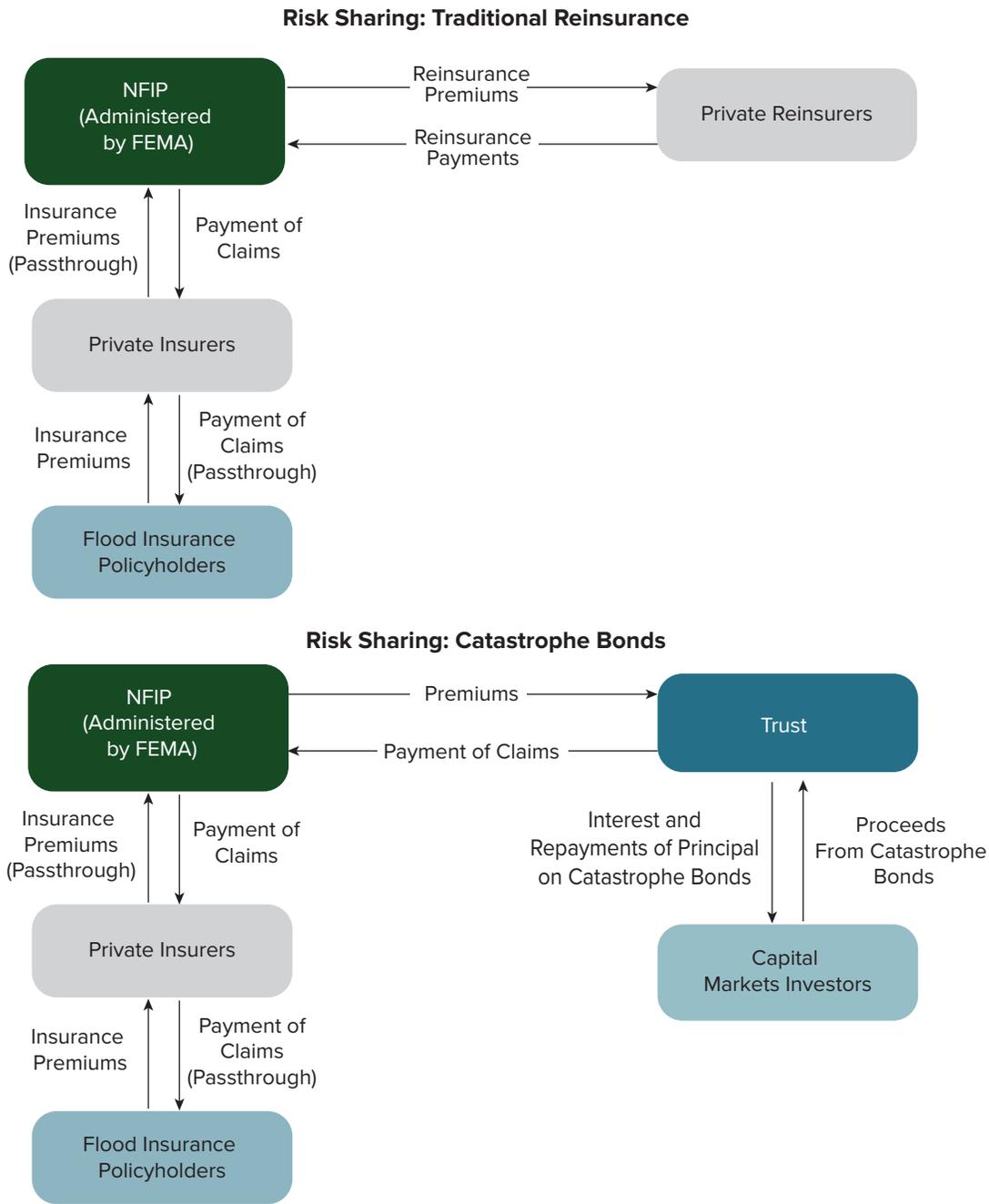
46. Diane P. Horn and Baird Webel, *The National Flood Insurance Program (NFIP), Reinsurance, and Catastrophe Bonds,* Report IN10965, version 13 (Congressional Research Service, March 23, 2022), https://go.usa.gov/xeDhJ.

47. Alexander Braun and Carolyn Kousky, *Catastrophe Bonds* (University of Pennsylvania, Wharton Risk Management and Decision Processes Center, July 2021), https://tinyurl.com/ff5ssrc7 (PDF).

48. Counterparty risk can be costly. Defaults and delayed payment by private mortgage insurers occurred during the 2007–2009 financial crisis and increased the losses experienced by Fannie Mae and Freddie Mac, the government-sponsored entities (GSEs) that help finance mortgages in the United States; see Laurie Goodman and Karan Karul, *Sixty Years of Private Mortgage Insurance in the United States* (Urban Institute, August 2017), https://tinyurl.com/22hvczrt. The GSEs now also use credit-risk transfers, including securities that are similar to catastrophe bonds, to share risk with private-sector investors. CBO has treated Fannie Mae and Freddie Mac as federal entities, for budgetary purposes, since those companies were put into federal conservatorship in September 2008; see Congressional Budget Office, *Transferring Credit Risk on Mortgages Guaranteed by Fannie Mae or Freddie Mac* (December 2017), www.cbo.gov/publication/53380.

