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August 1997

# CREDIT REFORM

## Review of OMB's Credit Subsidy Model



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United States  
General Accounting Office  
Washington, D.C. 20548

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Accounting and Information  
Management Division

B-276870

August 29, 1997

The Honorable Franklin D. Raines  
Director, Office of Management and Budget

Dear Mr. Raines:

Federal agencies use the Office of Management and Budget's (OMB) Credit Subsidy Model (CSM) to calculate the subsidy cost of direct loan and loan guarantee programs for budget and financial reporting purposes. The Government Management Reform Act of 1994, an expansion of the Chief Financial Officers Act of 1990, requires that all major agencies, beginning in fiscal year 1996, prepare annual financial statements and have them audited and that an audited governmentwide financial statement be produced every year starting with fiscal year 1997. With outstanding direct loan and guaranteed loan balances for federal credit programs approaching a reported \$1 trillion, accountants and auditors preparing and auditing these financial statements for federal credit agencies, as well as CSM users, need to have assurance that the CSM calculates a reliable subsidy cost in compliance with applicable legislation and accounting standards.

In order to provide such assurance on a governmentwide basis, we undertook a review of the CSM that preparers and auditors of financial statements at all federal credit agencies could rely upon. Specifically, the objectives of our review were to determine whether the CSM (1) conforms with relevant provisions of applicable legislation and accounting standards, (2) provides reliable results, and (3) is maintained and operated under a system of adequate controls. An additional objective was to identify supplemental audit steps that auditors should perform to ensure that federal credit agencies are using the CSM properly.

To assist us in our review, OMB management prepared written representations (referred to as assertions) about the CSM's capabilities, including its compliance with applicable laws and regulations, its reliability, and the nature of relevant controls. We contracted with the independent public accounting firm of Ernst & Young LLP to evaluate OMB's assertions and opine on whether they are fairly stated in all material respects. (OMB's assertions along with Ernst & Young's report are included in appendix I.)

This letter discusses the highlights of OMB's assertions and our findings and recommendations. Appendix II includes supplemental audit steps that we

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believe financial statement auditors should perform to ensure proper use of the CSM by federal credit agencies.

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## Results in Brief

OMB's assertions on the CSM thoroughly explain the CSM's capabilities, limitations, and user agency responsibilities. Ernst & Young concluded that OMB's assertions are fairly stated in all material respects and recommended several steps OMB should take to improve the reliability of CSM results and controls surrounding it. Based on our review of Ernst & Young's work, we generally concur with its conclusion and recommendations.

The key findings and recommendations follow.

- The Federal Credit Reform Act of 1990 (FCRA) and related federal accounting standards define the cost (subsidy) of a direct loan or loan guarantee as the estimated long-term cost to the government on a net present value basis at the time when a loan is disbursed. The CSM's calculation of subsidies complies with this definition in that the model computes a subsidy cost by calculating the estimated net present value, at the time of loan disbursement, of agency-generated cash flows over the life of the loan.
- OMB's assertions state that because of several limitations in the CSM's design, the subsidy cost calculated by the CSM may differ from a "theoretically precise" result. Although its assertions state that it has not found any instance in which such differences were significant, OMB also notes that the size of these differences cannot be precisely determined in general because the relevant factors, such as the applicable discount rate and the size and timing of future cash flows, will vary from case to case. For all but one of the limitations, credit agencies and their auditors can take steps to minimize or eliminate the impact of the limitations on the subsidy cost calculation. The impact on the subsidy cost calculation of the limitation involving the use of nonstandard equations for discounting certain projected cash flows, however, is more difficult to evaluate and cannot be minimized by credit agencies and their auditors. OMB should correct this limitation by replacing these nonstandard equations with standard discounting equations.
- Several weaknesses were identified relating to controls surrounding the development, maintenance, and use of the CSM. The CSM was not designed, and is not maintained, in accordance with the validation, verification, and testing (VV&T) approach to computer software development. VV&T is a process of review, analysis, and testing employed throughout a structured

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system development lifecycle<sup>1</sup> to ensure the production of quality, reliable software. Also, documentation provided to CSM users instructing them on proper installation and use contains several errors and omissions. Furthermore, agencies visited by Ernst & Young did not have logical computer access controls to prevent unauthorized access to or improper modification of the CSM. As a result, several recommendations were made to improve the control environment over the CSM. OMB staff agreed with the need to improve controls and documentation but expressed some concerns with aspects of Ernst & Young's report addressing controls over the CSM. We believe that if OMB implements a VV&T or similar process, improves documentation, and provides guidance to credit agencies on controlling access to the CSM, the basic control weaknesses identified by Ernst & Young will be addressed.

