



Fair-Value Estimates of the Cost of Federal Credit Programs in 2013

The federal government supports some private activities by providing credit assistance to individuals and businesses. Some of that assistance is in the form of direct loans, and some, in the form of guarantees of loans made by private financial institutions. Although about a hundred federal programs provide such assistance, just a few programs provide more than three-quarters of it: specifically, the programs offering student loans, single-family mortgage guarantees, and direct loans and loan guarantees for small businesses.

In this report, the Congressional Budget Office (CBO) provides an illustrative analysis of the federal government's costs for credit programs following two approaches:

- The procedures currently used in the federal budget as prescribed by the Federal Credit Reform Act of 1990 (FCRA)¹ and
- An alternative approach in which cost is based on an estimate of the market value of the federal government's obligations—termed a fair-value approach.

To facilitate the computation of the estimates for this analysis, CBO used its own projections of the volume of loans and cash flows for some programs and projections by the Office of Management and Budget (OMB) and other federal agencies for others. In particular, CBO used its own estimates for the Department of Education's student loan programs and the Federal Housing Administration's (FHA's) single-family mortgage

guarantee program, because those estimates are a routine part of its baseline budget projections. However, because CBO does not ordinarily project the detailed cash flows required to estimate the costs for most of the other, smaller federal credit programs, CBO relied on other federal agencies' projections of those cash flows for the purpose of comparing the two methods of accounting. Consequently, in the aggregate, the lending levels and costs described here are illustrative—and differ from those underlying CBO's baseline estimates or its analysis of the President's budget—but they provide a good basis for comparing the overall budgetary impact of the two ways of accounting for the costs of credit programs.

Using FCRA procedures, CBO estimates that new loans and loan guarantees issued in 2013, in the amount of \$635 billion assumed for this analysis, would generate budgetary savings of \$45 billion over their lifetime—thereby reducing the budget deficit. In contrast, using a fair-value approach, CBO estimates that those loans and guarantees would have a lifetime cost of \$11 billion—thereby adding to the deficit. Much of the difference between those two amounts derives from the valuation of student loans: Under FCRA procedures, those loans generate very large budgetary savings per dollar lent compared with other federal credit assistance; under the fair-value approach, most of those savings disappear.

Costs for all credit programs would be higher under the fair-value approach because it accounts more fully than FCRA procedures do for the cost of the risk the government takes on when issuing loans or loan guarantees. In particular, the fair-value approach accounts for the cost of market risk, and FCRA procedures do not. Market risk is

1. Section 504(d) of FCRA, 2 U.S.C. § 661c (d) (2006).

the component of financial risk that remains even after investors have diversified their portfolios as much as possible; it arises from shifts in macroeconomic conditions, such as productivity and employment, and from changes in expectations about future macroeconomic conditions. The government is exposed to market risk because when the economy is weak, borrowers default on their debt obligations more frequently, and recoveries from the borrowers are lower. When the government extends credit, the associated market risk of those obligations is effectively passed along to taxpayers, who, as investors, would view that risk as having a cost.

Lawmakers have considered changing federal budgetary accounting to require a fair-value approach.² If that approach was adopted, most programs that have budgetary savings under FCRA procedures would have a cost under the fair-value approach.

The Difference Between Procedures Under FCRA and the Fair-Value Approach

Although the costs of most federal activities are recorded in the budget on a cash basis (showing the balance of inflows and outflows when those flows occur), the lifetime costs of federal credit programs are recorded up front on an accrual basis. The lifetime cost, or subsidy, associated with a loan or loan guarantee is measured by discounting all of the federal government's expected future cash flows for the loan or loan guarantee to a present value at the date the loan is disbursed. That value expresses the flows of current and future income or payments in terms of a single number, equivalent to a lump sum received or paid today; the present value depends on the discount rate (or rate of interest) that is used to translate future cash flows into current dollars. For credit programs to have estimated budgetary savings, the discounted value of the government's cash inflows must exceed the discounted value of its cash outflows.

Under FCRA's rules, the present value of expected future cash flows is calculated by discounting them using the rates on U.S. Treasury securities with similar terms to maturity. (For instance, the yield on a Treasury security

maturing in one year would be used to discount cash flows one year from disbursement; a two-year rate, for cash flows two years from disbursement; and so on.) In contrast, under the fair-value approach, estimates would be based on market values—market prices when those prices were available or approximations of market prices when directly comparable figures were unavailable—which would more fully account for the cost of the risk the government takes on. Therefore, the fair-value approach would offer a more comprehensive estimate of federal costs.³

Although there are many techniques to approximate fair values, a standard method for estimating the market value of a direct loan or loan guarantee (adopted for the analysis here) is to discount the expected cash flows to the present using market-based discount rates. In that case, the only difference between FCRA and fair-value estimates stems from the choice of discount rates. The estimates of cash flows, including the net amount lost through defaults, are the same in both approaches, but the difference in discount rates means that those cash flows are valued differently. The difference between the FCRA and fair-value discount rates can be interpreted as the additional compensation that investors would require to bear the risk associated with federal credit.

