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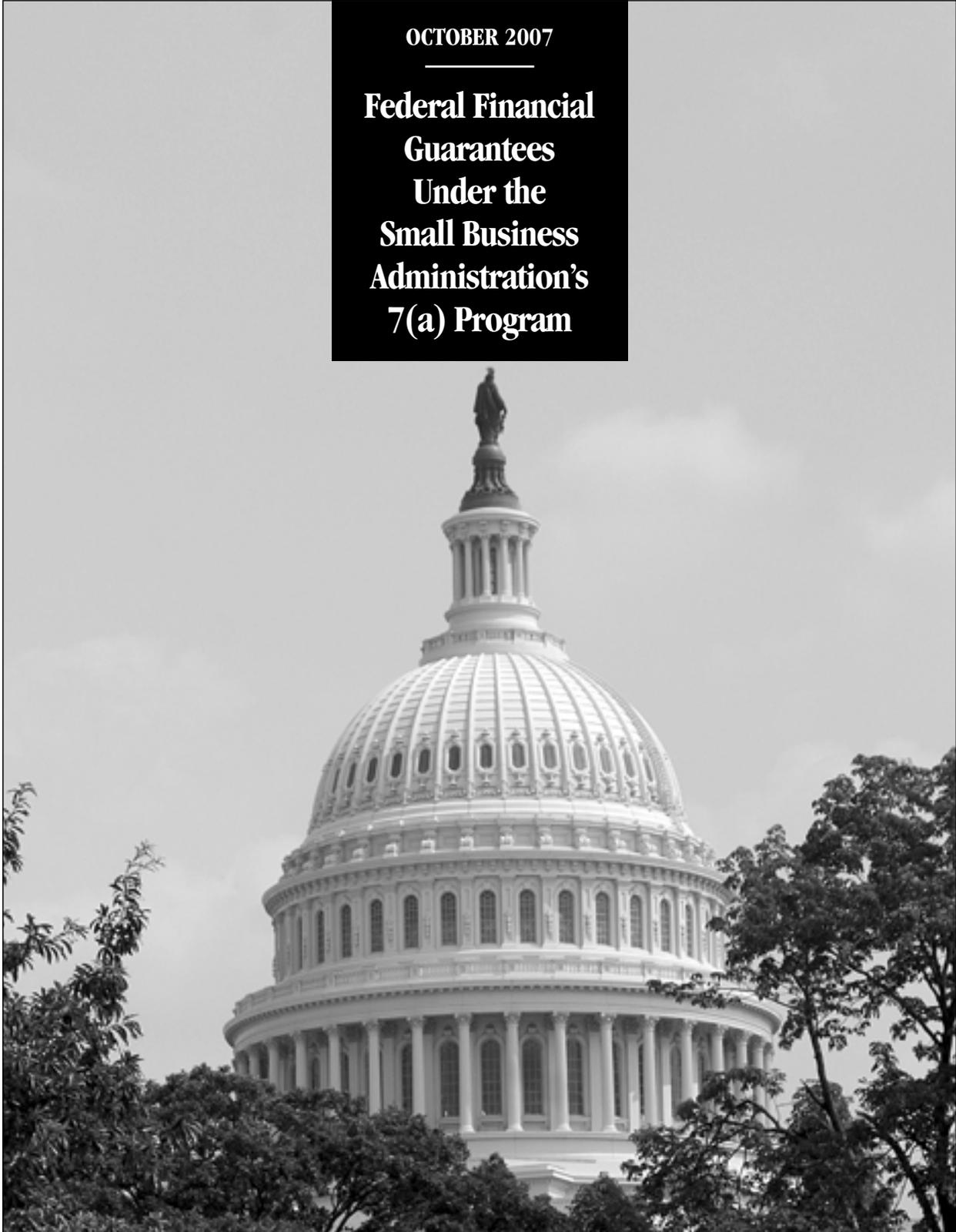
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**CBO**

**PAPER**

OCTOBER 2007

**Federal Financial  
Guarantees  
Under the  
Small Business  
Administration's  
7(a) Program**







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October 2007

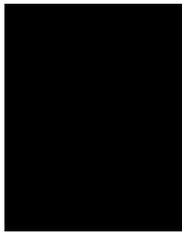
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## **Notes**

All years referred to in this paper are federal fiscal years.

Numbers may not sum to totals because of rounding.

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# Preface

**T**he Small Business Administration (SBA) guarantees new loans to qualified businesses each year through its 7(a) program. SBA assumes much of the credit risk on those loans, thereby assisting borrowers by making credit available at an affordable rate.

Since 2005, the budgetary cost of 7(a) loan guarantees—calculated under the rules specified in the Federal Credit Reform Act of 1990—has been estimated to be zero, with only minor changes as a result of reestimating the cost on the basis of actual cash flows. Those estimates indicate that the projected cost to the government from defaulted loans (minus any recovered amounts) has been roughly offset by fees collected by SBA from lenders and paid indirectly by borrowers.

At the request of the Ranking Member of the Senate Budget Committee, the Congressional Budget Office (CBO) has estimated the subsidy rate for SBA loan guarantees and tested the sensitivity of those cost estimates using private-sector discount rates and using more recent recovery rates on defaulted loans. This report provides the results of that analysis.

Deborah Lucas and Wendy Kiska prepared the report under the supervision of Robert Dennis and Marvin Phaup of the Macroeconomic Analysis Division. The authors thank Albert Metz and Ravi Prasad, both formerly of CBO, for their work on an earlier version of the project. Mark Hadley, Arlene Holen, Damien Moore, Nathan Musick, David Torregrosa, and Tom Woodward of CBO provided valuable comments and suggestions, as did Donald Marron, formerly of CBO.

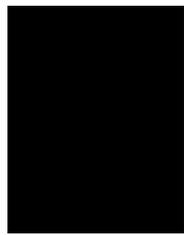
Christine Bogusz edited the paper, and Loretta Lettner proofread it. Allan Keaton produced the tables and figures for the paper. Maureen Costantino prepared the paper for publication, with assistance from Christian Howlett, and took the cover photograph. Lenny Skutnik printed copies of the paper. Linda Schimmel handled the print distribution, and Simone Thomas prepared the electronic version for CBO's Web site ([www.cbo.gov](http://www.cbo.gov)).



Peter R. Orszag  
Director

October 2007





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# Federal Financial Guarantees Under the Small Business Administration's 7(a) Program

## Summary and Introduction

The federal government provides loan guarantees and, to a lesser extent, direct loans to influence the availability and cost of credit. The Small Business Administration (SBA) extended \$20 billion of new guarantees in 2006, and its outstanding guarantees amounted to \$67 billion, or about 5 percent of total federal loans and loan guarantees outstanding.<sup>1</sup> The SBA's 7(a) program assists qualifying small-business borrowers by providing loan guarantees (\$12 billion was extended in 2006) that limit lenders' losses in the event that a borrower defaults. The guarantee typically covers 50 percent to 85 percent of a loan's balance, thereby transferring most of the credit risk of the loan to the federal government.

This analysis considers three estimates of the subsidy cost of the 7(a) program—the budget estimates, which are prepared according to the requirements of the Federal Credit Reform Act (FCRA) of 1990;<sup>2</sup> an alternative budget estimate that puts more weight on recent loss experience than the official budget estimates do; and an estimate of the cost of the program using private-sector discount rates. Under FCRA, cost is estimated by projecting the future cash flows from defaults minus recoveries and fees<sup>3</sup> and discounting those to the date of loan dis-

bursement at a Treasury rate of corresponding maturity. The alternative budget estimate reflects the lower recovery rate experienced since 1995. The third estimate discounts the expected cash flows at private-sector rates that reflect the market risk inherent in loan guarantees to small businesses. To estimate those private rates, the Congressional Budget Office (CBO) uses an options-pricing model.

The 7(a) loan guarantee program is not very costly to the government under the FCRA rules for estimating budget costs. Alternative measures also show moderate costs for that loan activity. The budget estimates produced by the Administration's Office of Management and Budget (OMB) and SBA find a subsidy cost of zero for the 2006 cohort of 7(a) loans (those approved by SBA in 2006), using assumptions that reflect the proportion of outstanding balances that SBA was historically able (from 1988 to 2006) to recover after defaults. The alternative budget estimate, using a more recent, lower recovery rate than OMB and SBA assume, produces a slightly higher subsidy rate of 0.2 percent of loan disbursements and a cost of \$24 million. Using private-sector discount rates (and the lower recovery rate) generates a subsidy rate of 1.0 percent, or \$120 million.

Subsidy estimates are quite sensitive to projected rates of default and recovery, which vary considerably over time and with economic conditions. If economic conditions are good, defaults could be fewer than under CBO's assumptions, and recoveries could be greater. In such boom times, subsidy costs could even be negative: The alternative budget estimate could be as low as -1.1 percent. In contrast, under assumptions of poor

1. The value of outstanding federal direct and guaranteed loans in 2006 totaled \$1,371 billion, up from \$890 billion in 1995.
2. Federal Credit Reform Act of 1990, section 13201(a), title V of the Congressional Budget and Impoundment Control Act of 1971 as added by the Omnibus Reconciliation Act of 1990, Public Law 101-508, 104 Stat. 1388-609. See also Congressional Budget Office, *Estimating the Costs of One-Sided Bets: How CBO Analyzes Proposals with Asymmetric Uncertainties* (October 1999); Office of Management and Budget, *Federal Credit*, Circular No. A-11, part 5 (July 2007); and Congressional Budget Office, *An Explanation of the Budgetary Changes Under Credit Reform* (April 1991).

3. FCRA estimates also exclude administrative costs and any incidental effects on government receipts or outlays.

economic conditions, subsidy estimates could be much greater: The alternative budget estimate could be as high as 1.6 percent, for example.

Federal exposure to loan losses also can be evaluated by estimating the present value of net loan losses over the remaining life of outstanding SBA 7(a) guarantees for all cohorts. CBO estimates the expected value of future net losses on the current SBA 7(a) portfolio of loan guarantees to be \$271 million using current budget assumptions, \$462 million under the alternative budget estimate, and \$687 million using private-sector discount rates. Those estimates of expected future losses exclude losses that have already occurred and fees that have already been received. CBO's estimate of \$271 million using current budget assumptions is very close to SBA's estimated liability of \$269 million for 7(a) guarantees for 2006.<sup>4</sup>

## The SBA's 7(a) Program

The SBA encourages the formation and growth of small businesses by providing financial assistance to enterprises that would otherwise be unable to obtain funding on what the law refers to as "affordable terms." SBA accomplishes that mission primarily by providing loan guarantees to private originators on qualifying small-business loans.

SBA-backed loans are typically made by commercial banks and, to a lesser extent, by thrifts and finance companies. When a small business applies for a loan, the lender determines whether the applicant is eligible for an SBA loan guarantee. If so, the lender may formally request a guarantee from the SBA. To qualify for a guarantee, the small business must meet certain criteria of the SBA (described below) and, importantly, the lender must certify that the funding would not otherwise be provided on reasonable terms.

To be eligible for the SBA's 7(a) guaranteed loan program, a borrower must not have been able to obtain credit elsewhere. By design, therefore, the program attracts a disproportionate number of high-risk borrowers. Like a private lender, the government cannot perfectly distinguish

between low- and high-risk borrowers. For that reason, loan guarantees are generally costly to the government. But loan guarantees can help overcome market imperfections that impede private lending arrangements. A young company with a good chance of success but without an established track record may find bank financing unavailable at an affordable rate because a bank cannot distinguish it from a much riskier prospect. Indeed, if good borrowers are dissuaded from borrowing by high interest rates but very risky borrowers are not, credit may become unavailable at any price. The government can help overcome such "adverse selection" problems by providing loan guarantees that mitigate the risk to private lenders, thereby making it feasible for them to offer credit at an affordable rate.