OMB's assertions also state that user agencies are responsible for properly using the CSM. This includes using proper data, correctly installing the appropriate version of the CSM, and making a correct choice from available CSM options to accurately reflect specific credit program characteristics. Consequently, when obtaining assurance that CSM subsidy cost calculations are correct, auditors will need to ensure that agencies are properly using the CSM. To help auditors obtain this assurance, we identified, with assistance from credit agencies' inspectors general, OMB's credit reform staff, and others, a series of supplemental audit procedures for auditors to follow when auditing federal credit agencies' financial statements and subsidy cost calculations. (See appendix II.)

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## Background

The federal government uses direct loans and loan guarantees as tools to achieve numerous program objectives, such as assistance for housing, farming, education, small businesses, and foreign governments. Before the enactment of FCRA, credit programs—like most other programs—were recorded in budgetary accounts on a cash basis. This cash basis distorted the timing of when costs would actually be incurred and, thus, the comparability of credit program costs with other programs intended to achieve similar purposes, such as grants. For example, the cash-basis cost of a direct loan in a fiscal year was equal to the cash-basis cost of a grant. The long-term cost of a direct loan, however, may be much less than a grant because of loan repayments. Cash-basis budgetary recording also

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<sup>1</sup>Federal Information Processing Standards (FIPS) Publication No. 101, *Guidelines for Lifecycle Validation, Verification, and Testing of Computer Software*, defines software lifecycle as the period of time beginning when the software product is conceived and ending when the resultant software product is no longer available for use. The software lifecycle is typically broken into phases, such as requirements, design, programming and testing, installation, and operations and maintenance.

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suggested a bias in favor of loan guarantees over direct loans. Loan guarantees appeared to be free because cash-basis recording did not recognize that some loan guarantees default. Furthermore, direct loans appeared to be relatively costly because the cash-basis recording did not recognize that many direct loans are repaid.

FCRA changed the treatment of credit programs beginning with fiscal year 1992 so that their costs can be compared more accurately with each other and with the costs of other federal spending. Two key principles of credit reform are (1) the definition of cost (subsidy) in terms of the net present value of cash flows over the life of a loan and (2) the requirement that budget authority to cover the subsidy cost be provided in advance before new direct loan obligations are incurred and new loan guarantee commitments are made.

FCRA defines the subsidy cost of direct loans as the present value over the loan's life of disbursements by the government (loan disbursements and other payments) minus estimated payments to the government (repayment of principal, payments of interest, and other payments) after adjusting for projected defaults, prepayments, fees, penalties, and other recoveries. It defines the subsidy cost of loan guarantees as the present value of cash flows from estimated payments by the government (for defaults and delinquencies, interest rate subsidies, and other payments) minus estimated payments to the government (for loan origination and other fees, penalties, and recoveries). According to FCRA, the net present value is calculated by discounting the cash flows at the average interest rate on marketable Treasury securities of similar maturity to the direct or guaranteed loan when the loans are disbursed.

FCRA gave OMB oversight responsibility to ensure proper implementation of credit reform, including agency calculation of subsidy costs. To provide a consistent, common approach to calculate the present value of credit program costs, OMB developed the CSM, a computer software program that calculates a subsidy rate based on agency-generated estimates of cash flows to and from the government. The CSM also calculates the portions of the subsidy cost attributable to defaults, interest subsidies, fees, and other subsidy components.

Thus, the CSM is basically a calculator. Agency-generated cash flows are entered into the CSM by means of an electronic spreadsheet. The CSM's basic function is to calculate the net present value of these cash flows by discounting them to the year monies are disbursed and dividing the

amount of subsidy by the present value of the amount of disbursement to obtain the subsidy percentage. Agency-generated cash flows are essential for determining subsidy costs. Changing data on the cash flows, such as the expected rate of defaults, changes the subsidy calculation. Therefore, the CSM's subsidy calculation is only as reliable as the data in agency-generated cash flows the CSM uses.