How would the results under the two approaches differ? The cost of a direct loan reported in the federal budget under FCRA procedures is lower than the cost that private institutions would assign to similar credit assistance based on market prices. Specifically, private institutions would generally calculate the present value of expected future cash flows by discounting them using the expected rates of return on private loans (or securities) with similar risks and maturities. Because the expected rates of return on private loans exceed the rates on Treasury securities, the discounted value of borrowers' expected payments is smaller under this alternative approach, which implies a larger cost for issuing a loan.

Similar reasoning implies that the cost of a loan guarantee calculated using the fair-value approach would be higher than its cost as estimated under FCRA. When it provides a loan guarantee, the government bears the losses resulting from a default on the loan and any market risk associated with those losses. Thus, a lender places more

2. For example, in February 2012, the House of Representatives passed the Budget and Accounting Transparency Act of 2012 (H.R. 3581), which would expand the use of fair-value accounting in the federal budget.

3. For further discussion, see Congressional Budget Office, *Fair-Value Accounting for Federal Credit Programs* (March 2012).

value on a loan with a guarantee than on the same loan without a guarantee. The difference in value between them is the fair value of the guarantee, which reflects the higher losses that an investor would expect on a loan without a guarantee and the higher discount rate that an investor would require to compensate for the market risk associated with such a loan. Under FCRA, the expected losses but not the value of the market risk would be included in the cost. Because a loan without a guarantee has more market risk than the same loan with a guarantee, assigning a cost to market risk through the use of the fair-value approach results in a higher estimated cost for the guarantee.

Federal Credit Programs Covered by CBO's Analysis

In this illustrative analysis, CBO included more than 100 programs in which the federal government provides credit assistance in the form of direct loans and loan guarantees. These lending activities constitute the bulk of the new loans and guarantees covered by this analysis:

- \$343 billion in mortgage guarantees provided by FHA, the Department of Veterans Affairs (VA), and the Rural Housing Service;
- \$113 billion in student loans offered by the Department of Education;
- \$85 billion in loans and loan guarantees provided by the Small Business Administration (SBA);
- \$46 billion in loan guarantees provided by the Export-Import Bank;
- \$19 billion in loans and loan guarantees extended to farmers through agencies under the Department of Agriculture (excluding the Rural Housing Service); and
- \$15 billion in loans and loan guarantees offered by the Department of Energy.

CBO's analysis does not encompass some other federal programs and activities. Most important, this analysis does not include the nearly \$1 trillion in mortgage guarantees projected to be provided by Fannie Mae and Freddie Mac. CBO considers those entities, which have been in federal conservatorship since September 2008, to

be federally owned and controlled and, consequently, displays their loan guarantees on a fair-value basis alongside other federal credit in its budget projections.⁴ In contrast, OMB treats those entities as private companies and generally displays in the federal budget the cash transactions between the Treasury and Fannie Mae and Freddie Mac.

This analysis also does not address the Troubled Asset Relief Program, which is already accounted for on a fair-value basis, both by CBO and the Administration. In addition, CBO has not included additional guarantees provided through the Government National Mortgage Association (also known as Ginnie Mae) and SBA to holders of securities backed by federally guaranteed FHA and SBA loans. Those guarantees create negligible additional exposure to losses because the government is already committed to make investors whole on any losses associated with the underlying guaranteed loans, so fair-value estimates of those additional guarantees would probably not differ significantly from the FCRA estimates.

Discretionary programs—whose funding is provided in annual appropriations acts—accounted for 85 of the 103 programs analyzed and for almost three-quarters of the dollar amount of loans and guarantees. The largest discretionary programs are FHA's and the Rural Housing Service's mortgage programs, SBA's small business loans, the Export-Import Bank's long-term guarantees, and the Department of Energy's Title XVII energy loans. The remaining 18 programs are mandatory programs, the largest of which are the Department of Education's student loan programs and VA's mortgage guarantee program. Lawmakers determine spending for those mandatory programs by setting eligibility rules and other criteria in authorizing legislation rather than by appropriating specific amounts each year.