Figure 6.

Risk Sharing in the National Flood Insurance Program

Risk Sharing: Traditional Reinsurance

NFIP (Administered by FEMA)

Reinsurance Premiums →
← Reinsurance Payments

Private Reinsurers

Insurance Premiums (Passthrough) ↑
↓ Payment of Claims

Private Insurers

Insurance Premiums ↑
↓ Payment of Claims (Passthrough)

Flood Insurance Policyholders

Risk Sharing: Catastrophe Bonds

NFIP (Administered by FEMA)

Premiums →
← Payment of Claims

Trust

Insurance Premiums (Passthrough) ↑
↓ Payment of Claims

Interest and Repayments of Principal on Catastrophe Bonds ↓
↑ Proceeds From Catastrophe Bonds

Private Insurers

Capital Markets Investors

Insurance Premiums ↑
↓ Payment of Claims (Passthrough)

Flood Insurance Policyholders

Data source: Congressional Budget office.

Private insurers retain a portion of the premiums to cover their administrative and operating costs.

Reinsurance purchased by the NFIP covers losses stemming from a single flooding event.

The National Flood Insurance Program's catastrophe bonds only cover losses from named storms. (A named storm is a storm or storm system that the National Weather Service's National Hurricane Center names a tropical storm or hurricane.) To date, no payoffs have been triggered. Technically, the catastrophe bonds are issued through a reinsurer; the proceeds are held in trust, so there is little or no counterparty risk (that is, the risk that private investors will not be able to fulfill their obligations to the government). The bonds are purchased by investors in the capital markets; investors forgo interest and some or all principal if claims exceed a given amount.

FEMA = Federal Emergency Management Agency; NFIP = National Flood Insurance Program.

Table 2.

Risk Sharing in the National Flood Insurance Program, Calendar Years 2017 to 2022

Millions of Dollars

	2017	2018	2019	2020	2021	2022
Traditional Reinsurance (One-year maturity)						
Maximum potential payout to the NFIP from reinsurers	1,042	1,460	1,320	1,330	1,153	1,064
Premiums paid by the government	150	235	186	205	196	172
Catastrophe Bonds (Three-year maturity)						
Maximum potential payout to the NFIP from bondholders	n.a.	500	300	400	575	450
Premiums paid by the government (First year)[a]	n.a.	62	32	50	79	61

Data source: Congressional Budget Office, using data from the National Flood Insurance Program. See www.cbo.gov/publication/57615#data.

The reinsurance contracts used with traditional reinsurance cover a portion of the losses between $4 billion and $10 billion stemming from a single flooding event. In 2017, claims from Hurricane Harvey exceeded $10 billion and triggered a full payout on that year's policy. Since then, no other payouts have occurred. The number of reinsurers sharing the risk increased from 25 in 2017 to 32 in 2021 before decreasing to 28 in 2022.

The National Flood Insurance Program's catastrophe bonds only cover losses from named storms. (A named storm is a storm or storm system that the National Weather Service's National Hurricane Center names a tropical storm or hurricane.) To date, no payoffs have been triggered. Technically, the catastrophe bonds are issued through a reinsurer; the proceeds are held in trust, so there is little or no counterparty risk (that is, the risk that private investors will not be able to fulfill their obligations to the government). The bonds are purchased by investors in the capital markets; investors forgo interest and some or all principal if claims exceed a given amount.

NFIP = National Flood Insurance Program; n.a. = not applicable.

a. Although catastrophe bonds provide three years of coverage, the estimate of premiums captures only the amount for the first year of coverage, not the amount for the other two years.

the economy or the stock market. However, the costs of issuing a catastrophe bond, whose structure is legally complex and requires the creation of a trust account, can be significant.[49]

The NFIP uses catastrophe bonds to help cover the risk of flooding stemming directly from named storms. (A named storm is a storm or storm system that the National Weather Service's National Hurricane Center names as a tropical storm or hurricane.) The NFIP assumes that most losses large enough to trigger a reinsurance payout would stem from named storms. In 2022, the NFIP paid $61 million in first-year premiums for the catastrophe bond placements, resulting in coverage of 2.5 percent of the losses between $6 billion and $7 billion, 5.0 percent of the losses between $7 billion and $9 billion, and 32.5 percent of the losses between

$9 billion and $10 billion.[50] As of March 2022, no catastrophe bond covering the NFIP's risk has suffered a loss.