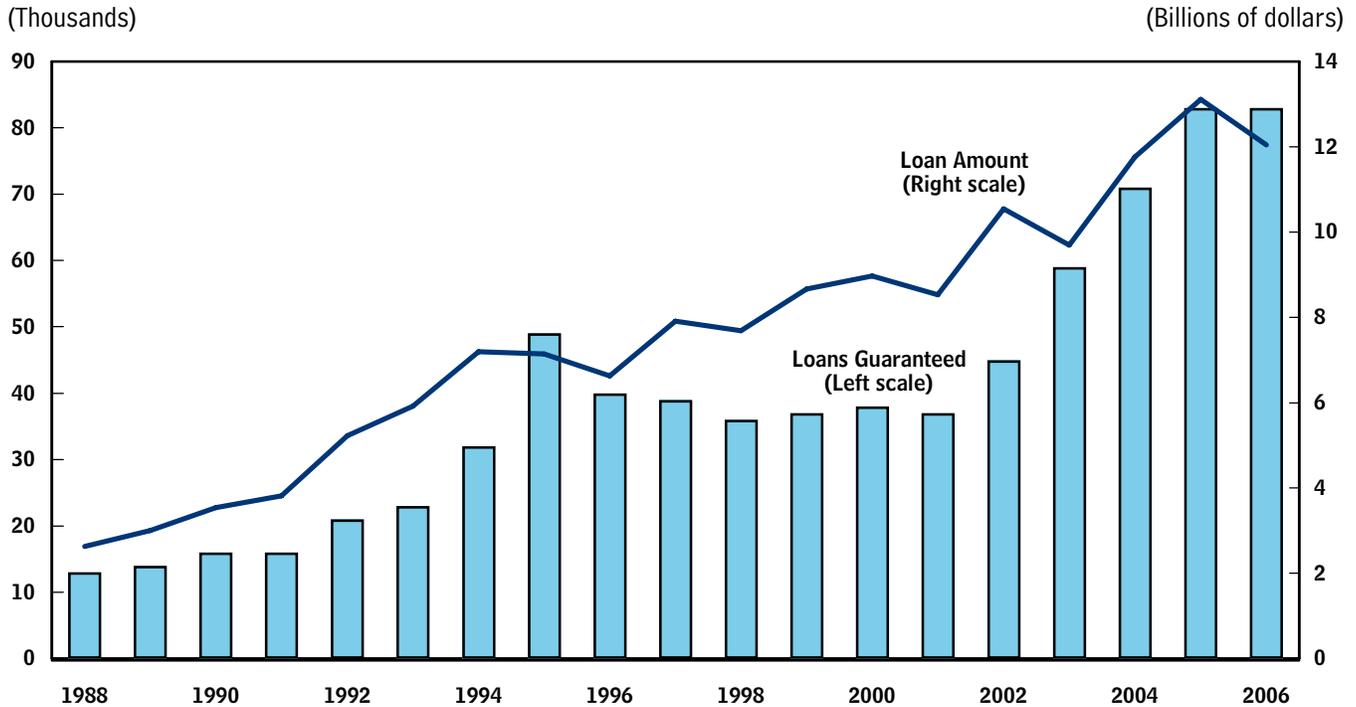
The 7(a) program has grown rapidly in recent years, with loan disbursements topping \$12 billion on more than 82,000 loans in 2006 (see Figure 1). Nonetheless, the program accounts for only 4.1 percent of outstanding small-business loans under \$1 million.<sup>5</sup>

In addition to its regular 7(a) loan program, SBA operates a program known as SBAExpress. A lender is eligible to participate in the Express program if it currently participates with SBA and meets certain portfolio performance standards. Alternatively, a lender may participate even if it is not an SBA lender if it makes a reasonable number of commercial loans of \$50,000 or less and those loans typically meet the eligibility restrictions outlined below. SBA makes eligibility decisions within 36 hours for Express loans, which is much faster than in the regular program, where eligibility decisions may take several days, depending on a lender's relationship with SBA. Some lenders, classified as preferred lenders, have authority to determine eligibility in the Express program.

The Express program has grown rapidly since its introduction in 1995. The program currently accounts for nearly 75 percent of loans guaranteed under the SBA 7(a) loan program but, because loans are smaller under the Express program, it accounts for only 20 percent of SBA's total guaranteed loan volume. The SBA also offers other

4. The SBA recorded a liability of \$1.631 billion for all loan guarantees in 2006. See Small Business Administration, *Fiscal Year 2006 Performance and Accountability Report* (November 15, 2006).

5. Government Accountability Office, *Small Business Administration: Additional Measures Needed to Assess 7(a) Loan Program's Performance*, GAO-07-769 (July 2007).

**Figure 1.****Annual SBA 7(a) Guaranteed Loan Disbursements by Number and Dollar Volume, 1988 to 2006**

Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

forms of assistance through a variety of mostly smaller programs, but those are not considered in this analysis.<sup>6</sup>

### Eligibility Criteria

In order to qualify for an SBA 7(a) loan guarantee, applicants must demonstrate an ability to repay the loan, as indicated by factors such as the business's quality of management, collateral, and the amount of owners' equity. In addition, the type of business, size of the business, use of the loan funds, and other special circumstances affect eligibility.

- **Type of Business:** Businesses must be for-profit; do business in the United States or its territories; have

sufficient owners' equity; and use other reasonable funding resources (such as personal assets) first. Some lines of business, such as real estate investment firms and lending institutions, are ineligible for assistance.

- **Size of Business:** The business must be small, independently owned and operated, and not dominant in its field. The definition of "small" varies by industry, and the size standard is stated either in terms of the number of employees or the amount of average annual receipts. To qualify, for example, a retail trade business may have annual sales of no more than \$6 million to \$29 million (depending on the type of business), and a wholesale business may have no more than 100 employees.
- **Use of Loan:** Proceeds may be applied to most business purposes. Generally, they may not be used directly for financial investments, to make payments to owners, to cover delinquent taxes, or to pay existing debt, except in certain cases.

6. The SBA distinguishes between 7(a) General Business Loans and 7(a) General Business Loans-DELTA programs. DELTA is a joint effort with the Department of Defense that provides loan guarantees to small businesses adversely affected by reductions in defense spending. The discussion throughout this paper refers to the General Business Loan program. There also are several specialized SBA guarantee programs, such as SBIC Debentures, which are not considered in this report.

**Table 1.****SBA 7(a) Loan Disbursements by Industry and Cohort, 2004 to 2006**

(Percent)

NAICS Industry	2004	2005	2006
Accommodation and Food Services	16.7	15.8	17.3
Administrative and Support and Waste Management and Remediation Services	3.3	3.3	3.1
Agriculture, Forestry, Fishing, and Hunting	1.2	1.0	1.0
Arts, Entertainment, and Recreation	2.2	2.2	2.0
Construction	5.8	6.6	6.9
Educational Services	0.7	0.9	0.8
Finance and Insurance	1.1	1.1	1.3
Health Care and Social Assistance	9.4	9.2	9.1
Information	1.1	1.3	1.1
Management of Companies and Enterprises	0	0	0
Manufacturing	11.1	10.9	10.3
Mining	0.2	0.3	0.3
Other Services (Except Public Administration)	9.9	9.8	9.4
Professional, Scientific, and Technical Services	6.5	7.0	7.1
Public Administration	0	0	0
Real Estate and Rental and Leasing	1.9	1.9	2.1
Retail Trade	19.9	20.2	19.8
Transportation and Warehousing	2.3	2.3	2.3
Utilities	0.1	0.1	0
Wholesale Trade	6.5	6.2	6.0
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: NAICS = North American Industry Classification System.

■ **Special Circumstances:** Certain types of businesses, including farms and agricultural firms, may have other specific loan programs designed for them that must be used before the SBA 7(a) program. In addition, applicants with special circumstances may be evaluated on a case-by-case basis to determine eligibility. For example, citizenship status may be considered in determining the degree of risk related to the continuity of an applicant's business.

In practice, borrowers are drawn from a broad group of industries, with retail trade representing the single largest group in recent years (see Table 1).

### Loan Terms

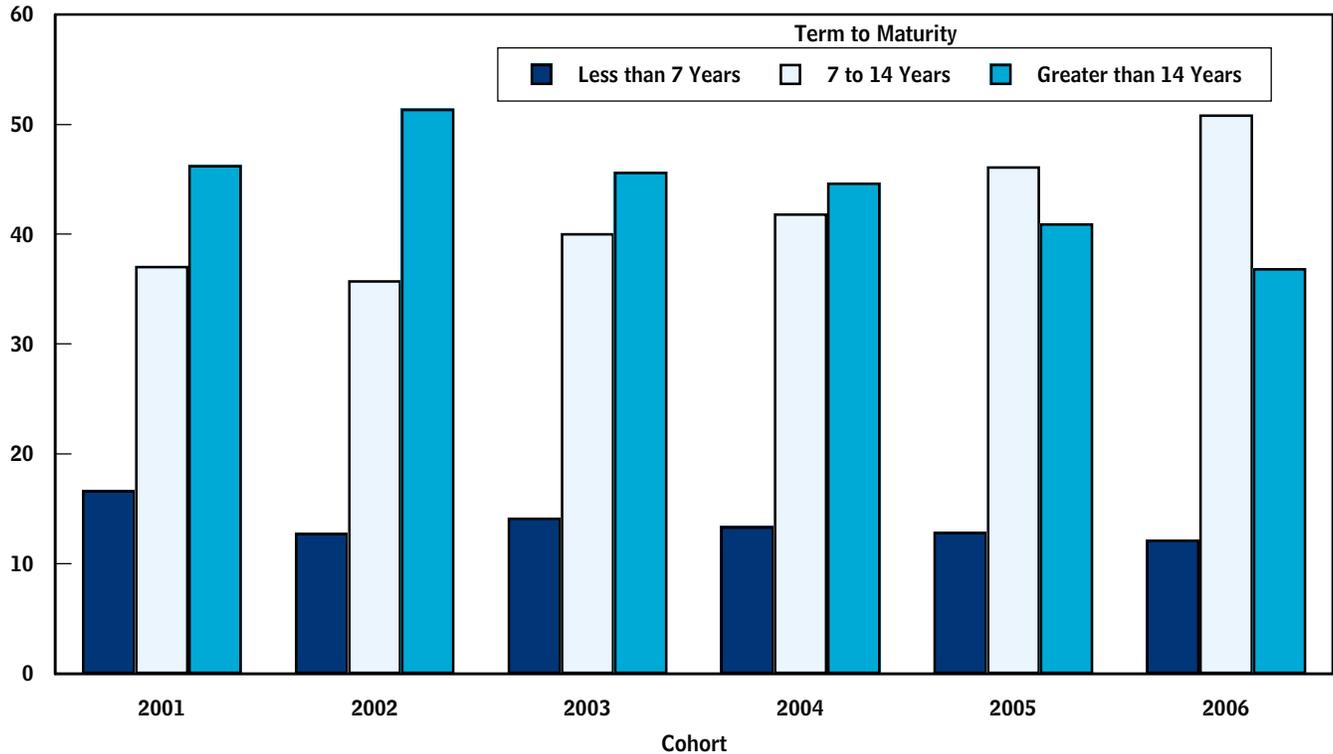
Certain payments are made by the borrower, and others are made by the lender. SBA guarantee and servicing fees are assessed on the lender, although the lender's costs are probably passed on to the borrower through higher interest rates or fees on the loan. Interest and principal are

paid by the borrower to the lender. Prepayment penalties, if applicable, are also charged to the borrower. Guarantee fees are assessed on the borrower once, at origination, whereas servicing fees are collected throughout the life of the loan. Loans backed by 7(a) guarantees also have restrictions with regard to their term to maturity, size, interest rates, and fees charged.

**Term to Maturity.** The SBA's loan programs are intended to encourage longer-term financing. Specific loan terms depend on a borrower's ability to repay, the purpose of the loan, and the useful life of any assets financed by the loan. The typical term to maturity at origination is between 7 and 10 years, but it varies with the purpose of the loan. For instance, maturities for loans for real estate and equipment may not exceed 25 years, and loans for working capital are typically for 7 years. The effective term to maturity is often much shorter, however, because many long-term loans are prepaid (that is, paid in full more than one year before the scheduled maturity). The

**Figure 2.****Annual SBA 7(a) Guaranteed Loan Disbursements by Initial Term to Maturity and Cohort, 2001 to 2006**

(Percent)



Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

high level of prepayments suggests that as a firm's financial condition improves, it is likely to be able to obtain funding on more favorable terms than those offered under the SBA's 7(a) guarantees.<sup>7</sup> Recently, the distribution of loans has shifted away from loan terms greater than 14 years in favor of loans with terms of 7 to 14 years (see Figure 2).

**Loan Size.** The maximum loan amount eligible for the traditional 7(a) program is \$2 million, and the maximum amount that may be guaranteed is \$1.5 million. For the Express program, the respective amounts are \$350,000 and \$175,000. Since 2003, loans of \$150,000 or less have made up about 25 percent of disbursements; loans of between \$150,001 and \$700,000 have fallen from

about 45 percent to 38 percent; and loans exceeding \$700,000 have increased from 30 percent to 38 percent of the portfolio (see Figure 3).