Subsidy Costs Under FCRA and the Fair-Value Approach

In its illustrative analysis, CBO compared FCRA and fair-value estimates of the cost of new federal credit for 2013. The cash flow projections underlying both sets of

4. See the statement of Deborah Lucas, Assistant Director for Financial Analysis, Congressional Budget Office, before the House Committee on the Budget, *The Budgetary Cost of Fannie Mae and Freddie Mac and Options for the Future Federal Role in the Secondary Mortgage Market* (June 2, 2011).

estimates are the same, and only the discount rates applied to them differ. For the FCRA estimates, the discount rates used are the projected yields on Treasury securities of varying maturities. The fair-value estimates employ discounting methods that are consistent with the way the loan or loan guarantee would be priced in a competitive market and, hence, account for the cost of market risk.

Whether a program has a positive or negative subsidy depends on whether the discounted value of the government's cash outflows for the program exceed the discounted value of its cash inflows. With a direct loan, the government's cash outflow is the disbursement of principal, and the inflows are the payments of interest and principal, net of amounts not paid when there is a default, and any fees that the government receives from the borrower. With a loan guarantee, a financial institution lends to the borrower, and the government pays a claim to the lender if the borrower defaults. The government's cash outflows are the payments it makes to the lender when the borrower defaults, and its inflows are the fees it charges the borrower or lender for its guarantee.

The difference between FCRA and fair-value subsidy rates depends on the annual risk premium associated with the underlying loan; the average life of the loan; and, for a loan guarantee, the structure of the guarantee. The annual risk premium is a measure of the cost of market risk for a given year; it is added to the corresponding yield on Treasury securities to produce a fair-value estimate of a loan. The longer the average life of a loan, the larger the effect of the risk premium on the difference between FCRA and fair-value subsidies. For a loan guarantee, the fair-value subsidy also depends on the percentage of the loan that is guaranteed and, if the guarantee is less than 100 percent, whether the government shares losses evenly with the lender or takes losses ahead of or after the lender. The fewer losses the government is exposed to, the more market risk is shifted from the government to the lender.

Most of the FCRA subsidy estimates presented here are the same as the ones published by OMB in the *Federal Credit Supplement* to the 2013 budget, with some minor discrepancies (resulting, for instance, from differences in rounding at various stages of the calculations).⁵ CBO developed the corresponding fair-value estimates using the projected cash flows that underlie those estimates by the Administration. The subsidy estimates for the

Department of Education's student loan programs and FHA's single-family mortgage insurance program are based on CBO's baseline budget estimates.

Illustrative FCRA Estimates

For fiscal year 2013, the sum of FCRA subsidies for all of the programs that CBO analyzed is -\$45 billion on the assumed \$635 billion of new credit (see Table 1).

Consequently, that assistance would have the net effect of lowering the deficit in 2013. The 37 largest programs, those with projected loan amounts of at least \$1 billion, account for 98 percent of the lending. CBO's analysis of credit programs, using the FCRA procedures, yields several conclusions:

- **The Department of Education's student loan programs and FHA's single-family mortgage insurance program principally determine the overall negative subsidy for federal credit.** In total, those programs generate the estimated savings of \$45 billion.
- **Subsidy rates vary among programs.** The average subsidy rate (the cost divided by the amount disbursed), weighted by the dollar amount of loans or guarantees, is approximately -7 percent, but there is considerable variation among programs. Of the 103 programs analyzed, 10 have a subsidy rate of less than -5 percent (which is to say that they are projected to generate savings in excess of 5 percent), and 10 have a subsidy rate of more than 25 percent (and, therefore, projected costs of that amount).
- **Discretionary and mandatory programs alike provide budgetary savings.** Discretionary programs would have a total subsidy of -\$9 billion, and mandatory programs, -\$36 billion (that is, the budget would show a net gain to the government of those amounts). Those dollar sums translate to average subsidy rates of -2 percent and -21 percent, respectively. The difference largely reflects the large negative subsidies in the student loan programs. Of the 85 discretionary programs, 12 have a subsidy rate of zero and 26 have a negative subsidy rate.⁶

5. See *Budget of the United States, Fiscal Year 2013: Federal Credit Supplement*.

6. In this analysis, a subsidy rate was deemed to be zero if it fell between -0.1 percent and 0.1 percent.

Table 1.**Comparison of FCRA and Fair-Value Approaches in CBO's Illustrative Analysis of Federal Credit Programs, Fiscal Year 2013**