Why the Government Uses Reinsurance and Catastrophe Bonds. Private insurers use reinsurance and catastrophe bonds in part to spread the cost of financing over a longer period of time and to reduce the need to raise capital to cover catastrophic losses, but those motivations are less significant at the federal level. Reinsurance and catastrophe bonds can lower the variability of the NFIP's annual costs and can be expected to reduce its need to borrow from the Treasury after a flood that generates large losses. (Because some of the policyholders' premiums are used to purchase reinsurance and pay interest to investors in catastrophe bonds, the NFIP's reserves might grow more slowly than if there were no purchases, which might increase the need to borrow in the long run.) The benefits to the federal government from reduced volatility in the NFIP's financing needs are small because the demand for debt financing, even after

49. For more information on catastrophe bonds and other insurance-linked securities, see Swiss Re, *The Fundamentals of Insurance-Linked Securities: Transforming Insurance Risk Into Transparent and Tradable Capital Market Products* (Swiss Re, September 2011), https://tinyurl.com/xd984ees.

50. Federal Emergency Management Agency, "National Flood Insurance Program's Reinsurance Program" (updated September 14, 2022), https://tinyurl.com/yckw7kuv.

a catastrophic flood, is small compared with the total amount of the Treasury's annual borrowing.

Effects of Risk Sharing. In addition to shedding risk, the NFIP's purchase of reinsurance has two potential benefits for the government.[51] First, the development of a reinsurance market for risks from flooding may demonstrate the feasibility of risk sharing with primary insurers and thereby support the emerging private market for flood insurance. A robust private market requires a stable reinsurance market. Second, prices for reinsurance can signal changes in how the risk of flooding is being perceived, which could be particularly important as the effects of climate change increase.

The NFIP began to develop the market for reinsurance against flood risk (and to use catastrophe bonds) only in recent years, and it may take time for the market to mature and for risk premiums, and thus the NFIP's costs, to decrease. In the short run, the NFIP may face "novelty premiums" for new transactions covering flood risks; but more liquidity should develop in the market as reinsurers' willingness to assume more risk increases along with their experience. Those premiums should fall with more annual reinsurance transactions.

The large number of private reinsurers involved with the NFIP creates some trade-offs. Using many reinsurers helps broaden the market, diversify risk, and reduce counterparty risk (the risk that the company the government contracts with will fail), but it could also lose the benefits from economies of scale and prompt higher transaction costs than if fewer reinsurers were involved.

Budgetary Effects of Risk Sharing

The budgetary effects of public-private risk sharing depend on the structure of the risk sharing and the amount of risk that remains with the federal government. Additionally, public-private risk sharing can indirectly affect the budget if the risk-sharing mechanism changes the number of insurance policyholders. Some of those budgetary effects may be better represented by accrual estimates that summarize anticipated cash flows over many years in net-present-value terms than by estimates made on a cash basis, which measure flows year by year over 10 years (see Table 3).

Measuring the Cost of Federal Insurance Programs

As it does for most of the government's activities, the federal budget records the costs of insurance programs on a cash basis, which means that a program's net effect on the budget is calculated as the difference between its cash inflows (from premiums, fees, and other income) and its cash outflows (primarily to pay claims for covered losses). For future years, those inflows and outflows are typically estimated using methods that account for the differing probabilities of various outcomes.

Budget Projections. For all federal insurance programs, CBO's budgetary projections reflect anticipated cash flows in the years when those flows are expected to occur, taking into account each program's unique features and statutory framework. For programs whose cash flows are affected by events that have a small chance of occurring—such as the terrorism risk insurance program—CBO creates a wide range of scenarios in which the frequency of events and magnitudes of potential losses (including potentially catastrophic losses with a very small likelihood of occurring) differ. The agency then calculates a weighted average of the outcomes of the scenarios, accounting for the estimated probability of each scenario.

CBO uses different approaches to project costs for the flood and crop insurance programs. For projections related to the NFIP, CBO uses FEMA's estimates of flood insurance subsidy rates, which are based on probabilistic weighted outcomes of all types of flood events, their severity, and their frequency.[52] For projections related to the federal crop insurance program, CBO estimates future crop prices, planted acreage, and production. Those projections take into account the supply of and demand for crops (including imports and exports) and interrelationships among crops.[53] After taking all those factors into account, CBO generates expected premiums and subsidies and an expected loss ratio (largely on the basis of historical patterns), which is used to forecast expected payouts for claims.

51. Federal Emergency Management Agency, *National Flood Insurance Program: Report to Congress on Reinsuring NFIP Insurance Risk and Options for Privatizing the NFIP* (August 13, 2015), https://tinyurl.com/5x6de9kw (PDF); and Government Accountability Office, *Flood Insurance: Comprehensive Reform Could Improve Solvency and Enhance Resilience*, GAO-17-425 (April 27, 2017), www.gao.gov/products/gao-17-425.

52. Under FEMA's new pricing method known as Risk Rating 2.0, the agency uses three catastrophe models from the private sector to estimate risk.

53. If the demand for corn rises, for example, more land might be devoted to planting corn and less to soybeans, which would affect the prices of both crops. Changes in relative prices also lead to substitutions between crops. For example, an increase in corn prices would make wheat more attractive for use as feed, and the resulting increase in wheat prices would raise the demand for, and thus the price of, oats.