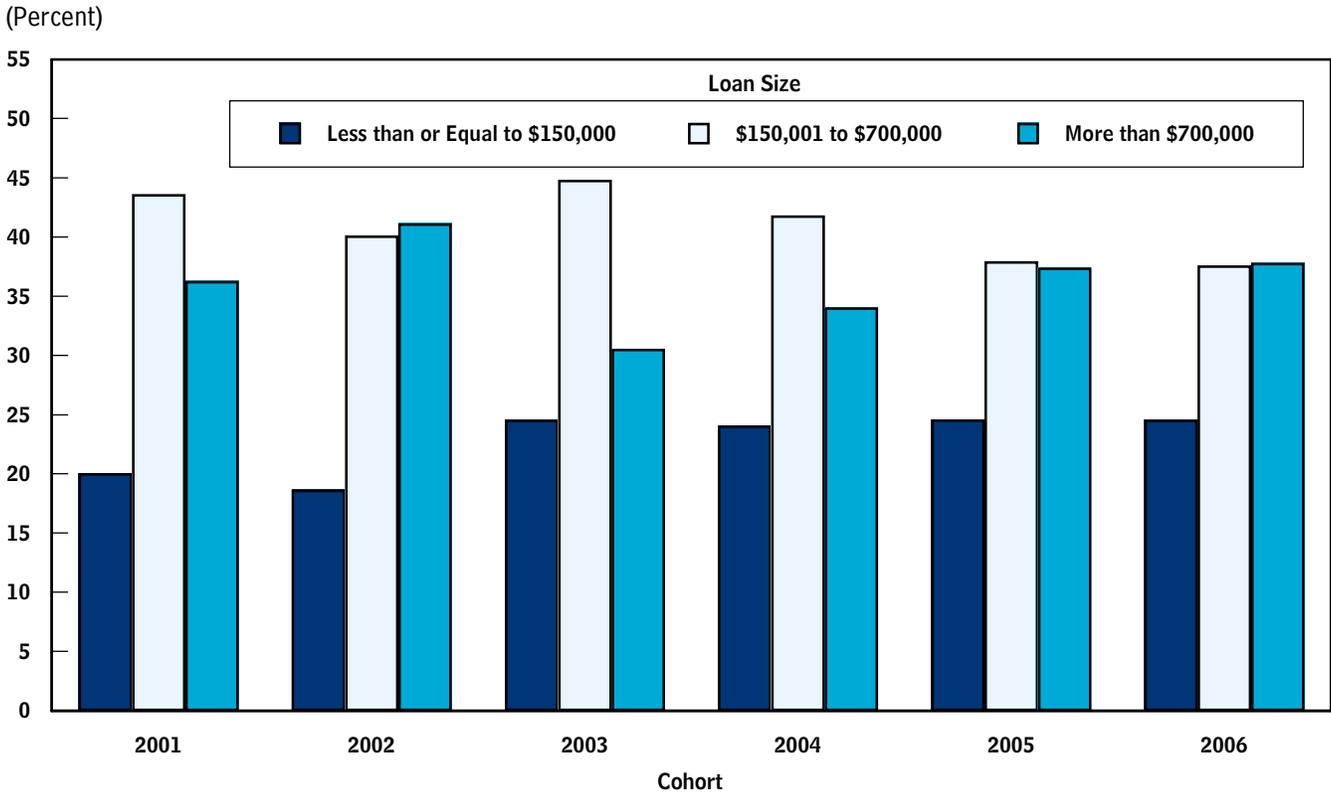
**Interest Rates.** Interest rates can be fixed or floating. In practice, about 95 percent of loans are set at a floating, or variable, rate, based on the prime rate plus a fixed spread. The prime rate, a rate that banks offer to some commercial customers, averages about 3 percentage points above rates on short-term risk-free Treasury securities. It has been unchanged at 8.25 percent since June 2006.

Although the rate on 7(a) loans is determined by mutual agreement of the borrower and lender, it is capped by maximum rate restrictions. The distribution of spreads differs between the regular 7(a) and Express programs (see Table 2) and varies with the subprogram, loan amount, and/or term to maturity. The cap on the spread ranges from 2.25 percent to 4.75 percent for the regular

7. Because most of the loans carry a floating (or variable) rate, prepayment is less affected by interest rate conditions than by changes in a firm's credit-risk status.

**Figure 3.**

**Annual SBA 7(a) Guaranteed Loan Disbursements by Size and Cohort, 2001 to 2006**



Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

7(a) program and from 4.5 percent to 6.5 percent for the Express program.

Within the 2006 cohort, the cap on the interest rate spread was binding for 15 percent of the regular 7(a) loans and 20 percent of the Express loans. The dollar-weighted average spread for the regular 7(a) program is 1.75 percent, whereas it is 3.37 percent for the Express program. That spread translates into an average borrowing rate of 10 percent and 11.62 percent for the respective programs under current market conditions. The higher average for the Express program is consistent with the greater loss rates in that program, the lower guarantee percentage, and the higher administrative costs per loaned dollar associated with smaller loans.

**Guarantee Fees.** SBA charges borrowers a one-time guarantee fee at loan origination. The guarantee fee for loans with a term of less than one year is 0.25 percent. The fee

rate for loans with a term of at least one year is determined by the loan size, but it is applied only to the guaranteed amount. For loans of \$150,000 or less, the fee is 2 percent (although the lending banks keep 25 percent of that amount);<sup>8</sup> for loans of between \$150,001 and \$700,000, the fee is 3 percent; for loans of between \$700,001 and \$1 million, the fee is 3.5 percent; and for loans in excess of \$1 million, the fee is 3.5 percent on the first \$1 million and 3.75 percent on the remaining amount.

**Servicing Fees.** SBA charges lenders an annual servicing fee of 0.545 percent on the outstanding guaranteed balance of all insured loans. The lending institution,

8. Banks were given statutory authority to retain 25 percent of the guarantee fee on loans of up to \$150,000 in an effort to encourage lenders to guarantee smaller loans. In practice, some banks return that 25 percent to the borrowers.

**Table 2.**  
**Distribution of Interest Rate Spreads over the Prime Rate for the 2006 Cohort of SBA 7(a) Loans**

(Percent)		
Spreads over Prime (Basis points)	7(a) Regular Loans	7(a) Express Loans
0 to 100	0.02	27.55
101 to 150	24.83	8.27
151 to 200	24.32	13.72
201 to 250	26.18	9.44
251 to 300	15.41	7.35
301 to 350	9.19	4.67
351 to 400	0.03	3.96
401 to 450	0.01	11.03
451 to 500	0	1.42
501 to 550	0.01	2.96
551 to 600	0	0.83
601 to 650	0	8.81
<b>Total</b>	<b>100.00</b>	<b>100.00</b>
Weighted Average Spread	1.75	3.37

Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: A basis point is one-hundredth of a percentage point.

however, is responsible for servicing loans and collecting on defaulted loans, including those sold to SBA.

**Prepayment Penalties.** Borrowers pay a prepayment penalty if all of the following conditions apply to their loan:

- The loan has a term of 15 years or more and prepayment is voluntary;
- The prepayment amount exceeds 25 percent of the outstanding loan balance; and
- The prepayment is made within three years of the loan's disbursement.

The penalty rate is applied to the amount being prepaid and is intended to recapture the annual servicing fees forgone by the lender because of the prepayment. The rates are 5 percent of the outstanding loan balance for prepayments made in the first year of the loan, 3 percent for prepayments made in the second year, and 1 percent for

those made in the third year. The high fees deter most borrowers from prepaying loans with a long term to maturity because prepayment in that case would be advantageous only if interest rates fell significantly and the business was performing well enough to obtain a more attractive rate. In practice, most borrowers that prepay do so after three years, without penalty.

**“All-In” Cost.** The all-in cost of a loan takes into account both the interest rate and associated fees. With interest rates at a spread averaging more than 2 percentage points over the prime rate since 1988 and fees ranging from 2 percent to more than 5 percent of the guaranteed amount, it appears that SBA borrowers pay an all-in cost that is higher than that on uninsured commercial loans of similar size (see Figure 4). The interest rate also exceeds the average on debt that is rated below investment grade (BB or lower), which has higher lifetime default rates and carries no guarantee. Nevertheless, the fact that small businesses appear eager to take 7(a) loans suggests that they do not have better sources of financing—which may suggest that private lenders perceive larger risks than are identified in this paper. To the extent that such larger risks exist, the subsidy costs estimated here could be understated.

### Guarantee Terms

In general, on regular 7(a) loans of \$150,000 or less, the SBA will guarantee up to 85 percent. For loans of more than \$150,000, the maximum guarantee is 75 percent. For the majority of smaller loans that are originated through the Express program, however, the maximum guaranteed amount is 50 percent. The value-weighted average guaranteed amount for 7(a) loans originated in 2006 is 68 percent.

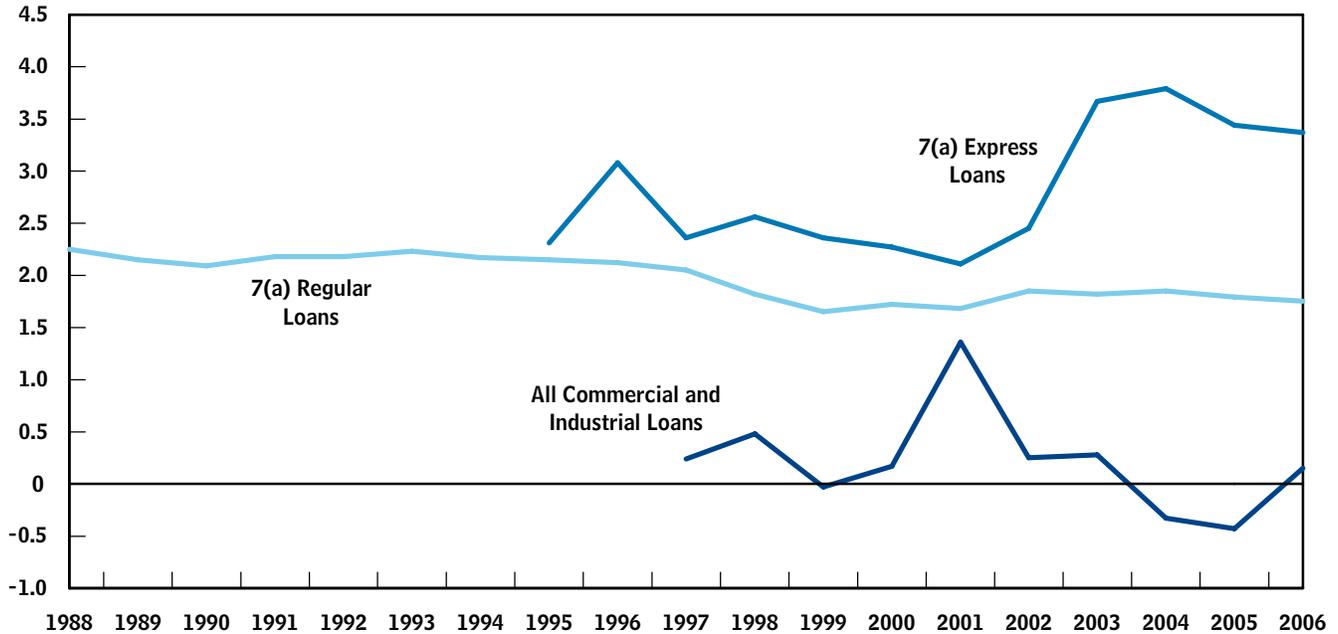
In the event that a borrower defaults, the lender has the option to receive from SBA the face value of the outstanding guaranteed balance.<sup>9</sup> Proceeds from the liquidation of a firm's assets and any subsequent recoveries are then split in proportion to the guarantee percentage. (For example, if the SBA guarantees 70 percent of the loan, it has claim to 70 percent of recoveries.)

9. Lenders can choose to retain a defaulted loan, which they sometimes do because they expect to recover more than the guaranteed amount. Such retention of nonperforming loans by SBA lenders tends to reduce reported default rates relative to the reporting standards for noninsured commercial credit.

**Figure 4.**

**Interest Rate Spreads over the Prime Rate for SBA 7(a) Loans and for All Commercial and Industrial Loans, by Cohort, 1988 to 2006**

(Percentage points)



Source: Congressional Budget Office based on data from the Small Business Administration (SBA) and the Board of Governors of the Federal Reserve System.

Note: Interest rate spreads over the prime rate for all commercial and industrial loans are for loans made by commercial banks in amounts between \$100,000 and \$999,999.

In the Express program, unlike regular 7(a) loans, a borrower’s assets are generally liquidated upon default and before lenders submit the loan to SBA. The lender receives all proceeds from liquidation of the borrower’s assets, and any subsequent recoveries after the lender submits the loan to SBA are split between SBA and the lender according to the guarantee percentage.

For example, assume that a borrower who has a loan with a \$100,000 balance and a 50 percent guarantee defaults and that the borrower’s assets are worth \$60,000. In the regular 7(a) program, the lender submits the defaulted loan to SBA and receives \$50,000 (the guaranteed portion of the loan balance). When the borrower’s assets are later liquidated, the lender and SBA each receive 50 percent of the assets, or \$30,000. The net loss to SBA is \$20,000 (the \$50,000 payment to the lender minus the \$30,000 recovered from the borrower’s assets), and the net loss to the lender is also \$20,000 (the \$100,000 loan

balance minus the \$50,000 received from SBA and the \$30,000 recovered from the borrower’s assets).