Department or Agency	Number of Programs	Projected Obligations or Commitments (Billions of dollars)	Estimated Subsidy Rate (Percent)		Estimated Subsidy (Billions of dollars)	
			FCRA	Fair Value	FCRA	Fair Value
Housing and Urban Development ^a	17	264	-3.4	1.8	-9.1	4.7
Education	6	113	-32.1	-4.9	-36.3	-5.5
Small Business Administration	8	85	0.6	3.6	0.5	3.0
Veterans Affairs	6	52	0.2	1.7	0.1	0.9
Agriculture	32	46	-0.4	4.5	-0.2	2.1
Export-Import Bank	6	46	-2.3	-0.2	-1.0	-0.1
Energy	1	15	*	16.3	*	2.5
Transportation	7	6	8.6	32.9	0.5	2.1
International Assistance Programs ^b	6	5	-3.6	6.1	-0.2	0.3
Other ^c	14	3	25.0	37.5	0.7	1.1
Total	103	635	-7.1	1.7	-44.9	11.0

Sources: Congressional Budget Office (for subsidy estimates, using data supplied by various agencies) and *Budget of the United States, Fiscal Year 2013: Federal Credit Supplement* (for commitments and obligations).

Notes: The table shows projected obligations (for direct loans) and commitments (for guaranteed loans) and FCRA estimates provided by the Administration's Office of Management and Budget and other agencies except for two programs. For student loans and guarantees of single-family mortgages, which are administered, respectively, by the Department of Education and the Federal Housing Administration, within the Department of Housing and Urban Development, the projections of commitments and FCRA estimates were prepared by CBO.

The table excludes the Troubled Asset Relief Program, guarantees on securities backed by federally guaranteed loans, and consolidation loans administered by the Department of Education.

FCRA = Federal Credit Reform Act; * = between -0.05 and 0.05.

- The Federal Housing Administration's single-family mortgage program constitutes the bulk of the Department of Housing and Urban Development's credit assistance, specifically, \$227 billion, or 86 percent of the total.
- International assistance programs include ones administered by the Agency for International Development and the Overseas Private Investment Corporation.
- Other departments include Commerce, Health and Human Services, Homeland Security, the Interior, State, and the Treasury.

Illustrative Fair-Value Estimates

According to CBO's estimates, accounting for the cost of new credit obligations on a fair-value basis in fiscal year 2013 would cost \$11 billion, in contrast to the \$45 billion in savings under FCRA—for a total difference of \$56 billion in budgetary impact (see Figure 1). Three results from the analysis stand out:

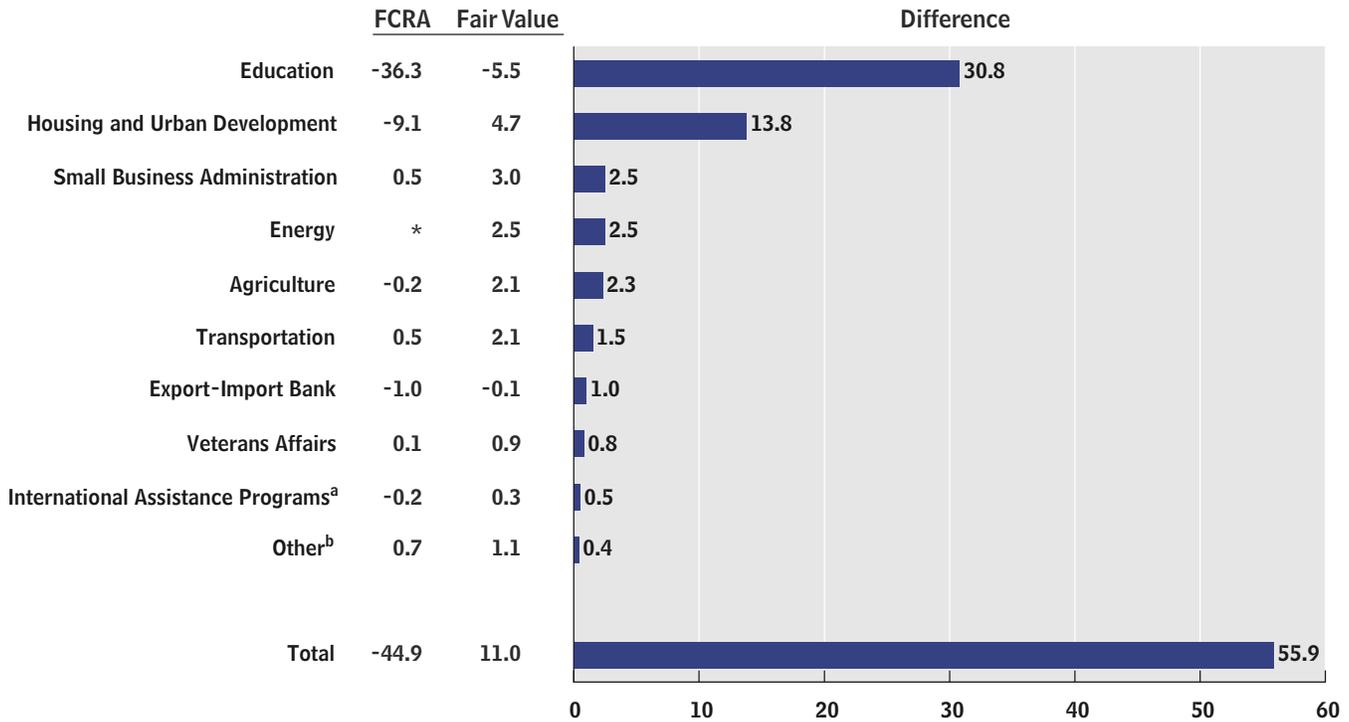
- **On average, fair-value subsidy rates are about 9 percentage points higher than FCRA subsidy rates.** The average subsidy rate, weighted by the amount of programs' credit, is almost 2 percent on a fair-value basis, compared with -7 percent on a FCRA basis. The fair-