Table 3.

Factors Affecting CBO's Budget Estimates for Selected Federal Insurance Programs

Insurance Program	Predictability of Cash Flows	Exposure to Market Risk	Lag Between Timing of Insurance Commitments and Resulting Cash Flows	Summary of Information Conveyed by CBO's Current Cash-Based Budget Projections	Summary of Information Conveyed by Accrual Measures
Terrorism Risk Insurance Program	Difficult to predict. The expected cash flows for the program depend on the likelihood that a rare event—a qualifying terrorist attack—will occur.	Moderate. A major terrorist attack could have negative effects on the economy and financial markets.	Moderate after an event. Even if most claims were paid quickly, full payment could take several years. However, taxes to offset projected federal costs would be assessed soon after losses occurred.	Incomplete information. Ten-year cash-based projections may miss some effects expected to occur outside that period, but they generally indicate expected long-term effects. However, because terrorist events are rare, projections for any particular year (and even over 10 years) are likely to be wrong.	Complete information. Accrual measures would eliminate timing-related distortions and help provide more accurate projections of net budgetary effects.
Federal Crop Insurance Program	Fairly predictable. Some variability is because of weather. The program experiences a high volume of cash flows in each year, which can be used to predict the expected costs to the program in future years.	Low. Most claims, especially those related to weather, are not strongly correlated with the state of the economy.	Short. Most claims are paid within a year of a loss.	Complete information. Ten-year cash-based projections provide accurate information about the net costs stemming from commitments made during that period.	Complete information. Accrual measures would provide information similar to that of cash-based measures.
National Flood Insurance Program	Fairly predictable. Some uncertainty is because of weather. The program experiences a high volume of cash flows, but in each year there is a probability that a large storm will generate higher-than-expected and widespread losses.	Low. Losses from floods are largely independent of the state of the economy and generally have limited effects on financial markets.	Short. In the absence of constraints on available resources, most claims are paid within a few years of a flood.	Incomplete information. Cash-based projections for the near term may be dominated by events that have already occurred. Ten-year projections indicate the amount of claims payable over that period. If a catastrophic flood occurs, payable claims may be less than the full amount owed due to limits on borrowing authority.	Complete information. Accrual measures would more clearly indicate the expected net costs of each year's commitments.

Data source: Congressional Budget Office.

The cash-based measures that are used to account for insurance programs in the federal budget generally focus on the coming 10 years, called the budget window. However, some federal insurance programs, including deposit, pension, and terrorism insurance, have effects on the budget that may extend years or decades beyond the standard budget window. When a significant share of a program's cash flows is expected to occur outside the budget window, or when there is a mismatch in the timing of receipts and expenditures, the budget period may not be long enough to accurately indicate an insurance program's expected net effects on the budget over the long term. To make well-informed choices about federal insurance programs, policymakers need accurate measures of the extent to which a program's income is expected to cover the costs stemming from the risk assumed by the government.

Accrual Measures. The difference between cash and accrual accounting lies in the timing of when the commitment (or collection) of budgetary resources is recognized. Accrual measures summarize in a single number the anticipated net financial effects at a specific point in time of a commitment that will affect federal cash flows years into the future.

Accrual-based measures can help provide more information about the costs or savings of federal insurance programs that have long-term effects on the budget. That additional information could allow for more meaningful comparisons of the costs of competing programs and a greater focus on risk when setting premiums. Accrual measures may be especially useful for programs in which there are significant timing lags between outlays and receipts (as with the obligations of the Pension Benefit Guaranty Corporation).

Using accrual measures has several disadvantages, however. They are less transparent and verifiable than cash measures and have a wider range of uncertainty. In addition, using accrual measures to project the costs of federal insurance programs would complicate budget reporting.[54]

Measures That Account for Market Risk. Following standard procedures for the federal budget, CBO's projections of the budgetary effects of federal insurance programs are not adjusted for market risk, but the agency has provided some estimates on a supplemental basis that adjust for market risk for pension insurance.[55] (Current law requires adjustments for market risk for the Troubled Asset Relief Program. Such adjustments have been used in the past for U.S. contributions to the International Monetary Fund, and CBO makes such adjustments for the credit activities of Fannie Mae and Freddie Mac, the government-sponsored housing enterprises.)[56] To make those adjustments, CBO uses accrual measures—specifically, it makes fair-value estimates that use market prices, when available, to measure net costs to the public.[57] Incorporating the cost of market risk increases the estimated costs or reduces the estimated savings of federal insurance programs.

In CBO's view, fair-value estimates provide a more comprehensive measure of costs and help lawmakers more fully understand the trade-offs between certain policies. That information could be particularly important for understanding the net costs of certain programs, such as the pension and deposit insurance programs, that insure against financial risks. (The NFIP's purchases of reinsurance automatically incorporate the cost of market risk.)