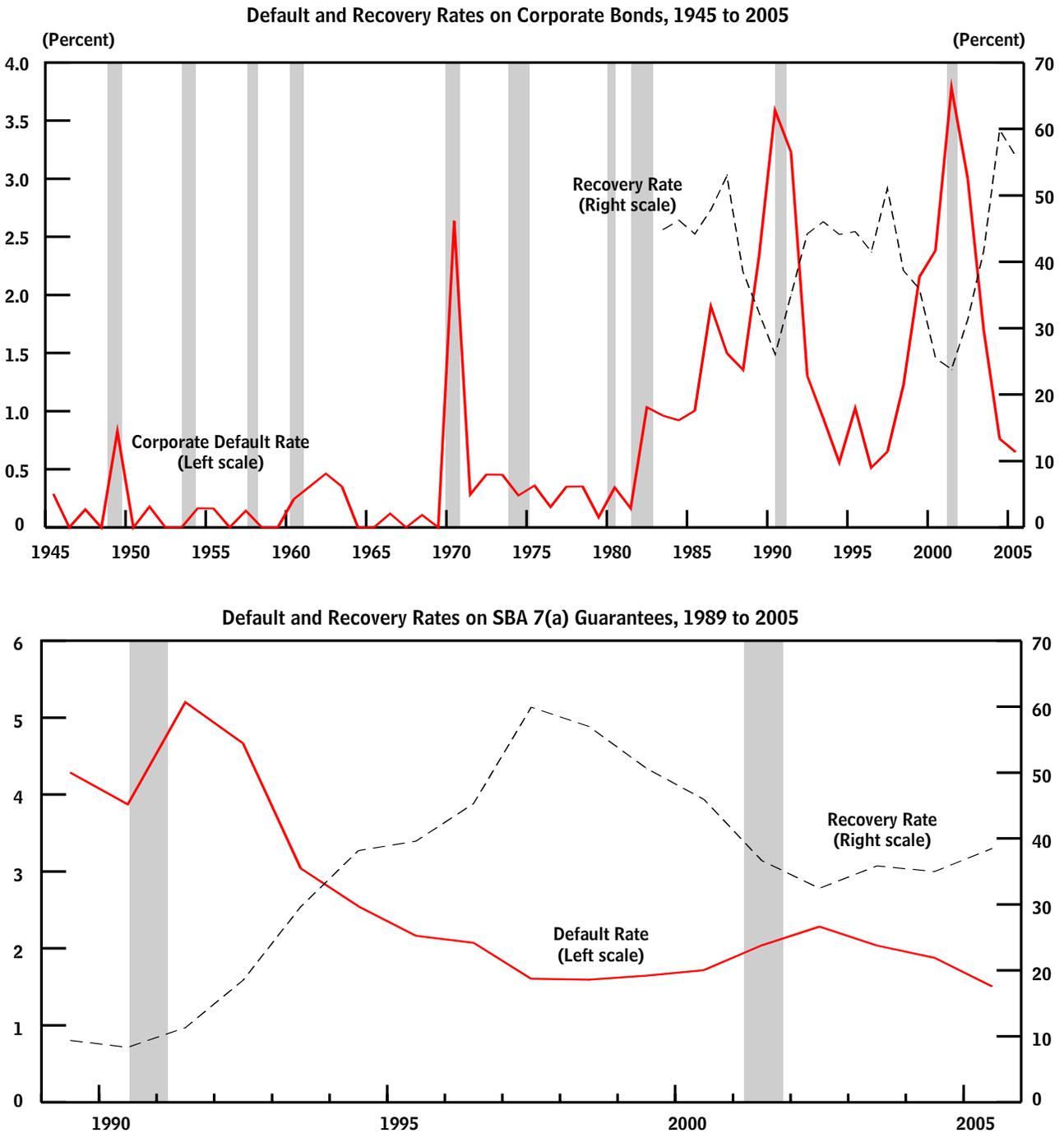
If the loan was made through the Express program, the lender liquidates the borrower’s assets (worth \$60,000) and then submits the remaining loan balance of \$40,000 to SBA. The lender then receives \$20,000 (the guaranteed portion of the loan balance) from SBA. The net loss to SBA is \$20,000, and the net loss to the lender is also \$20,000. If an additional \$1,000 is later recovered, the lender and SBA would each receive \$500.<sup>10</sup>

In both programs, the SBA eventually bears the same net loss. In the regular 7(a) program, however, the payments from SBA to the lender occur earlier than they do in the

10. Although the borrower’s assets are liquidated upon default in the Express program, the borrower may still be responsible for the excess of the loan balance over the value of the collateral unless he or she has been formally released from that debt.

**Figure 5.**

**Default and Recovery Rates**



Source: Congressional Budget Office based on data from Moody's Investors Service and the National Bureau of Economic Research (for rates on corporate bonds) and the Small Business Administration (for rates on 7(a) guarantees).

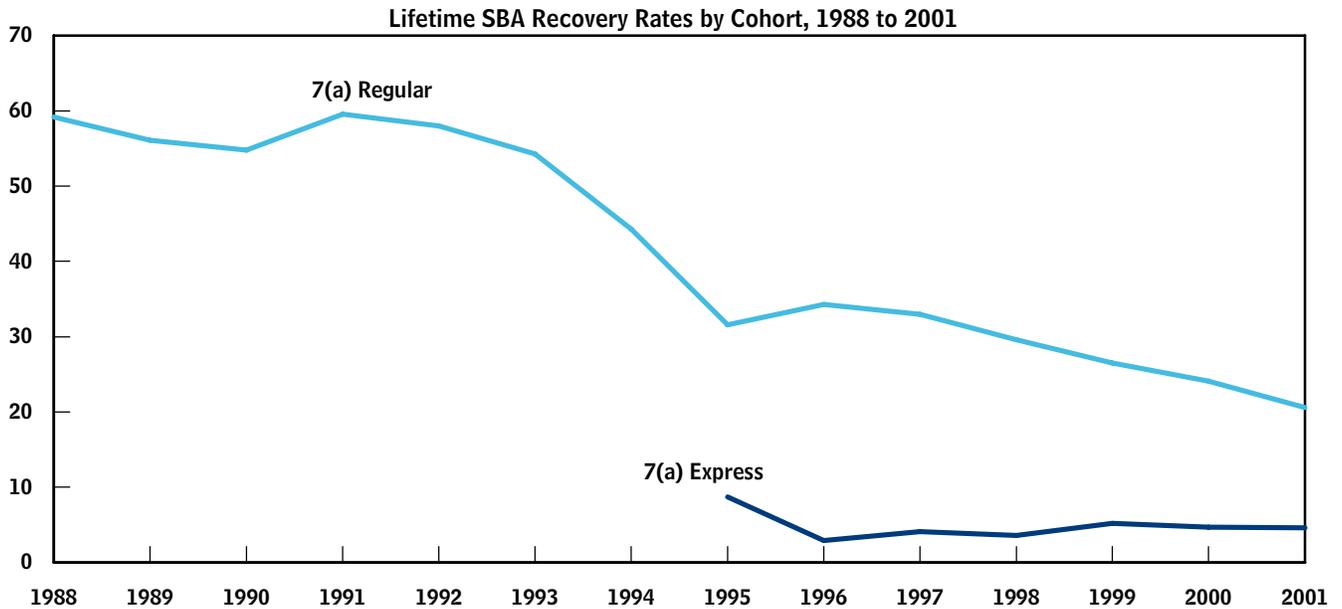
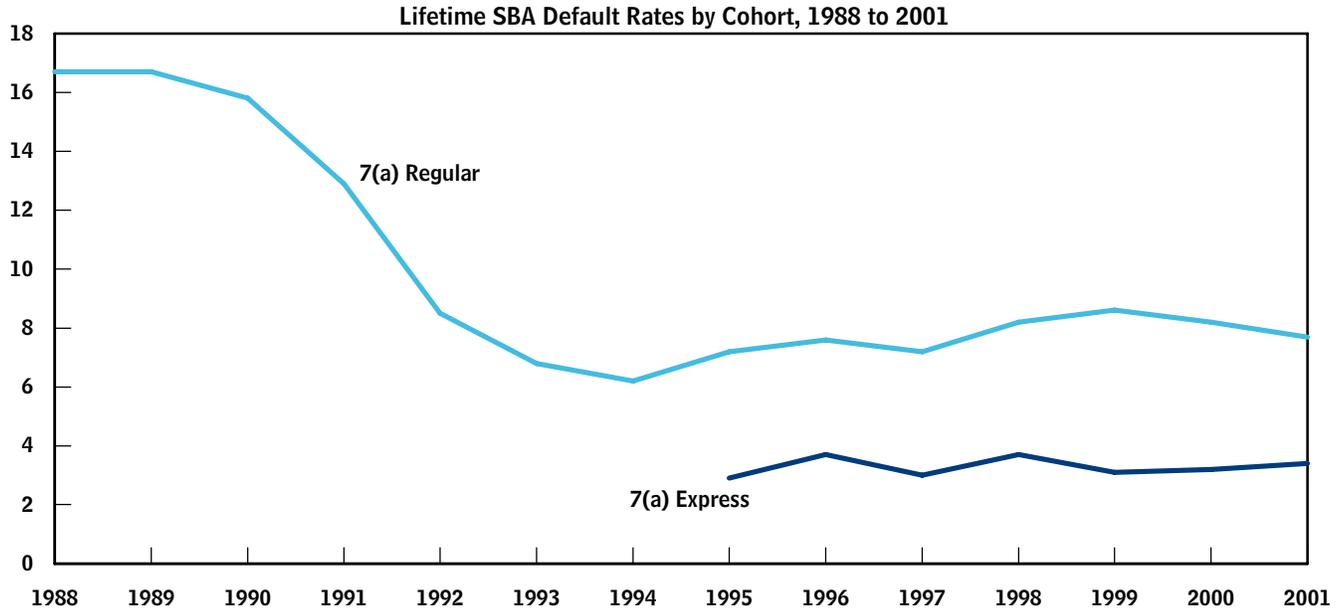
Notes: The default rate on corporate bonds is the frequency of missed scheduled payments as a percentage of the number of rated U.S. and foreign corporate debt securities with scheduled payments. The recovery rate is the amount recovered (proxied by trading prices following default) as a percentage of the amount defaulted on by rated U.S. and foreign corporate debt securities.

The default rate on 7(a) guarantees measures the claims paid by SBA as a percentage of the balance of loans outstanding. The recovery rate is dollars recovered as a percentage of claims paid by SBA.

The shaded vertical bars indicate periods of recession. (A recession extends from the peak of a business cycle to its trough.)

**Figure 6.**  
**Lifetime SBA Default and Recovery Rates**

(Percent)

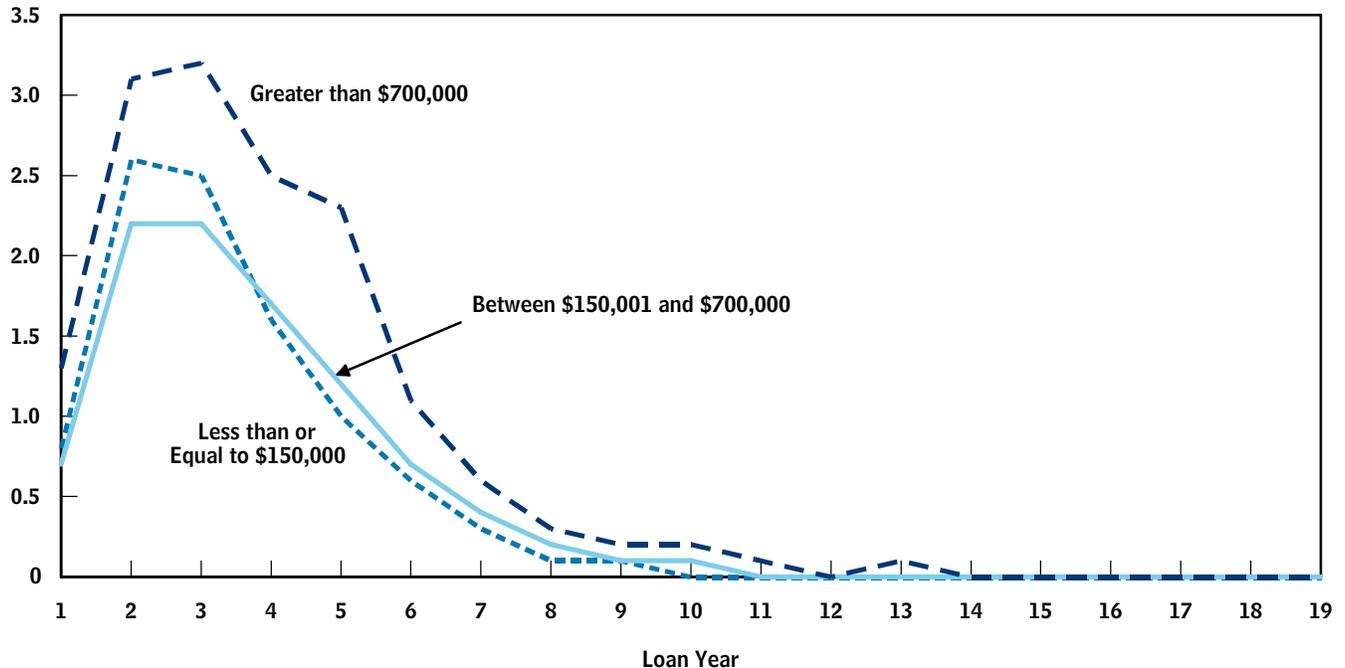


Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: For a given cohort, the lifetime default rate measures the claims paid by SBA as a percentage of the total loan volume. The lifetime recovery rate is dollars recovered as a percentage of claims paid by SBA, also by cohort.