value subsidy rates are higher in all cases, though the amount by which they exceed the FCRA subsidy rates varies considerably. The largest difference in subsidy rates between fair-value and FCRA estimates occurs for long-term consumer loans, reflecting the high degree of market risk in that type of lending. For example, the difference in subsidy rates for student loans exceeds 27 percentage points. For shorter-term or secured lending, such as mortgage guarantees secured by real estate in VA's veterans' housing guarantee program and SBA's loan guarantee program for revolving lines of credit, the difference is much smaller—about 1 percentage point in each program.

Figure 1.

Difference in Subsidy Costs Using FCRA and Fair-Value Approaches, by Department or Agency, Fiscal Year 2013

(Billions of dollars)



Source: Congressional Budget Office based on data supplied by various agencies.

Notes: FCRA estimates of subsidy costs were provided by the Administration’s Office of Management and Budget, except for two programs. For student loans and guarantees of single-family mortgages, which are administered, respectively, by the Department of Education and the Federal Housing Administration, within the Department of Housing and Urban Development, the FCRA estimates were prepared by CBO.

The figure excludes the Troubled Asset Relief Program, guarantees on securities backed by federally guaranteed loans, and consolidation loans administered by the Department of Education.

FCRA = Federal Credit Reform Act; * = between -\$50 million and \$50 million.

- a. International assistance programs include ones administered by the Agency for International Development and the Overseas Private Investment Corporation.
- b. Other departments include Commerce, Health and Human Services, Homeland Security, the Interior, State, and the Treasury.

■ **Most discretionary programs with a negative subsidy using FCRA procedures have a positive subsidy using the fair-value approach.** Altogether, discretionary programs have a total fair-value subsidy of \$15 billion. For 33 of the 38 discretionary programs in 2013 with a zero or a negative subsidy rate on a FCRA basis, the fair-value subsidy is positive.⁷

■ **Some fair-value estimates show net savings for the government (that is, the subsidies are negative).** Although most programs that have a negative subsidy rate under FCRA procedures have a positive subsidy rate (that is, a net budgetary cost) under the fair-value approach, three of the four largest student loan programs and several smaller programs have a negative subsidy rate on a fair-value basis. In principle, programs with a large negative fair-value subsidy should be rare, because a negative fair-value subsidy should represent a profitable opportunity for a private financial institution to provide credit on the same or

7. For a list of those 33 programs and the estimates of subsidies for them, see the supplemental spreadsheet posted along with this report on CBO’s Web site at www.cbo.gov/publication/43352.

better terms. However, a negative fair-value subsidy could arise, for instance, if there are barriers to entry—such as the need for private lenders to incur large fixed costs to enter a particular credit market—and if the profit opportunity is expected to be short-lived. Furthermore, in some cases, such as for student loans, the federal government has tools to collect from delinquent borrowers that private lenders do not have, giving federal programs a real advantage over private-sector competitors. But a negative fair-value subsidy could also stem from overly optimistic assumptions about defaults and recoveries, underestimates of the appropriate risk premium because of a lack of good market proxies, or understatement of the true subsidy because administrative costs are shown separately.

Volatility of Fair-Value Estimates

Fair-value estimates may be more volatile over time than FCRA estimates because the cost of market risk is not constant. However, the additional volatility arising from changes in the risk premium tends to be less than the considerable volatility of FCRA estimates that is attributable to fluctuations in Treasury interest rates, swings in projected losses resulting from defaults, and changes in fees and other terms of the loans that result from administrative changes to programs or changes in the mix of borrowers who participate.