However, fair-value estimates have some characteristics that limit their usefulness. They can be more volatile and uncertain than cash estimates, less transparent, and less useful for projecting the effects of policies on federal debt.[58] Fair-value estimates would be less useful for programs that have little market risk, such as federal crop insurance and flood insurance.

Measuring the Costs of Risk Sharing in Federal Insurance Programs

CBO uses its baseline budget projections as a reference point to measure the cost of policy changes. Those projections reflect the assumption that current laws governing federal taxes and spending generally remain unchanged. The cost or savings of risk sharing in federal insurance programs depends on the structure of the risk-sharing mechanism and on the relative timing of the government's outlays and receipts. That relative timing can vary widely among federal insurance programs on the basis of the risk-sharing mechanisms they use.

Costs of Federal Reinsurance: The Terrorism Risk Insurance Program. In its baseline budget projections published in May 2022, CBO projected that over the 2022–2032 period, TRIA can be expected to increase federal spending by $5.9 billion and increase net revenues by $6.9 billion, resulting in an overall deficit reduction of $0.92 billion (see Table 4). Those projections are based on the estimated likelihood of experiencing terrorist attacks generating losses of various sizes. Therefore, in each year, there is some small probability of a large attack triggering significant costs to the program. However, some of those costs would be recouped in subsequent years through taxes.

When the federal government shares risk with private insurers by serving as a backstop for catastrophic losses, the budgetary costs of that risk sharing depend on the amount of risk left with the private sector. TRIA

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

55. Congressional Budget Office, *Options to Improve the Financial Condition of the Pension Benefit Guaranty Corporation's Multiemployer Program* (August 2016), www.cbo.gov/publication/51536; and Wendy Kiska, Jason Levine, and Damien Moore, *Modeling the Costs of the Pension Benefit Guaranty Corporation's Multiemployer Program*, Working Paper 2017-04 (Congressional Budget Office, June 2017), www.cbo.gov/publication/52749.

56. Congressional Budget Office, *Accounting for Fannie Mae and Freddie Mac in the Federal Budget* (September 2018), www.cbo.gov/publication/54475.

57. The fair value of an asset is the price that would be paid for that asset in an orderly transaction (one that occurs under competitive market conditions between willing participants and that does not involve forced liquidation or a distressed sale). For an analysis of market risk and how it can be incorporated into cost estimates and baseline budget projections, see Congressional Budget Office, *How CBO Produces Fair-Value Estimates of Federal Credit Programs: A Primer* (July 2018), www.cbo.gov/publication/53886, *Measuring the Cost of Government Activities That Involve Financial Risk* (March 2021), www.cbo.gov/publication/56778; and Michael Falkenheim and Wendy Kiska, *How CBO Estimates the Market Risk of Federal Credit Programs*, Working Paper 2021-14 (November 2021), www.cbo.gov/publication/57581.

58. Congressional Budget Office, *Measuring the Cost of Government Activities That Involve Financial Risk* (March 2021), www.cbo.gov/publication/56778.

provides catastrophic federal reinsurance against the risk of terrorism, and that reinsurance is offered without charging premiums. By law, the government would recoup its costs by assessing a tax on all policyholders of commercial property and casualty insurance if a terrorist attack occurred. That recoupment mechanism has yet to be tested, however, and after a very large terrorist attack, lawmakers might be reluctant to require the collection of such taxes from commercial policyholders, including those without terrorism insurance, by the specified deadlines—the more so if the economy was weak.[59]

Lawmakers have reauthorized TRIA many times, and each reauthorization has gradually shifted more risk to private insurers through higher deductibles and copayments. CBO recorded budgetary savings for the two most recent reauthorizations, largely because the tax rate (the recoupment amount of the assessments) was set to yield 140 percent of all federal outlays, up from its initial level of 100 percent, so expected revenues from the assessments exceeded expected cash outlays for the government's share of costs.[60]

Costs of Coinsurance: The Federal Crop Insurance Program. In CBO's baseline projections, the federal crop insurance program has net spending of $89.3 billion over the 2022–2032 period. Premiums would exceed claims (insured losses) by $16.0 billion. But that gain is offset

by costs, including premium subsidies of $72.6 billion, delivery expenses for administrative and operating costs of $16.8 billion, and $15.7 billion for private insurers' underwriting gains—their share of the program's earnings, including risk sharing (the government's share of underwriting gains is $0.3 billion).

On average, crop insurance policies have generated premiums in excess of total claims (and thus underwriting gains) for private insurers. Between crop years 2010 and 2021, the federal crop insurance program made average annual payments of $1.5 billion to the insurers for their share of the underwriting gains (and losses). That average includes a $1.3 billion payment from the insurers to the government in crop year 2012, when claims exceeded premiums.