**Figure 7.****Annual Default Rate for SBA 7(a) Loans by Size**

(Percent)



Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: The annual default rate measures the average claim paid by SBA each year over the life of the loan as a percentage of the total loan volume.

Express program, and SBA's recoveries from a borrower's assets may occur over several years. Given that difference in the present value of payments and recoveries, the net loss to SBA for an identical loan is greater in the regular program than in the Express program.

### Past Performance of 7(a) Loans

Default and recovery experience in all credit markets varies widely over time and with economic conditions. Loss rates from defaults net of recoveries on lower-rated debt, including SBA loans whose default experience is similar to that of BB-rated bonds, are especially volatile over time. Corporate default rates tend to be high when business-cycle conditions are poor (see the top panel of Figure 5 on page 9). Data on historical recovery rates are more limited but suggest that recoveries are also cyclical. For instance, the two periods since 1989 when default rates peaked and recovery rates bottomed out correspond to the recessions of 1991 and 2001. For SBA's 7(a) loans, the default rate peaked and the recovery rate<sup>11</sup> bottomed out a few months after the latest recession ended (see the

bottom panel of Figure 5 on page 9). That pattern may indicate that lenders wait a short period of time before submitting defaulted loans to SBA for payment.

In SBA's regular 7(a) program, default rates have remained fairly flat in recent years while recovery rates have fallen over time (see Figure 6 on page 10).<sup>12</sup> In the

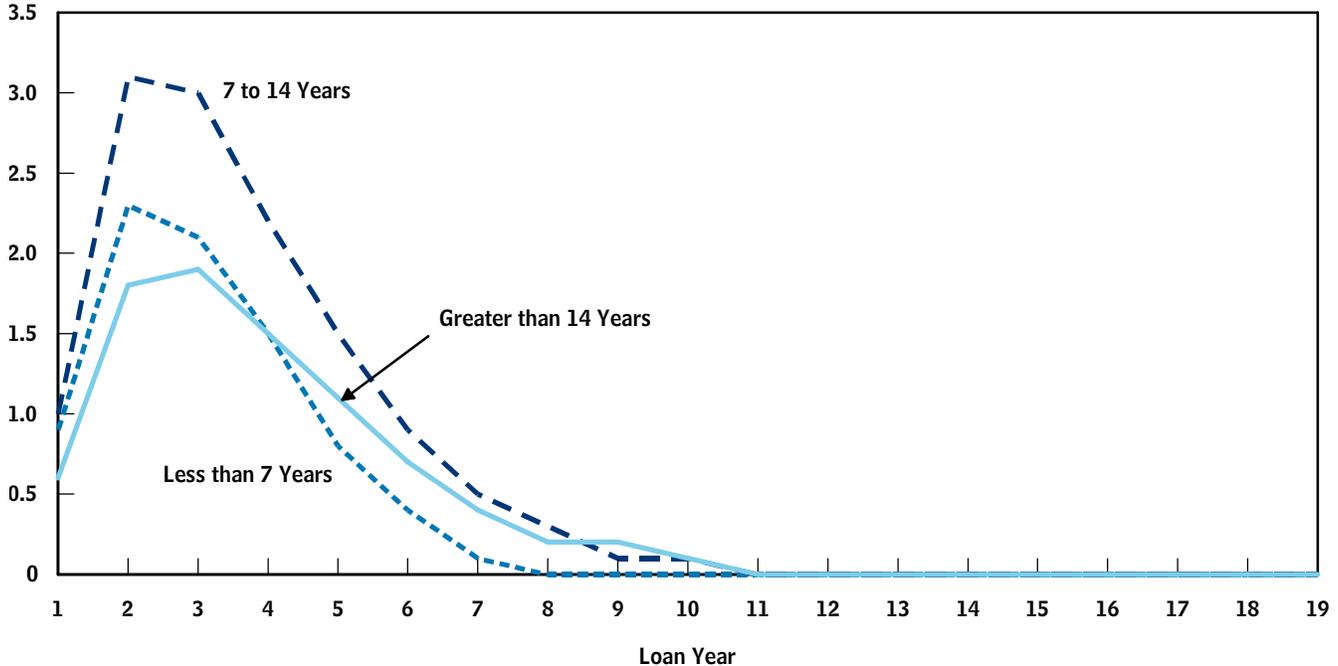
11. The calculation of the recovery rate from 1988 to 1991 is not as robust as in other years because of a lack of reliable data prior to 1988.

12. Because recoveries are often spread over five years following loan defaults, recovery rates for cohorts later than 2001 are not good indicators of lifetime rates for recent originations. Hence, Figure 6 excludes cohorts more recent than 2001.

The recent decline in the recovery rate for the regular 7(a) program may be partially explained by the existence of the Low Documentation Loan Program (LowDoc) from 1994 to 2005. That program required minimal documentation and relied on the character and credit history of the borrower and the experience and judgment of the lender. That program was identified as costly for SBA and terminated in 2005.

**Figure 8.****Annual Default Rate for SBA 7(a) Loans by Term to Maturity**

(Percent)



Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: The annual default rate measures the average claim paid by SBA each year over the life of the loan as a percentage of the total loan volume.

Express program, default and recovery rates are lower than they are in the regular program. (The recovery rate in the Express program is near zero because that program is structured so that the lender submits a defaulted loan to SBA only after it receives all proceeds from liquidation of a borrower's assets.)

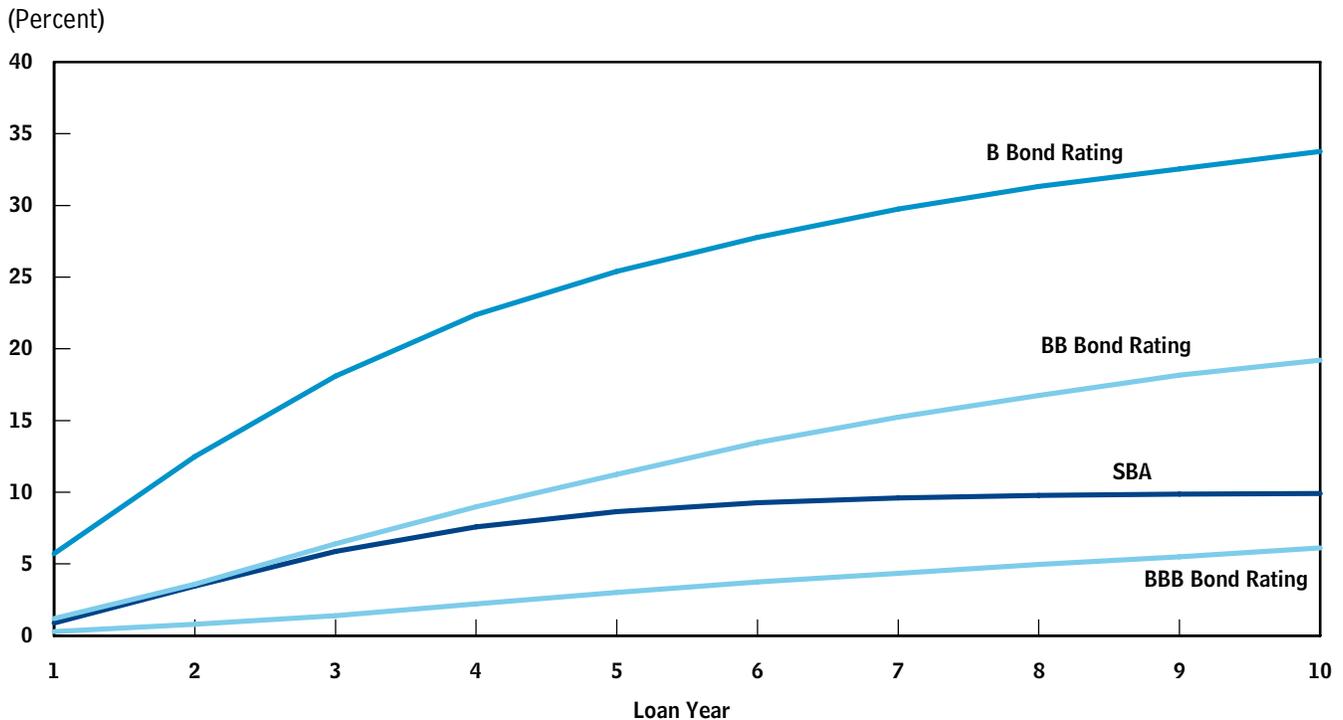
Default experience also varies with a loan's characteristics. Larger loans have higher default rates than small- and medium-sized loans (see Figure 7 on page 11), and loans with original maturities of between 7 and 14 years default more frequently than those with shorter and longer maturities (see Figure 8). Defaults are most prevalent in the second and third years of a loan's life and approach zero thereafter as the loan balance amortizes.

Several considerations suggest that SBA-backed loans would be expected to default more often than small-business loans generally. Eligibility restrictions exclude the highest quality small-business borrowers from SBA-guaranteed loans because those borrowers can obtain rea-

sonable terms without a guarantee. Further, SBA guarantees are provided to a disproportionately large percentage of new firms, which tend to fail at higher rates than similar but established firms. Prior research finds that SBA loans are concentrated in the high-risk segment of the loan market but that the overall performance of SBA loans has been in many respects similar to that of other loans held by large commercial banks.<sup>13</sup>

Overall, the performance of SBA loans appears similar to the performance of corporate bonds rated BB by Standard & Poor's, with an upgrade to BBB after three years. Default rates on SBA loans vary systematically with age, with higher default rates in the first few years after origination and low default rates thereafter. Comparing the pattern of cumulative SBA default rates with those on

13. See Dennis Glennon and Peter Nigro, "Measuring the Default Risk of Small Business Loans: A Survival Analysis Approach," *Journal of Money, Credit, and Banking*, vol. 37, no. 5 (October 2005).

**Figure 9.****Cumulative Default Rates on SBA 7(a) Loans and on S&P Corporate Bonds**

Source: Congressional Budget Office based on data from the Small Business Administration (SBA) and Standard & Poor's.

Note: The default rate is the number of defaulted loans as a percentage of the total number of loans in SBA's portfolio or the number of corporate bond issuances for each rating class as determined by Standard & Poor's.

various corporate bond ratings confirms the similarity to BB-rated bonds for the first few years (see Figure 9). It also reveals the much faster decrease in the incidence of default on SBA-guaranteed loans than on BB-rated corporate bonds after the third year.

SBA loans carry interest rates that are higher than those set for other commercial and industrial bank loans, on average. Some borrowers, therefore, choose to prepay those loans as soon as they can do so without penalty (at least three years after disbursement on loans of 15 years or more and any time on shorter loans; see Figure 10).<sup>14</sup> Prepayment has two partially offsetting effects on the cost to the government. Prepayment decreases the government's risk exposure to subsequent default, but it also reduces earnings from the annual servicing fees collected. To the extent that low-risk borrowers are more likely to

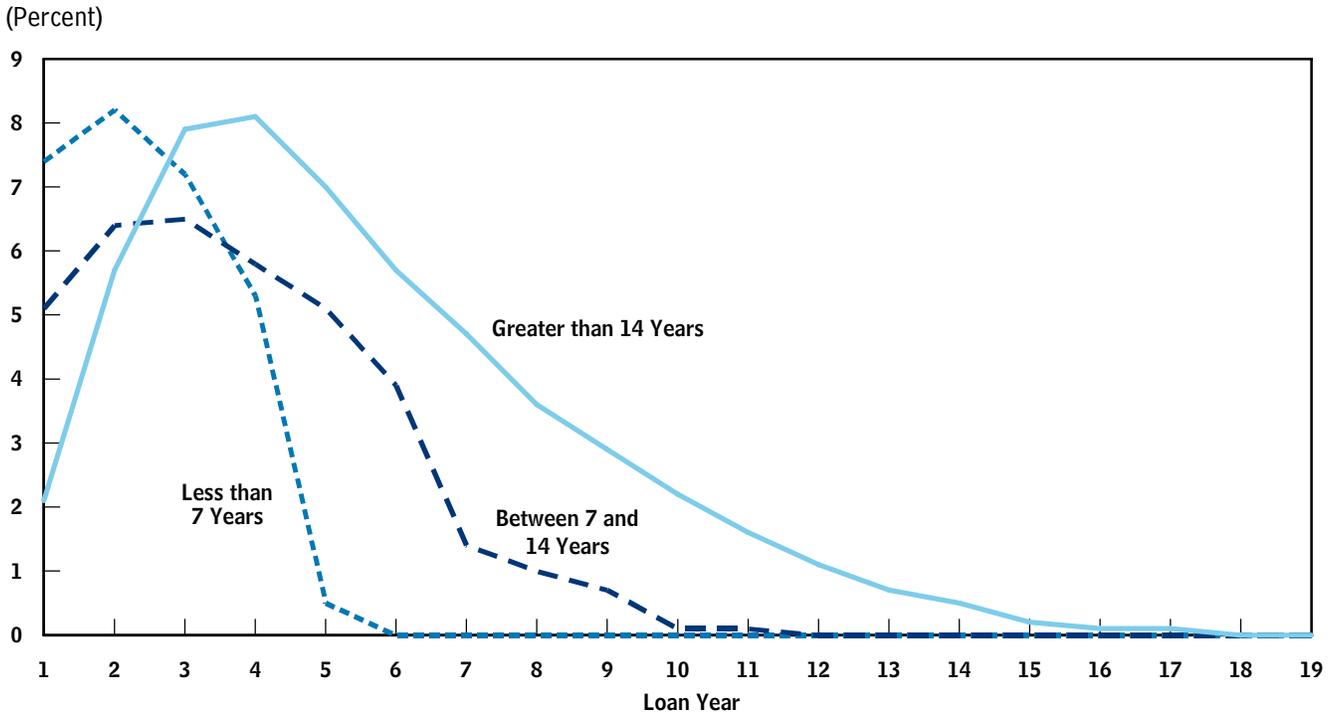
prepay to obtain better financing elsewhere, the net effect may be to increase the government's costs.