To examine volatility, CBO compared subsidy rates for the 2012 and 2013 cohorts of loans calculated on both a FCRA basis and a fair-value basis. In both cases, subsidies for all of the loans taken together are projected to be lower in 2013 than in 2012—by \$24 billion and \$16 billion, respectively. Much of the change is attributable to student loans, whose subsidy is projected to be significantly lower in 2013 because of a combination of a statutory increase in the rates charged for some student loans and a projected decline in the interest rates used to determine the FCRA and fair-value discount rates. The difference between the FCRA and fair-value subsidies is \$47 billion for 2012 and \$56 billion for 2013. That \$9 billion year-to-year change is small compared with the \$24 billion change in estimated FCRA subsidies, primarily because estimates of risk premiums were mostly unchanged between those two years.

Although market prices of credit can change significantly from year to year (because, for example, anticipated cash flows are derived from expectations about defaults, recoveries, and borrowers' decisions to prepay on their

mortgage that may vary over time), estimates of risk premiums tend to move more slowly, especially when economic conditions are stable. Generally, a major change in market conditions must occur for risk premiums to change significantly. In the wake of the recent financial crisis, investors now demand significantly higher rates of return on credit obligations, especially household-related debt, than they did before the crisis. As the economy and credit markets recover, those premiums should slowly decrease, though perhaps not to the levels that existed before the crisis.

CBO's Method for Computing the Fair-Value Estimates

CBO computed all of the fair-value estimates in this analysis using a discounted cash flow approach. In the past, CBO has also used more sophisticated techniques, such as options-pricing models, to more precisely estimate the fair value of some credit instruments.⁸ In some cases, the insights from those more sophisticated analyses were used to guide the assumptions about discount rates used in this analysis. The use of a single approach for this analysis makes the fair-value estimates more readily comparable across programs and with the FCRA estimates.

CBO used its own cash flow projections and assumptions about discount rates for both the FCRA and fair-value estimates for the Department of Education's student loan programs and FHA's single-family mortgage programs. In this illustrative analysis, those programs account for just over half of the new lending in federal credit programs in 2013. For the remaining programs, CBO relied on estimates of cash flows submitted to OMB by the responsible federal agencies as part of the annual budget cycle; CBO applied its own estimates of the appropriate discount rates in calculating the fair-value estimates.⁹

Estimates of Cash Flows and Discount Rates

For most of the programs analyzed, CBO obtained from federal agencies the projections of cash flows that the

8. For example, to price FHA's mortgage insurance, CBO has used an options-pricing model that took into account the probability of prepayment and defaults. See Congressional Budget Office, "Accounting for FHA's Single-Family Mortgage Insurance Program on a Fair-Value Basis," attachment to a letter to the Honorable Paul Ryan (May 18, 2011).

9. For the 2012 estimates, CBO did not receive detailed cash flow information for 37 smaller programs and had to rely on approximations based on information provided in the *Budget of the United States, Fiscal Year 2013: Federal Credit Supplement*.

Administration used to calculate FCRA estimates—including defaults, recoveries, prepayments, fees, and other miscellaneous amounts. For direct loans, those cash flows also include interest payments and principal repayments. CBO made no adjustments to the projections of cash flows and followed OMB's methodology for discounting to the date of disbursement. CBO also assumed the same yields on Treasury securities (which affect projected cash flows as well as the fair-value discount rates that CBO used for the fair-value estimates).

The computation of fair-value subsidies for loan guarantee programs was complicated by the fact that the data files that agencies provided to CBO for those programs included only the projected fee and claim payments but not the payments of interest and principal, because those cash flows are not required to compute FCRA estimates. They are necessary, however, to compute fair-value estimates, so CBO approximated them using data on loan characteristics published by OMB in the *Federal Credit Supplement* to the 2013 budget.

For the Department of Education's student loan programs and FHA's single-family mortgage program, CBO's estimates of cash flows (including scheduled and unscheduled principal payments, defaults, and recoveries) are based on models calibrated to data on the historical performance of loans in those programs. The cash flows generated by those models account for the characteristics of the loans and borrowers in each program and CBO's projections of macroeconomic variables such as interest rates and house prices. CBO and OMB account for student loans somewhat differently. In particular, CBO considers consolidation loans—which replace one or more federal student loans with a single loan that typically carries a longer term—to be extensions of the original loans, whereas OMB considers consolidation loans to be new loans.