Although FCRA requires the use of present value to measure the subsidy costs of direct loans and loan guarantees for budgetary accounting and reporting, the law does not address financial statements and associated reporting. However, the Federal Accounting Standards Advisory Board (FASAB)<sup>2</sup> concluded that significant benefits would result from integrating budgetary and financial accounting for federal credit programs. FASAB recommended that since budgetary resources for direct loan and loan guarantee subsidies are required to be reported on a net present value basis, financial reporting of loan activity should be on the same basis. Statement of Federal Financial Accounting Standards (SFFAS) No. 2, Accounting for Direct Loans and Loan Guarantees, was issued in 1993 to provide accounting standards for federal direct loans and loan guarantees that incorporate FCRA's subsidy calculation requirements. With the issuance of SFFAS No. 2, subsidy calculations became important not only for budgetary accounting and reporting purposes but also for financial reporting purposes.

## Scope and Methodology

To determine whether the CSM complies with applicable laws and accounting standards, provides reliable results, and is maintained and operated under a system of adequate controls, we engaged the independent public accounting firm of Ernst & Young to perform an attestation in accordance with American Institute of Certified Public Accountants (AICPA) attestation standards on OMB management's assertions regarding the CSM's capabilities and limitations. A complete discussion of Ernst & Young's scope and methodology is included in its report in appendix I. To ensure that Ernst & Young complied with contract requirements and applicable auditing standards, we

- defined the scope of work to be completed by Ernst & Young;

<sup>2</sup>FASAB was established in October 1990 by the Secretary of the Treasury, the Director of OMB, and the Comptroller General to consider and recommend accounting principles for the federal government. If Treasury, OMB, and GAO decide to adopt the recommended standards, the standards are published by OMB and GAO and become effective.

- met periodically with Ernst & Young during the course of its evaluation and attended key meetings with them, including their initial meeting with OMB staff;
- reviewed Ernst & Young's work in accordance with generally accepted government auditing standards;
- performed a limited analysis of the CSM, its assumptions, and mechanics in order to better understand the results of Ernst & Young's work;
- analyzed the discounting formulas used by the CSM to discount the cash flows to the time of disbursement; and
- developed a limited number of test cash flow spreadsheets for use with the CSM to compare its results with those calculated manually and to gain an understanding of the proper use of the CSM.

To identify supplemental audit steps that auditors should perform, we reviewed the CSM's User's Guide, OMB's assertions, and Ernst & Young's report. We also received advice and assistance from the Federal Audit Executive Council, credit agencies' inspectors general, representatives of the Governmentwide Credit Reform Subgroup, and OMB's credit reform staff.

Our analysis of the Ernst & Young report and related work was conducted in Washington, D.C., from April 1997 through June 1997 in accordance with generally accepted government auditing standards. We requested comments on a draft of this report from the Director of OMB or his designated representative. OMB staff responsible for credit reform suggested some technical clarifications to our report, which we have incorporated where appropriate.

## CSM Calculations Comply With Definition of Credit Subsidy

FCRA and SFFAS No. 2 contain several requirements about the budgetary and financial accounting treatment of direct loans and loan guarantees. However, the primary requirement pertinent to the calculation of the subsidy is the definition of cost. FCRA and SFFAS No. 2 define the cost of a direct loan or loan guarantee as the net present value of estimated future cash flows at the time when the loan is disbursed. This calculation incorporates cash flows to and from the government, excluding administrative costs and any incidental effects on governmental receipts or outlays. The CSM's calculation of subsidies complies with this definition in that the CSM computes a subsidy cost by calculating the net present value of agency-generated cash flows of expected payments to and from the government by discounting these cash flows to the fiscal year when they are disbursed. For loans that disburse in more than 1 year, the CSM



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allocates the cash flows to each disbursement year and discounts the associated cash flows to the appropriate year of disbursement.

FCRA and SFAS No. 2 require that cash flows contain certain components, such as loan disbursements; repayments of principal; payments of interest; and other payments, including fees, penalties, and other recoveries. Spreadsheets that capture these cash flows are not part of the CSM and responsibility for creating these spreadsheets lies with CSM users rather than with OMB. However, OMB designed the CSM to read spreadsheets that contain these components.