The availability and pricing of credit to small businesses varies over time with the risk attitudes of lenders and perceptions of default risk. In recent years, high-risk borrowers have had greater access to credit. Lenders have increased their reliance on automated risk assessment using credit scoring (commonly measured by Fair Isaac & Co.'s FICO score), which streamlines the loan-approval process. Most SBA 7(a) loan guarantees are for floating-rate loans, where the mutual agreement between the borrower and the lender determines a fixed-rate spread (subject to maximum limits set by SBA) over the prime rate. The average spread reflects lenders' perception about the quality of SBA-backed loans and general credit-market conditions. Following the 2001 Russian debt crisis, spreads charged on Express loans widened sharply along with spreads in other credit markets, while the spreads charged on traditional 7(a) loans remained flat. Although bank and other credit spreads quickly fell back to lower

14. The prepayment rate is the number of loans that are prepaid as a percentage of the total number of loans.

**Figure 10.**

**Annual Prepayment Rate for SBA 7(a) Loans by Term to Maturity**



Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: The prepayment rate is the frequency of full prepayments each year over the life of the loan as a percentage of the number of loans.

levels, the spreads on Express loans have remained at historical highs since that time (see Figure 4 on page 8).<sup>15</sup>

**Current Budget Estimates**

In the federal budget, SBA's programs are discretionary. They require legislation each year to establish a dollar-volume limit for each program and an appropriation for estimated subsidy costs. Subsidy costs are the discounted value of the government's projected net cash flows from guaranteed loan commitments in a fiscal year. Guarantee and other fees received by the government are credited against expected losses in the subsidy estimates.

Administrative expenses are subject to separate appropriations and are recorded each year as they are paid rather than up front as loans are originated. The 7(a) program is inexpensive for the SBA to administer because lenders bear the responsibility and costs for loan origination, ser-

vic-ing, and collection on defaulted loans (including those sold to SBA). The SBA incurs expenses only for processing guarantee applications and for some transactions associated with defaulted loans. This analysis, as is the case with FCRA estimates, excludes administrative costs.

The original subsidy rate reported in the budget for a particular cohort of 7(a) loans varies, although it has been at or near zero for the past few years (see Table 3). The subsidy rate is reestimated each year using actual cash flows through the current budget year and updated projections about future defaults, recoveries, and fees for those loans. The reestimates for the 7(a) program in recent years have differed only slightly from the original subsidy estimates.

**Alternative Budget Estimates with More Recent Recovery Rates**

Current budget estimates assume a recovery rate reflecting SBA's experience from 1988 to 2006 for all 7(a) loans. An alternative estimate uses recovery rates since 1995. That more recent experience may be a better indicator of

15. Spreads in the SBA guaranteed market have been little affected by the recent turmoil in the subprime mortgage market.

**Table 3.**  
**SBA 7(a) Program Subsidy Rates**  
**Recorded in the Federal Budget**

(Percent)

Cohort	Original Subsidy Rate	Reestimated Subsidy Rate
2002	1.07	-0.16
2003	1.04	0.64
2004	0.78	0.36
2005	0	-0.01
2006	0	-0.08
2007	0.01	n.a.

Source: Congressional Budget Office based on data from the *Budget of the United States Government, Fiscal Year 2008: Federal Credit Supplement*.

Notes: The original subsidy rate for each cohort is calculated at the time of loan origination or commitment. The reestimated subsidy rate may be calculated during the life of a cohort and reflects actual cash flows that have occurred prior to the reestimate.

n.a. = not available.

future performance because of substantial program changes that appear to have affected recoveries in recent years (see the bottom panel of Figure 6 on page 10).

Under this alternative, CBO uses separate recovery rate estimates for the two programs: 30 percent for the regular 7(a) program and 5 percent for the Express program (see the appendix for details). The weighted average of those recovery rates is lower than the rates that OMB and SBA currently assume. For new guarantees originated in 2006, the alternative recovery rates result in a total 7(a) subsidy estimate of 0.2 percent, which is very close to the budget's estimate of a subsidy cost of zero.

**Private-Sector Discount Rates**

FCRA estimates include the cost of expected losses from defaults, using risk-free Treasury rates to discount federal cash flows. Private-sector discount rates applied to those cash flows, however, would also take risk into account.

If markets were indifferent as to whether losses in any particular year were above or below the expected value, the private-sector discount rate would probably be close to the Treasury rate. But losses on federal credit guarantees are more likely to occur in years when prices for most

other assets are low, such as during recessions. Investors place more weight on losses in such years than on those that might occur when prices for other assets were high and thus require additional compensation for taking on those risks. As a result, private-market participants would apply a higher discount rate to those cash flows.

Using such private-sector discount rates, the estimated subsidy value of SBA 7(a) guarantees is 1 percent. As of September 2006, the present value of future net costs for the outstanding 7(a) portfolio was about \$687 million.

The present value of future cash flows is calculated using an options-pricing model. Options-pricing methods are applicable to loan guarantees because a loan guarantee is a “put option”—a contract that gives the holder the right (though not the obligation) to sell specified assets for a predetermined price, no matter how much they turn out to be worth. Under the 7(a) program, the lender is the holder of the put option, whereas SBA, as the guarantor, is the writer of the option. That is, the lender can “sell” (put) collateral assets recovered from the defaulting firm to the guarantor at a price equal to the unpaid guaranteed balance on the loan. Indeed, the relationship between the value of collateral assets and debt is a key factor affecting the likelihood and expected cost of default. When the value of the assets is substantially above the amount owed, the borrower will refinance or sell the assets and pay off the debt rather than default on the loan obligation. But when the value of the assets is less than the unpaid balance, the borrower no longer has the opportunity to refinance or to liquidate the assets and repay the loan obligation. In that case, default is more likely. If default occurs, SBA pays the amount due to the lender, receives its share of collateral assets and future recoveries, and takes a loss equal to the difference between the promised loan payments and the residual value of the assets.

CBO's estimation model first projects the distribution of future cash flows (loan defaults net of recoveries and fee income) over the maximum life of the guarantee. Those cash flows are used for all estimates reported in this paper—those based on the budget rules using risk-free Treasury rates as well as those based on private-sector discount rates. The options-pricing model then calculates the present value of those flows using the same methods that market participants use to price financial flows of similar risk. (The appendix provides additional details about the model.)

For an individual loan, the probability, timing, and severity of default are assumed to depend on a few key parameters: the initial ratio of a firm's assets to its liabilities; the volatility and average growth rate of those assets and liabilities; the rules for triggering default and prepayment; and the rule determining recoveries. SBA's losses further depend on the agency's share of the total loss. Parameters are chosen so that forward-looking estimates match historical SBA default and recovery patterns and also to be consistent with the historical experience on BB-rated debt, adjusted for the lower default rate on SBA-backed loans after three years of loan amortization.

The distribution of future cash flows in the guarantee program then determines the effective private-sector discount rate for guarantee payments.<sup>16</sup> Each year, the value of assets held by an SBA-guaranteed borrower is changed by a random variable that has a common market component and a firm-specific (or idiosyncratic) component. The size of the market component, assumed to be common to all the loans, is determined from an analysis of the S&P SmallCap 600 index in the Compustat database.<sup>17</sup> The change in asset value relative to the loan balance determines whether the borrower defaults on the loan (if assets are worth significantly less than guaranteed debt, the borrower defaults) and the corresponding cash flows to the SBA. (See the appendix for more details.)

To estimate the distribution of future losses for SBA's entire portfolio of loans, CBO simulates many paths—consistent with historical experience—of possible default losses on individual loans.<sup>18</sup> Information from SBA enables CBO to specify the initial distribution of loan sizes, guaranteed percentages, loan ages, prepayment propensity, and risk categories. Loan balances decline over time with normal amortization, prepayments, and defaults. Each year, a common market shock and firm-

specific shock are realized and used to adjust each borrower's asset value. If that value falls below the level that triggers default, the corresponding loss is recorded and the loan is removed from the SBA's portfolio. Prepayments also trigger a reduction in loan balances and, hence, in SBA's exposure. Subsidy rates are calculated on the basis of the average present value of losses for a large number of simulations.

## Subsidy Estimates and Sensitivities

Estimated subsidy rates are especially sensitive to assumptions about default and recovery rates, which vary significantly over time and with ups and downs in the business cycle. To examine the effect of changes in market conditions, the subsidy rates are reestimated under two different scenarios: one in which the cumulative lifetime default rate is 20 percent lower or higher than its base-case value, and one in which the recovery rate is 50 percent lower or higher. The results show considerable sensitivity to those assumptions (see Table 4). Persistent strong performance of the U.S. economy might be considered consistent with the scenario of a 20 percent lower default rate and a 50 percent higher recovery rate. Calculated using the alternative budget estimates, that scenario has a subsidy rate of -1.1 percent, or -\$132 million; using private-sector discount rates, the figure is -0.6 percent, or -\$72 million. If economic conditions worsened, the market-value subsidy cost could turn out to be closer to the 2.7 percent estimated for the high-default, low-recovery scenario, or \$324 million for the cohort of 2006 originations.

Loans originated under the Express program have a greater subsidy cost than do those originated under the regular 7(a) program. Specifically, the subsidy rate using private-sector discount rates for the regular 7(a) program is 0.6 percent, compared with an estimated 2.1 percent for the Express program (see Table 5). The difference in the estimated subsidies between the two programs is larger when calculated using the alternative budget estimates: The subsidy rate is -0.3 percent for the regular program and 1.6 percent for the Express program.<sup>19</sup>

16. This approach produces a lower estimate of private-sector cost than would be found using private-sector discount rates directly. The difference is that the options-pricing approach incorporates a charge for market risk but not for other factors affecting spreads (such as a liquidity premium and tax effects).

17. The Compustat database is a standard source for financial and operating data on publicly traded companies.

18. The analysis uses Monte Carlo simulation, the inputs to which are described in the appendix to this report. For a related analysis, see Congressional Budget Office, *The Risk Exposure of the Pension Benefit Guaranty Corporation* (September 2005).

19. The budget does not report individual subsidy rates for the regular 7(a) and Express programs. CBO estimates a subsidy rate of 1 percent for the regular program and -0.5 percent for the Express program using the budget's recovery rate assumption.

**Table 4.**  
**Estimated Subsidy Rates for the SBA 7(a) Program**

(Percent)

	Recoveries Decrease by 50%	Base Case	Recoveries Increase by 50%
<b>Subsidy Estimates Using Market Valuation</b>			
Default Losses Decrease by 20%	0.4	-0.1	-0.6
Base Case	1.6	1.0	0.3
Default Losses Increase by 20%	2.7	1.9	1.2
<b>Subsidy Estimates Using FCRA Rules with Lower Recovery Rate</b>			
Default Losses Decrease by 20%	-0.2	-0.6	-1.1
Base Case	0.8	0.2	-0.3
Default Losses Increase by 20%	1.6	1.0	0.4

Source: Congressional Budget Office.

Notes: The subsidy rate is the estimated subsidy cost as a percentage of total loan volume.

FCRA = Federal Credit Reform Act of 1990.

The estimated subsidy rates also reveal considerable cross-subsidization among various loan maturities and loan amounts (see Table 5). The estimated subsidy rate for loans with a term to maturity of between 7 and 14 years is at least three times as large as the rate for loans with a term of less than 7 years. Additionally, loan terms of at least 15 years have a negative subsidy rate, primarily resulting from the collection of servicing fees over a longer period. Loans of \$150,000 or less have a greater subsidy than larger loans, and the largest loans again generate a negative subsidy rate.