The discount rates used in fair-value calculations exceed the Treasury rates used in FCRA calculations to the extent that the loans have market risk. That difference, the risk premium, reflects the fact that investors demand additional compensation to accept the risk that losses may exceed those already reflected in the estimates of cash flows and that those losses may occur when resources are scarce and particularly valuable. Theoretically, if those losses could be completely eliminated, such as by holding a diversified portfolio of loans that is large enough for the aggregate losses to become certain, the risk premium

would be zero. For almost all credit programs supported by the federal government, a zero risk premium is unlikely because defaults on all types of loans tend to rise in recessions, limiting the amount of diversification that can be achieved.

To make those ideas concrete, consider the issuance by the federal government of a group of one-year loans totaling \$1 million, made at a 7 percent interest rate; suppose that the government expects losses (interest payments or repayments of principal that will not be made) totaling \$50,000. Thus, in one year's time, the government expects to receive \$1,020,000—the amount due plus interest of \$70,000 minus losses of \$50,000. If the Treasury rate is 1 percent, then the value of the future cash flows under FCRA would be about \$1,010,000 (that is, \$1,020,000 divided by 1.01), resulting in a budgetary *gain* (or negative subsidy) of \$10,000 (the difference between the \$1,000,000 disbursed and the present value of \$1,010,000 for interest payments and principal repayments). If, however, it was estimated that investors would require a risk premium of 2 percent (for a total discount rate of 3 percent) to hold such loans, the estimated market value of the future cash flows would be about \$990,000, corresponding to a fair-value subsidy *cost* of \$10,000.

The discount rates used in CBO's fair-value calculations reflect the type of lending and the degree of market risk. The discount rates were chosen on the basis of a consistent set of estimates of risk premiums for the various types of credit (categorized into commercial, consumer, and real estate lending) and the degree of market risk based on projected default rates and the terms of the loans (such as their maturity and the opportunity for borrowers to repay the loans early). As credit programs and market conditions change over time, the appropriate discount rate for estimating subsidies may also change. In addition, because in most cases CBO relied on the projections of cash flows that underlie OMB's FCRA estimates, using the loss expectations embedded in those cash flows to infer appropriate risk premiums, a reappraisal of those cash flows or additional analysis of the characteristics of the programs or borrowers might suggest that different discount rates should be used to calculate the fair-value subsidies.

Direct Loans

CBO estimated the fair-value subsidy for direct loan programs by computing the present value of cash flows,

discounting them in each period by using a discount rate equal to a Treasury rate of appropriate maturity plus a risk premium. Because the cash flows are identical to those used for the FCRA subsidy estimates, the difference between the fair-value and FCRA subsidy estimates for direct loans results solely from differences in the discount rate.

To determine the risk premium, CBO considered three categories of loans: commercial, consumer, and real estate.

■ **Commercial loans.** CBO assigned a credit rating to each commercial lending program on the basis of the loans' maturity and reported default rates. Using that credit rating, CBO then assigned a risk premium depending on whether the loans were long term (with a maturity of seven years or longer) or short term. CBO's estimates for the risk premiums relied on academic research that extracted average risk premiums for various credit ratings using data on yields for corporate bonds between 1996 and 2004.¹⁰ Because those risk premiums were available only for broad categories, CBO interpolated between those amounts to infer risk premiums for intermediate categories. For example, CBO used a weighted average of the estimated risk premiums for the A-rated and BBB-rated securities to infer risk premiums for the A-minus and BBB-plus categories. Additionally, CBO reduced the risk premiums slightly for short-term loans.

■ **Consumer loans.** CBO categorized each consumer lending program as low-, moderate-, moderate-to-high-, or high-risk on the basis of the characteristics of the program and its borrowers. Low-risk programs include, for instance, conditions that reduce the creditor's exposure to default risk (such as seniority in the priority of payment of the federal loan over a borrower's other loans or a requirement that the borrower pledge specific assets as collateral); high-risk programs may involve, for instance, unsecured lending to borrowers whose ability to pay is significantly correlated with the state of the economy. CBO analyzed data on the pricing of private student loans and other consumer lending to inform its estimates of the risk premiums for federal loans.

■ **Real estate loans.** CBO categorized each real estate credit program as either residential or commercial. It further classified residential programs as low-, moderate-, moderate-to-high-, or high-risk on the basis of the characteristics of their loan portfolios—examining, for example, loan-to-value ratios (capturing the relationship between the amounts lent and the value of properties) and the creditworthiness of the borrowers. To determine the risk premiums for residential real estate programs, CBO relied on two sources of private market pricing: the interest rates charged on mortgages that are not guaranteed by Fannie Mae, Freddie Mac, FHA, or another federally backed entity and prices for private mortgage insurance. CBO adjusted those prices to factor out differences between private and federally backed mortgages that do not relate directly to market risk, including differences in liquidity and other characteristics of the transaction. For riskier types of mortgages, such as those with low down payments, CBO applied a higher risk premium than it used for other mortgages. For commercial real estate programs, CBO assigned risk premiums on the basis of research on the returns on real estate investment trusts (private entities that invest in real estate).