With crop insurance, the primary purpose of the risk sharing is to provide incentives for private companies to sell and service the insurance policies, not to reduce budgetary costs. In general, budgetary costs can be lower with coinsurance than if the government bears all the risk. In this case, however, because the risk-sharing agreements allow private insurers to retain the majority of the premiums from low-risk producers (which would otherwise represent income received by the government) while passing on the bulk of the risk of losses from high-risk producers to the government, the agreements tend to increase the overall cost to the federal government.

Costs of Private Reinsurance: The National Flood Insurance Program. CBO projects that, under current law, the NFIP's operations would result in net costs of $6.3 billion over the 2022–2032 period, reflecting the structural deficit caused by most policyholders' paying rates that are less than the full risks of their properties. Over the 2022–2032 period, the program's estimated expenses of $64.7 billion (comprising claims, commissions paid to private insurers, interest payments to the Treasury, administrative costs, grants, and reinsurance purchases) would exceed estimated collections of $58.4 billion (comprising premiums plus surcharges and fees).[61] Under current law, the program is increasing premiums—in most cases, by a maximum of 18 percent annually—on all policies for which premiums do not

59. Legislation would probably be required if lawmakers wanted to delay, reduce, or eliminate those taxes to avoid further burdening insurers and their policyholders after a major attack. See Perry Beider and David Torregrosa, *Federal Reinsurance for Terrorism Risk and Its Effect on the Budget,* Working Paper 2020-04 (Congressional Budget Office, June 2020), p. 10, www.cbo.gov/publication/56420.

60. Congressional Budget Office, cost estimate for H.R. 4634, the Terrorism Risk Insurance Program Reauthorization Act of 2019 (November 18, 2019), www.cbo.gov/publication/55868, and cost estimate for S. 2877, the Terrorism Risk Insurance Program Reauthorization Act of 2019 (December 9, 2019), www.cbo.gov/publication/55933. CBO and the staff of the Joint Committee on Taxation project that payment of taxes for recoupment would reduce income in the private sector and, consequently, reduce income and payroll tax revenues. When TRIA was reauthorized in 2015, that projected reduction was about 25 percent of the projected taxes from recoupment, varying slightly from year to year. (Because tax rates have since dropped, the offset for 2022 is 24.5 percent.) Setting the tax to yield 140 percent of the outlays before accounting for an offset of 25 percent, for example, implies that net revenues would be 105 percent of outlays ($140 \times [1 - 0.25] = 105$). Thus, setting the tax to yield 140 percent of outlays counterbalances the resulting reduction in income payroll tax revenues and provides some additional compensation to the government for bearing risk.

61. Over the 2022–2032 period, CBO estimates that the program's expenses would include about $5.2 billion in interest payments to the Treasury—roughly $300 million to $650 million annually—on its outstanding debt; those intragovernmental payments have no net effect on the deficit. Payouts from reinsurance purchases or catastrophe bonds also could contribute to total collections, if sufficiently large flood events occur.

Table 4.

CBO's Baseline Projections for Selected Federal Insurance Programs, 2022 to 2032

Millions of Dollars

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total, 2022– 2032
Terrorism Risk Insurance Program												
Net revenues[a]	0	0	1,455	144	350	729	1,323	2,876	0	0	0	6,879
Outlays	3	83	333	573	743	873	963	943	683	443	303	5,943
Net Increase or Decrease (-) in the Deficit	**3**	**83**	**-1,122**	**429**	**393**	**144**	**-360**	**-1,933**	**683**	**443**	**303**	**-936**
Federal Crop Insurance Program[b]												
Total claims net of premiums[c]	-1,448	-981	-1,345	-1,468	-1,486	-1,528	-1,560	-1,569	-1,539	-1,548	-1,531	-16,004
Premium subsidy	8,066	7,032	6,452	6,309	6,276	6,298	6,358	6,422	6,442	6,455	6,454	72,564
Delivery expense	1,525	1,526	1,524	1,525	1,525	1,525	1,525	1,526	1,526	1,526	1,529	16,780
Underwriting gains[d]	1,325	1,825	1,660	1,418	1,349	1,336	1,331	1,340	1,354	1,367	1,367	15,672
Other[e]	22	22	22	22	22	22	22	22	22	22	22	242
Total Outlays	**9,490**	**9,423**	**8,313**	**7,805**	**7,686**	**7,653**	**7,677**	**7,740**	**7,805**	**7,821**	**7,840**	**89,253**
National Flood Insurance Program												
Premiums[f]	2,943	3,212	3,456	3,708	3,966	4,227	4,490	4,751	5,011	5,271	5,529	46,563
Fees/surcharges[g]	871	913	951	992	1,033	1,076	1,119	1,163	1,206	1,250	1,238	11,813
Total Collections	3,814	4,125	4,407	4,699	4,999	5,303	5,609	5,914	6,218	6,521	6,767	58,376
Expenses	5,663	5,623	5,611	5,632	5,727	5,820	5,877	6,003	6,123	6,254	6,388	64,722
Net Outlays[h]	**1,849**	**1,498**	**1,204**	**933**	**728**	**517**	**268**	**89**	**-95**	**-267**	**-379**	**6,346**