Following standard budget practice, the subsidy rates reported in this analysis are expressed in terms of net losses as a percentage of total funds borrowed. That measure is informative about the cost of the guarantee relative to the total borrowing capacity provided by the program, but it does not directly address the government's financial exposure. An alternative would be to report the subsidy as a percentage of guaranteed loan volume—that is, expected losses as a percentage of the dollars the government has at risk. Because the SBA guarantees only a portion of the total loan volume, expected losses as a percentage of that smaller base would be considerably higher.<sup>20</sup>

**Value and Risk of SBA's Portfolio**

In addition to the budget's measure of the expected cost to the government of SBA's loan guarantees by cohort, this analysis estimates expected losses for the entire portfolio of outstanding SBA loan guarantees. That is, at any

point, the government is responsible for losses on all guaranteed loans that have not defaulted or been repaid, without regard to the year in which those loans originated. At the end of 2006, CBO estimates, the present value of expected losses over the remaining life of the portfolio of 7(a) guarantees was \$271 million under the FCRA rules with SBA's recovery rate assumption. That estimate excludes guarantee fees, servicing fees, and default losses that have already occurred and corresponds to SBA's liability for 7(a) guarantees as of year-end 2006. If the portfolio is valued under FCRA rules with a lower recovery rate, the implied cost over the remaining life is \$462 million. Using private-sector discount rates, CBO estimates that the market-value cost of the remaining life of the SBA portfolio of 7(a) loan guarantees is \$687 million.

To estimate the cost of the existing portfolio, outstanding loan values are simulated forward, taking into account for each loan the current principal value, the initial and remaining maturity, and other loan terms. As for the subsidy estimates, default and prepayment are stochastic, and

20. The alternative calculation can be approximated as a 100 percent increase in the estimated subsidy rate for the Express program and a 30 percent increase in the estimated subsidy rate for the regular 7(a) program. Those results are consistent with the 50 percent guarantee in the Express program and the value-weighted average 68 percent guarantee for the regular 7(a) program.

**Table 5.**  
**SBA 7(a) Subsidy Rates by Subprogram**

(Percent)

	Market Valuation			FCRA Rules with Lower Recovery Rate		
	Regular	Express	Total	Regular	Express	Total
Term to Maturity						
Less than 7 years	0.3	0.8	0.7	0	0.6	0.5
7 to 14 years	2.2	2.9	2.4	1.1	2.3	1.5
More than 14 years	-0.9	0	-0.9	-1.7	-0.4	-1.6
Loan Amount						
Less than or equal to \$150,000	1.2	2.2	2.1	0.9	1.7	1.7
\$150,001 to \$700,000	1.3	0.3	1.3	0.4	-0.2	0.4
More than \$700,000	-0.9	n.a.	-0.9	-1.7	n.a.	-1.7
Credit Status						
Low risk	0.5	1.9	0.9	-0.3	1.5	0.1
Moderate risk	0.5	2.2	1.0	-0.3	1.7	0.3
High risk	0.5	2.2	1.1	-0.4	1.7	0.3
Not available	0.6	2.1	1.0	-0.3	1.6	0.2
<b>Total</b>	<b>0.6</b>	<b>2.1</b>	<b>1.0</b>	<b>-0.3</b>	<b>1.6</b>	<b>0.2</b>

Source: Congressional Budget Office.

Note: FCRA = Federal Credit Reform Act of 1990; n.a. = not applicable.

the estimated cost is based on average payouts net of fees across many simulations.

The uncertainty about future default and recovery rates suggests that realized costs could be much more—or much less—than the present-value cost. For example, using private-sector discount rates, the expected five-year loss is \$598 million on a market-value basis. But there is a 25 percent chance that five-year losses could be less than \$92 million and a 25 percent chance that those losses could exceed \$1 billion (see Figure 11).

### Loan Profitability

SBA loans seem to be quite profitable to lenders, based on the costs CBO has been able to identify, but that conclusion may simply mean that there are additional costs CBO has not been able to isolate. After accounting for identified sources of risk, profit margins seem to be about 2.5 percent on Express loans and 1.3 percent on regular 7(a) loans (both at floating interest rates).<sup>21</sup> Those margins may reflect higher expected default losses than CBO

assumes, limited competition in the 7(a) loan market, or the presence of other costs that have not been identified in this analysis. (Identified costs include the lender's cost of funds, servicing and other ongoing administrative costs, and fees paid to the SBA.)

A lender's cost of funds differs for the insured and uninsured portions of a loan. The insured portion is nearly free of default risk, but its funding costs are at about LIBOR<sup>22</sup> plus 20 basis points (or 70 basis points over Treasury rates). On the uninsured portion, default experience suggests funding costs similar to those on loans rated between BB and BBB. Based on historical BB rate spreads, the gross funding rate on the risky portion is roughly the Treasury rate plus 3.5 percentage points. Of that amount, expected losses based on default experience account for no more than 1.25 percentage points of the spread, leaving 2.25 percentage points as a risk and liquidity premium. The overall cost of funding is higher

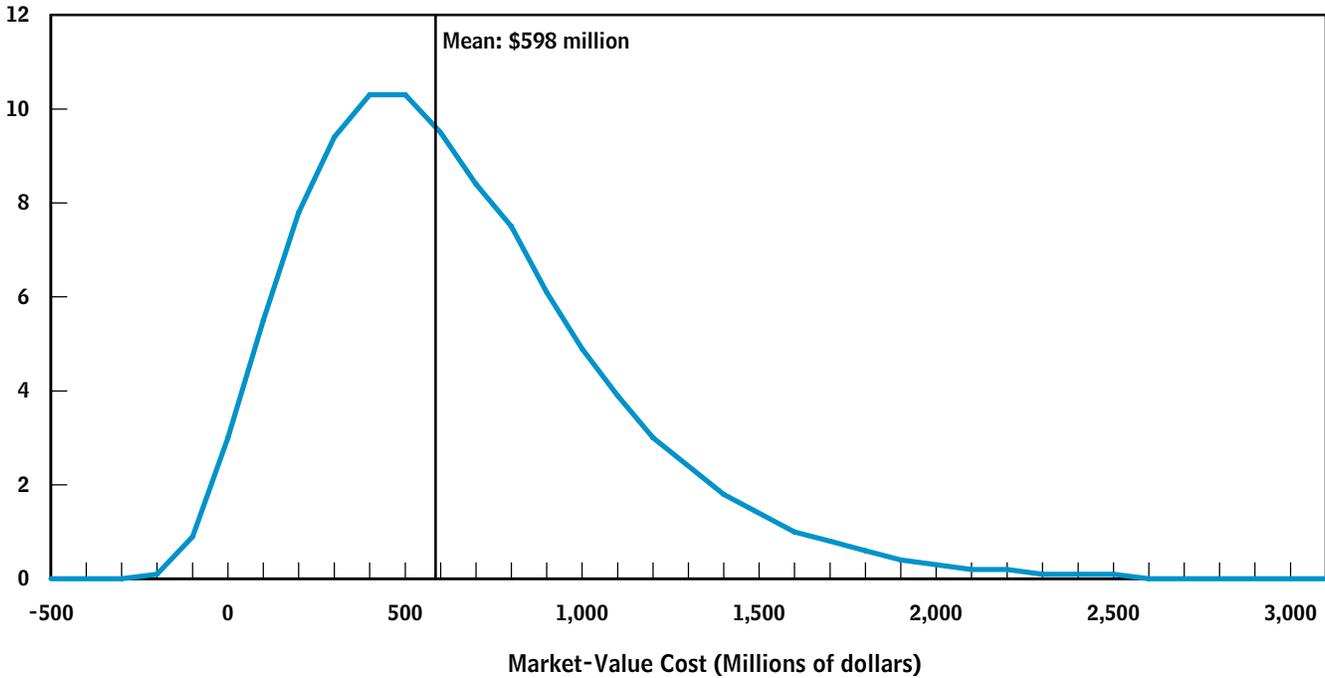
21. Ninety-five percent of 7(a) loans carry a floating rate.

22. LIBOR, the London Interbank Offered Rate, is the rate that banks charge each other for loans (typically in eurodollars). LIBOR is currently 5.5 percent.

**Figure 11.**

**Distribution of Future Five-Year Net Losses for SBA's Current 7(a) Portfolio**

(Percent)



Source: Congressional Budget Office.

for the Express program because of its lower guarantee percentage.

For each program, the overall cost of funds is found by taking a weighted average of the insured and uninsured

portions. Other expenses are accounted for by assuming annual servicing and administrative costs of 2 percent and an annual SBA servicing fee of 0.545 percent. The net spread, or profit margin, is calculated by subtracting average costs from the interest rate paid.





# Appendix:

## Assumptions and Parameters of the Models Used in This Analysis

**T**he Congressional Budget Office (CBO) used two models in this analysis. The first, a Monte Carlo cash flow model, generated a probability distribution of future cash flows. Those cash flows, discounted using budget rules or using private-sector discount rates, produced the three sets of subsidy estimates presented in the paper. The second model, an options-pricing model, calculated how a private-sector guarantor would discount those cash flows and, thus, how much the guarantor would charge to assume similar obligations. That model was used for only the third subsidy estimate.

### The Cash Flow Model

Cash flows predicted in the Monte Carlo model arise from defaults, prepayments, recoveries, and fees. In the event a borrower defaults on a guaranteed loan, the Small Business Administration (SBA) makes a payment to the lender based on the loan's guarantee percentage. To offset expected losses, SBA charges an up-front guarantee fee on each loan as well as an annual servicing fee.

The model uses two subsets of SBA data (see Table A-1). The larger data set, from 1988 to 2006, consists of 257,775 outstanding loans, aggregated for simplicity into 5,541 observations by loan size, term to maturity, loan age, borrower's credit status, and cohort. Estimates for the 2006 cohort of loans are based on a smaller data set of 60,470 loan originations, similarly aggregated into 326 observations. For each observation, CBO calculated an average initial and outstanding loan amount, guarantee percentage, and loan spread over the prime rate.

The subsidy estimates in this paper reflect the pool of loans originated in 2006 and are not adjusted for defaults and prepayments that occurred during that year. In con-

trast, the estimated cost for the SBA portfolio reflects only those loans outstanding at the end of 2006.

### Asset Returns and Volatility

The risk of default is inferred from estimates of the underlying volatility of a firm's assets. Because the firms

**Table A-1.**

### SBA 7(a) Data Used in CBO's Analysis

Data Field	Description
Cohort	The year in which the loan was approved by the SBA.
Subprogram	An indicator for whether the loan was approved under the traditional 7(a) program or the Express program.
Loan Type	Fixed- or variable-rate loan.
Loan Maturity	Initial term to maturity.
Remaining Years	The number of years remaining based on the initial term to maturity.
Loan Amount	The initial principal amount of the loan.
Outstanding Balance	The remaining principal amount of the loan as of June 2006.
Guarantee Percentage	The percentage of the loan guaranteed by the SBA.
Interest Rate	For fixed-rate loans, the interest rate applicable over the life of the loan.
Interest Rate Spread	For variable-rate loans, the interest rate spread over the prime rate.

Source: Congressional Budget Office.

Note: SBA = Small Business Administration.

to which the SBA typically makes loans are not publicly traded, CBO estimated the risk to a borrowing firm's assets by examining a set of comparison firms—those in Standard & Poor's (S&P) SmallCap 600 index. The value that the market would place on the risk associated with a firm's assets is inferred from the correlation between its equity returns and those of a broad market index, adjusted for the firm's leverage. That computation yields a measure of the firm's "asset beta," which averaged 0.6 for the comparison firms and was assumed to apply to each of the firms borrowing from the SBA. Data on asset values, leverage, and stock prices were taken from Compustat for the comparison firms.

The expected return,  $E(r)$ , on the firm's assets was then calculated as the sum of the risk-free rate,  $r_f$  and the asset beta of 0.6 times the market risk premium,  $r_m - r_f$  as called for by the capital asset pricing model (CAPM)<sup>1</sup>:

$$E(r) = r_f + .6E(r_m - r_f)$$

The one-year Treasury bill rate fluctuated in a narrow range around 5 percent between April 2006 and April 2007. CBO's January 2007 economic projections imply little change in interest rates in the near term, so the short-term risk-free interest rate is fixed at 5 percent. The market risk premium,  $r_m - r_f$  is based on historical data adjusted to recent experience and is fixed at 3.5 percent.<sup>2</sup>

A firm's assets have two sources of risk: nondiversifiable market risk and diversifiable idiosyncratic (firm-specific) risk. Market risk is measured by the volatility of broad market returns and is fixed at a long-term historical average of 18 percent per year.<sup>3</sup> The asset beta of 0.6 implies an expected return of 7.1 percent according to the CAPM. Firm-specific risk has a base volatility of 15.6 percent, although the realized idiosyncratic risk is closer to 18 percent as a result of the jump process (discussed later). The combination of firm-specific and idiosyncratic risk yields total risk of about 20 percent, which is

1. For a complete description of the CAPM, see Richard Brealey and Stewart Myers, *Principles of Corporate Finance*, 7th ed., rev. (New York: McGraw Hill, July 2002).  
 2. For a discussion of the historical market risk premium and volatility, see John Y. Campbell, *Forecasting U.S. Equity Returns in the 21st Century* (Cambridge, Mass.: Harvard University Press, July 2001).  
 3. Ibid.