In some cases, issuing direct loans exposes the government to risks other than the risk of default. For example, the Treasury's purchases in 2009 of mortgage-backed securities that were issued and guaranteed by Fannie Mae and Freddie Mac exposed the government to prepayment risk (the risk that the securities will be repaid sooner, or later, than expected). Investors facing that risk generally expect to earn a higher rate of return than they would on a Treasury security. Therefore, the discount rate that CBO used to estimate the fair value of certain types of direct loans included a component for risks other than those related to the risk of default.¹¹

Loan Guarantees

The fair value of loan guarantees approximates what a private guarantor would charge for obligations with

10. See John Hull, Mirela Predescu, and Alan White, "Bond Prices, Default Probabilities and Risk Premiums," *Journal of Credit Risk*, vol. 1, no. 2 (Spring 2005), pp. 53–60, www.rotman.utoronto.ca/~hull/DownloadablePublications/CreditSpreads.pdf.

11. The ability to prepay a loan confers a valuable benefit to the borrower, allowing him or her to exercise the option of accelerating the repayment of principal when doing so is most valuable (in particular, when interest rates fall), imposing a cost on the lender. To account for the value of that option, CBO adjusted the discount rate applied to the expected cash flows for direct loans, using estimates from its options-pricing models and the observed difference between market values of securities that do and do not have prepayment options.

similar risk and expected returns. In the absence of directly observable prices for such loan guarantees, which are not available for most of the programs that CBO analyzed, a standard approach to calculating the fair value of a loan guarantee relies on determining the difference between the fair value of the loan with and without the guarantee.¹²

When the government guarantees a loan that is provided by a private lender, its expected cash flows are quite different from those that would occur if it made a loan itself that had the same terms. With its guarantee, the government is essentially transforming a loan with a risk of losses from default into a loan that has that risk removed (either completely, in the case of a full guarantee, or partially, in the case when the government guarantees something less than 100 percent of losses). The value of the guarantee is the difference between the value of the underlying loan and the value to the lender of the guaranteed loan, whose cash flows are the sum of those for the underlying loan and the net guarantee payments (default claim payments minus the guarantee fees that the borrower or lender must pay).¹³

For each program, CBO computed the present value of the cash flows stemming from the loans with and without guarantees, using discount rates that incorporate appropriate premiums for their market risk. The procedure for determining the discount rate for the cash flows from the underlying loan was the same as that for a direct loan. However, the discount rate applied to the less risky cash flows from the guaranteed loan should be lower than the discount rate for the underlying loan. For a loan guarantee that ensures the lender receives all principal and interest and does not bear any other risks, such as prepayment risk, the discount rate for the guaranteed

loan should be the Treasury discount rate. For a loan guarantee for which the lender has some exposure to losses from default or bears prepayment risk, the discount rate on the guaranteed loan should be between the Treasury rate and the discount rate for the underlying loan. That discount rate can be estimated from the prices of securities that lenders issue to fund their guaranteed loans.

Accounting for market risk raises the costs of guarantees in much the same way as it raises the cost of direct loans. The subsidy cost of a guarantee under FCRA can be found using the method for the fair-value approach but using a Treasury discount rate for both the underlying loan and the guaranteed loan. Under the fair-value approach, a higher discount rate is used for the underlying loan and perhaps for the guaranteed loan. Even when a higher rate is used for both, the value of the underlying loan, without a guarantee, is reduced by more than is the value of the guaranteed loan because the former has more market risk and, hence, a higher discount rate. Thus, the difference between the value of the underlying loan and that of the guaranteed loan is larger under the fair-value approach than under FCRA, which means that the estimated subsidy cost is greater when the fair-value approach is used.

12. An alternative method for valuing loan guarantees is to use an options-pricing approach. See Congressional Budget Office, *Estimating the Value of Subsidies for Federal Loans and Loan Guarantees* (August 2004).

13. For an illustration, see Congressional Budget Office, *Federal Loan Guarantees for the Construction of Nuclear Power Plants* (August 2011), pp. 29–33.

This report was requested by the Chairman and Ranking Member of the Senate Budget Committee. In accordance with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations. Wendy Kiska, Rebecca Rockey, and Mitch Remy of CBO's Financial Analysis Division prepared the report under the supervision of Damien Moore. Chad Chirico and Deborah Kalcevic contributed to the analysis. This report, along with other CBO publications, is available on the agency's Web site (www.cbo.gov).

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