Data source: Congressional Budget Office. See www.cbo.gov/publication/57615#data.

a. Projected net revenues fluctuate because the 2020 authorization of the program specified the timing of the tax assessments after a terrorist attack. For example, for an attack that occurs before the end of calendar year 2022, all the assessments must be collected by the end of fiscal year 2024. In addition, all required assessments must be collected by the end of 2029. Also, under current law, private insurers (and their policyholders) are responsible for all losses below an amount known as the aggregate retention amount, which is the average of insurers' deductibles over the previous three years. In its May 2022 baseline projections, CBO estimated that the aggregate retention amount would be $45.8 billion for 2022. In June 2022, the Treasury estimated that the aggregate retention amount would be $42.7 billion for 2022.

b. The projections reported here are in fiscal years rather than crop years, which generally begin earlier and end sooner than fiscal years. (A crop year is the calendar year in which the crop is harvested.) Differences also exist between outlays and budget authority. For crop year estimates, see Congressional Budget Office, "Federal Crop Insurance Corporation—CBO's May 2022 Baseline" (May 2022), p. 24, https://go.usa.gov/xJYJd (PDF).

c. Savings (shown as a negative cost) result when premiums exceed total claims.

d. As defined by the crop insurance program, underwriting gains include the risk sharing that takes place between the government and private companies. Here, underwriting gains represent the private insurers' share of the earnings (or losses) on the insurance book of business—that is, the difference between premiums and claims. If the insurance book of business is a loss, then private insurers pay the the Federal Crop Insurance Corporation for their share of the the underwriting losses, which would be shown as a negative number.

e. The category "Other" includes a set of expenses stemming from the Agricultural Risk Protection Act, such as refunds.

f. The National Flood Insurance Program is gradually raising premiums to phase out subsidies.

g. Some fees are based on premiums, so they increase as premiums increase.

h. The decreasing net outlays reflect the effects of increases in premiums and fees over time, which CBO estimates will gradually close the gap with expected costs. The program's expenses include interest payments to the Treasury; those payments are intragovernmental and do not affect the deficit. As a result, the program will increase the deficit less (or, in 2030 through 2032, decrease it more) than shown.

fully cover the expected costs.[62] As premiums increase, along with additional revenues from assessments and surcharges, the structural deficit of the program will steadily decline over the coming decade, CBO estimates.[63] By 2030, total revenues will have grown enough to exceed the program's expenses on an annual basis, even though a small proportion of policies at that time will probably still reflect rates that are below full risk.

Whether the NFIP's reinsurance purchases increase or decrease the program's short-term budgetary costs depends on the timing of large flooding events. Through October 2022, the purchases have resulted in net costs of about $100 million.[64] The reinsurance purchases resulted in outlays of about $1.1 billion; however, the NFIP received about $1.0 billion from the reinsurers after Hurricane Harvey in 2017. The large losses experienced after that storm triggered the maximum payments to the NFIP on the reinsurance policies that year. Those payments were large enough for the reinsurance purchases to generate a small net budgetary savings through December 2021. Unless another large-scale flooding event occurs, total premiums paid could continue to outpace the total claim payments received in the next two to three years if FEMA continues to make similar reinsurance purchases.

So far, the NFIP has not realized any returns on its catastrophe bonds but has paid nearly $300 million in premiums to bond investors.[65] The program's first catastrophe bonds (which were issued in 2018) expired on July 31, 2021. Catastrophic flooding may become more common in the future as climate change progresses,

though the higher risk could be matched by higher premiums.

In the long run, purchasing private reinsurance or issuing catastrophe bonds will not save the program money, because private insurance companies charge market rates for risk sharing. CBO estimates, on a probabilistic basis, that the reinsurance purchases have an expected net cost in the current year on a cash basis. Because those purchases are at market prices, they should, in principle, have no cost on a fair-value basis.

Indirect Effects of Risk Sharing. The direct effects of risk sharing are determined by how much it increases or decreases the costs to the government. However, risk sharing can also have important indirect effects based on the extent to which it helps facilitate or hinders the development of well-functioning and well-priced insurance markets. Public-private insurance markets with risk-based pricing can provide incentives for people and businesses to mitigate risks, reducing overall claims. Additionally, insurance markets can reduce the uncertainty of the recovery from catastrophes and other unforeseen adverse events, making the economy more resilient. Each of those factors can help reduce the need for assistance from the government in the wake of catastrophic events.

CBO's estimates of the costs of federal insurance programs do not reflect the possibility of reduced emergency spending. In the budget, most such spending—for example, on disaster assistance administered by FEMA from the Disaster Relief Fund—is funded by appropriations. The amounts of those appropriations are determined each year by the Congress. Although the use of reinsurance could ultimately reduce the need for such appropriations, CBO does not include those potential reductions as savings in its baseline projections of spending, because they are not certain to occur. More broadly, insurance programs (not just reinsurance) probably reduce the need for emergency appropriations. Without those programs, the need for government assistance would probably be greater than it currently is.