**Table A-2.**

**Distribution of Ratios of Liabilities to Assets for SBA 7(a) and SmallCap Borrowers**

(Percent)

Ratio of Liabilities to Assets	Term to Maturity (CBO's Assumptions)		Observed S&P SmallCap 600 Share <sup>a</sup>
	Less than 15 Years	Greater than or Equal to 15 Years	
25	20	50	18
35	20	50	22
45	20	0	27
60	20	0	18
75	20	0	14

Source: Congressional Budget Office.

Note: S&P = Standard & Poor's.

a. Excluding the top and bottom 10 percent of observations and observations with a weighted average maturity of debt of less than two years.

consistent with that observed for the S&P SmallCap 600 index in Compustat.

**Leverage Ratio**

The initial ratio of a firm's liabilities to assets affects the default rate, with a higher ratio increasing the probability of default. The distribution of that ratio is approximated using data from Compustat on assets and liabilities of the firms in the S&P SmallCap 600 index.<sup>4</sup> (The SBA does not collect information on borrowers' asset values or the value of their non-SBA liabilities.)<sup>5</sup> The assumed distribution is reported in Table A-2.

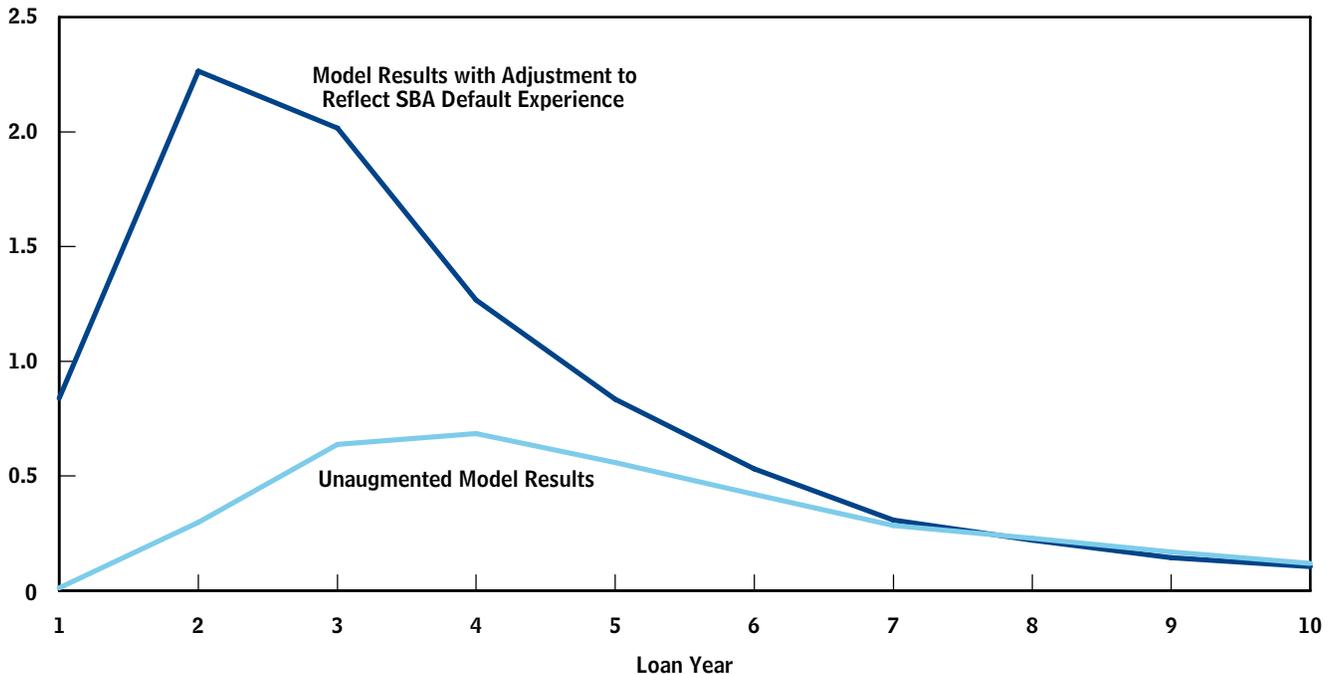
The leverage ratio changes over time and with the level of a firm's assets. Liabilities, initially set to equal the amount of principal in the SBA-guaranteed loan, decline over time as the loan is amortized and sometimes prepaid. The initial value of assets is selected on the basis of the initial value of liabilities and the assumed leverage ratio. For

4. The distribution of the S&P SmallCap 600 index presented in Table A-2 excludes observations with a weighted average term to maturity of less than two years for debt. That exclusion more closely aligned the debt maturity of the S&P data with that of the typical SBA loan.  
 5. Even if such data were available, the effective amount of assets backing the debt would be difficult to determine because some loans are backed by personal guarantees and other assets.

**Figure A-1.**

## Annual SBA Default Rates With and Without Time-Varying Volatility of Asset Values

(Percent)



Source: Congressional Budget Office based on data from the Small Business Administration (SBA).

Note: The annual default rate measures the average claim paid by SBA each year over the life of the loan as a percentage of the guaranteed loan volume. Asset volatility in the first three to five years of the loan is calibrated to SBA default experience.

loans that are more than four years into their life, the initial ratio of liabilities to assets is set to either 0.4 (for loans with an initial term to maturity of less than 15 years) or to 0.3 (for all other loans).

### Default and Recovery

For SBA loans and many other types of loans, default rates are highest in the first few years that a loan is outstanding. Rates then decline and flatten out. The usual assumption that a firm's assets will follow a random walk does not reproduce the observed pattern of loan defaults and predicts default rates that are far too low in the early years (see Figure A-1). In order to replicate historical default experience and correct for the high early-year default rates, adjustments are made to the assumed volatility process that depend on a loan's initial term to maturity. A transitory, stochastic jump process is incorporated into the firm-specific component of risk.<sup>6</sup> Jumps arrive according to a Poisson distribution with an intensity of 10 percent and with an expected jump return and volatil-

ity dependent on a loan's initial term to maturity and amortization (see Table A-3).<sup>7</sup>

To detect a default event, the default trigger is checked monthly. Following common practice in this type of modeling, default occurs when the value of assets is at or below 70 percent of liabilities. If default was conditional simply on the value of assets being below the value of liabilities, losses would be below observed rates. In practice, borrowers appear to continue to service debt until their cash flow is no longer able to sustain those payments. Changing the trigger level affects the severity of default and its frequency. The default trigger level, in combination with assumptions about the volatility of firms' assets,

6. See Robert McDonald, *Derivatives Markets* (Boston: Addison-Wesley, 2006).

7. Alternative assumptions for jump intensity, expected return, and volatility that yield similar default patterns produce results similar to those presented here.

**Table A-3.**

**CBO's Assumed Parameters for the Poisson Jump Process**

(Percent)

Term to Maturity	Loan Year							
	1	2	3	4	5	6	7	8
Less than 7 Years								
Expected jump return	-12.5	-25	-25	-20	-20	-20	n.a.	n.a.
Volatility of jump return	5	30	20	20	30	20	n.a.	n.a.
7 to 14 Years								
Expected jump return	-10	-30	-20	-2.5	-2.5	n.a.	n.a.	n.a.
Volatility of jump return	15	20	20	20	5	n.a.	n.a.	n.a.
Greater than 14 Years								
Expected jump return	-5	-30	-30	-30	-20	-10	-5	-2.5
Volatility of jump return	20	20	30	5	15	15	5	5

Source: Congressional Budget Office.

Note: n.a. = not applicable.

reasonably approximates historical default and recovery experience (see Figure A-1).

SBA reports an assumed recovery rate of 50.75 percent with its 2007 subsidy estimate.<sup>8</sup> In contrast, the pricing model used in this paper assumes a recovery rate of 30 percent for loans in the regular 7(a) program and 5 percent for loans in the Express program. Those assumptions reflect several adjustments to the recovery rate reported in the budget.

■ **Present Value:** The recovery rate reported in the budget is not discounted, although the subsidy rate is calculated using the present value of recoveries. In contrast, CBO reports a recovery rate that reflects the present value of future recoveries. SBA's assumed recovery rate of 50.75 percent is equivalent to a present value of 43 percent.

■ **Time Period:** In contrast to SBA's lifetime recovery rate calculation that includes all recoveries from the 1988–2006 cohorts, CBO calculates the historical recovery rate using data from the 1995–2006 cohorts (see the bottom panel of Figure 6 in the main analysis). SBA's Express program, introduced in 1995, has a much lower recovery rate.

■ **Subprogram:** SBA uses historical recoveries for all 7(a) loan programs—including various types of credit lines—in its recovery rate calculation, whereas CBO excludes recoveries from programs other than regular 7(a) and Express. Those exclusions constitute about 7 percent of total recoveries from the 1995–2006 cohorts. Also, as mentioned earlier, CBO applies separate recovery rates to the regular 7(a) and Express programs. When the data are split by subprogram, the discounted recovery rate for the regular 7(a) program is 30 percent and the discounted recovery rate for the Express program is 5 percent.

Recovered amounts are divided between the SBA and private lenders according to ownership shares. For example, if SBA owns 75 percent of the loan, then it is entitled to 75 percent of any recoveries.

**Prepayment**

Prepayment is common on SBA loans, with about 30 percent of loans prepaid in full during the first five years. Future prepayment activity is modeled to match past prepayment experience, and the base prepayment patterns vary with the term to maturity, size, and years outstanding on the initial loan. On average, 6 percent of loans are assumed to be prepaid in each of the first five years. For the next five years, the prepayment rate averages about 1.5 percent per year. A loan that is selected for prepay-

8. *Budget of the United States Government: Federal Credit Supplement, Fiscal Year 2008.*

ment is assumed to be prepaid in full and is removed from the data set.

### Loan Terms

Most SBA-guaranteed loans charge interest at a floating rate, quoted at a spread to the prime rate. The prime rate is set to its typical level, which is 3 percentage points higher than the rate on risk-free Treasury securities. The assumed 5 percent Treasury rate thus implies a prime rate of 8 percent. The spread over the prime rate is set equal to the actual average spread from SBA's data for each loan observation. The model does not project future values for risk-free Treasury or prime rates and instead assumes no change over the life of the loans.

By fixing the underlying Treasury and prime rates, the model abstracts from the floating-rate nature of the loans. Taking into account rate changes would affect guarantee value only to the extent that the probability of default is correlated with the level of the rates. Because default probabilities are calibrated to match past experience, a model with volatile interest rates but with other parameters adjusted to maintain a realistic default rate would be expected to produce similar estimates to the fixed-rate model used here.

The maturity distribution of the loans also matches the distribution found in SBA's data. The distribution is set to correspond to the portfolio of interest: either SBA's portfolio at a particular point or a single-year cohort of new businesses.

The distribution of guaranteed percentages also matches that found in SBA's data. For loans originated in 2006, 74 percent were guaranteed through SBAExpress and received the maximum guarantee of 50 percent under that program. Of the remaining 26 percent, three-quarters had a 75 percent guarantee, and one-quarter had an 85 percent guarantee.

## The Options-Pricing Model

The options-pricing model used in part of this analysis estimates how much a private guarantor would charge to assume the obligations of the SBA's 7(a) loan guarantee program (in addition to fees currently paid to the government). Such a private guarantor would consider the cash flows that could arise from the guarantee commitment and would value those cash flows according to the extent they are undiversifiable—that is, correlated with the market—or diversifiable. For diversifiable risks, the cash flows would be discounted at the risk-free rate. For undiversifiable (market-correlated) risks, the private guarantor would have to take into account the likelihood that defaults would increase in bad economic times and decrease in good ones, and thus the cash flows would be discounted using risk-adjusted rates. The government's valuation model relies on the same underlying cash flows, but all discounting is done at Treasury rates.

The estimated net cost of the portfolio is the present value of the loan amount purchased by SBA in the event that a borrower defaults, offset by servicing fees and expected recoveries after the borrower defaults. The subsidy rate is the estimated net cost for the 2006 cohort including up-front guarantee fees, expressed as a percentage of total loan volume. Private-sector discount rates are based on the market risk estimates from the S&P Small-Cap 600 index, and valuation is done using “risk-neutral pricing.”<sup>9</sup> That method transforms the probabilities associated with asset returns so that the resulting present-value calculation reflects the market risk implicit in the possibility of default.

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9. For a detailed discussion of risk-neutral pricing, see McDonald, *Derivatives Markets*.