62. Under current law, a small proportion of subsidized policies, such as those covering vacation homes and those that have experienced repetitive losses, are subject to 25 percent annual increases.

63. In 2012, lawmakers authorized a reserve fund to help cover future claims and debt expenses from catastrophic losses and authorized FEMA to charge an assessment—currently set at 18 percent of premiums—for deposit into the fund. Since 2014, the reserve fund has also received revenues from surcharges on policies, which are set as flat fees of $25 for primary residences and $250 for all other properties.

64. Diane P. Horn and Baird Webel, *Introduction to the National Flood Insurance Program (NFIP)*, Report R44593, version 50 (Congressional Research Service, October 14, 2022), https://go.usa.gov/xeDjK.

65. Although catastrophe bonds provide three years of coverage, the estimate of premiums captures only the amount for the first year of coverage, not the amount for the other two years.

List of Tables and Figures

About This Document

Phillip L. Swagel
Director
November 2022

CBO has changed this page since the report was originally published. Changes are listed at the end of the report.

Corrections and Other Changes

The Congressional Budget Office has corrected and, for the sake of clarity, made other changes to this report since its original publication. Both the PDF and online versions were changed, but for ease of reference, this list indicates the locations of the changes in the PDF.

The following changes were made on March 6, 2023:

Page 12, left-hand column, first full paragraph: "nationwide" was deleted from the phrase "expected nationwide losses"; the sentence "The FCIC does not adjust premiums to reflect differences in risks among producers or across geographic regions, as a private insurer would" was corrected to "The FCIC seeks to adjust premiums to reflect differences in risks among producers and across geographic regions"; and footnote 35 was added, causing the sequential renumbering of all subsequent footnotes.

Page 12, left-hand column, second full paragraph: The final sentence, "The subsidies and lack of risk-based pricing give the policyholders less incentive to take measures to manage their risks, such as diversifying their planting locations and the crops they plant," was corrected to "The subsidies may give the policyholders less incentive to take measures to manage their risks, such as diversifying the crops they plant."

Page 12, left-hand column, final paragraph: The following clause was added to the end of the first sentence: ", which reduces the need for other forms of federal assistance after losses." In the second sentence, "uninsured" was added to form the phrase "significant uninsured losses." And the following sentence was deleted from the end of the paragraph: "Demand for such assistance would have been higher in the absence of crop insurance and could have been lower with higher rates of coverage."

Page 12, right-hand column, first full paragraph: The second sentence, "The provisions for the risk sharing are complex, which probably benefits private insurers and hurts taxpayers, but the main principle is simple," was changed to "The provisions for the risk sharing are complex, but the main principle is simple."

Page 12, right-hand column, final paragraph: The first three sentences were changed. They used to be: "The program allows for adverse selection by insurers because it gives them the choice of allocating policies between two funds (essentially, separate risk pools)—the Commercial Fund for low-risk policies and the Assigned Risk Fund for high-risk policies—that share risk differently. That choice creates profitable opportunities for the insurers because the government does not set risk-based premiums. Consequently, private insurers seek to retain the policies that they expect to be profitable and pass the others to the government." They now are: "The program gives insurers the choice of allocating policies between two funds (essentially, separate risk pools)—the Commercial Fund for low-risk policies and the Assigned Risk Fund for high-risk policies—that share risk differently. Insurers can make that choice in a way that is most profitable for them. They seek to retain the policies that they expect to be profitable and pass the others to the government."

Page 14, left-hand column, second full paragraph: In the first sentence, the phrase "and the difference between premiums collected and claims paid" was replaced by "and the difference between total premiums and claims paid." Immediately thereafter, the following two sentences were deleted: "Premium subsidies are the largest component. Overall, sharing of the underwriting gains or losses tends to be a relatively small component of the government's total cost." The paragraph was then combined with the one that followed it.

Page 14, right-hand column, first full paragraph: The final sentence, "The subsidies disproportionately flowed to the largest producers," was replaced by "Because the program is tied to the amount of crops produced, the benefits of the crop insurance program tend to flow to the largest producers."

Page 15, Figure 4: A dashed, vertical line was added to indicate where the value of the loss ratio equals 100, along with an accompanying label and, below the figure, the following explanatory note: "A loss ratio of 100 represents the point at which the total premiums exactly cover the claims paid to producers. Less than 100 means that total premiums exceed the claims paid out, and greater than 100 means that the claims paid exceed total premiums." The following caption was added to the figure: "In the Commercial Fund, when the loss ratio is between 65 percent and 95 percent, private insurers in five states receive 75 percent of the gains; in the other states, they receive nearly all of the gains. When the loss ratio is less than 45 percent, the insurers' share is just 5 percent. Private insurers receive a smaller share of the gains in the Assigned Risk Fund."

Page 27, second paragraph: Tiffany Arthur, who contributed to the review of the report after it was published, was added to the list of reviewers.