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## CSM Results May Differ From Theoretically Precise Net Present Value Calculations

OMB's assertions state that limitations exist in the CSM resulting from (1) the complexity of the FCRA requirement to calculate the net present value with respect to the time of disbursement, (2) efforts to simplify the CSM while at the same time making it flexible enough to fit all federal credit programs, (3) inherent limitations of discounting methods and financial models such as rounding definitions, and (4) the use of discounting formulas that differ slightly from standard methods. Because of these limitations, the subsidy percentage calculated by the CSM may differ from a "theoretically precise" result. For example, under some government loan programs, an agency receives principal and interest payments from borrowers on a daily basis throughout the year. Therefore, a theoretically precise subsidy calculation would require the daily discounting of these cash flows to time of disbursement. OMB believes that the added precision of such daily discounting would be burdensome and yield little value. Consequently, OMB provides timing options that approximate the daily discounting of cash flows.

Although neither OMB nor Ernst & Young have identified any instances where differences between the CSM subsidy cost calculation and the theoretically precise calculation were significant, the materiality of these differences cannot be precisely determined in general because the relevant factors, such as the applicable discount rate and the size and timing of future cash flows, will vary from case to case. Except for one of the limitations, however, our assessment is that CSM users and their auditors can take steps to minimize or eliminate the impact of the limitations.

Of the several limitations OMB included in its assertions, three impact the subsidy cost calculations. These are described in detail in OMB's assertions and Ernst & Young's report. The first limitation results from the CSM's use of nonstandard discounting equations to calculate the net present value of

cash flows for partial periods, such as semiannual and quarterly. The CSM adjusts its discounting equations for partial periods, when timing options other than “simple annual” are used,<sup>3</sup> by dividing the discount rate by a factor, which is determined by the timing of cash flows and the periodicity of discounting. However, such partial period adjustments should be made exponentially to conform with standard discounting conventions. For example, the standard adjustment to the discounting equation for the semiannual discounting of cash flows occurring at the end of each 6-month period is the square root of  $(1 + \text{rate})$  while the CSM uses  $(1 + \text{rate}/2)$ . This results in CSM present values that are slightly lower than those calculated using standard geometric formulas.<sup>4</sup> Because these equations are embedded in the CSM’s source code, users and their auditors are unable to mitigate this limitation. To resolve this problem, OMB should revise the computer source code so that the net present value calculations reflect standard discounting equations.

The second limitation arises for programs that disburse loans over several years. FCRA requires that cash flows be discounted to the time of disbursement. OMB interprets the FCRA “time of disbursement” for calculation purposes as the “fiscal year of disbursement.” Consequently, in cases where programs disburse over several years, precisely calculating subsidies requires that agencies prepare cash flows clearly associated with each disbursement so that these cash flows can be discounted to the year of disbursement. Because disbursement year cash flows cannot always be provided due to limited agency accounting systems and credit program data, the CSM permits less detailed, aggregated cohort level data to be used as an approximation.<sup>5</sup> If cohort level data are used, the CSM uses one of two methods to disaggregate the cash flows into portions that are attributable to the amounts that are disbursed in each year. However, the use of cohort level data can introduce distortions that result from (1) the disaggregation of the cohort level data and (2) the CSM’s averaging of

<sup>3</sup>The “simple annual” timing option assumes that all outflows occur at the beginning of the year and all inflows occur at the end of the year.

<sup>4</sup>The effect on present value calculations of using CSM’s nonstandard discounting formulas for partial periods compared with using standard formulas is illustrated by the following example. Cash flow payments of \$100 are made at the end of each 6-month period for 5 years. The discount rate is 5 percent. The CSM formula will calculate a present value of \$875.21 for these cash flows, whereas the standard formula will calculate a present value of \$876.59. The CSM’s net present value is \$1.38 or 0.16 percent lower than the standard formula’s present value. While this difference appears to be insignificant, the impact on individual subsidy rate calculations of the CSM’s nonstandard formulas depends on various factors, including the discount rate and the timing of cash flows, and cannot be generalized.

<sup>5</sup>OMB defines a cohort as those direct loans or loan guarantees of a program that are subsidized by an appropriation for a fiscal year even if disbursements occur in subsequent years or if the loan is modified.

discount rates for programs where discount rates differ for each disbursement year.<sup>6</sup> Agencies can eliminate the impact of this limitation by using disbursement year data, when available, rather than cohort level data.

The third limitation involves rounding. Because of rounding, and particularly in programs that have disbursements over several years, the calculated subsidy will be less precise if an inappropriate scale is used in the cash flow data. If the data are presented in millions and the actual values are in thousands, a significant amount of data may be lost when the CSM rounds to three decimal places. This effect is most pronounced when a large portion of program cash flow items are very small, since rounding of smaller dollar values increases the risk that the rounded values will be materially different than the actual values. For example, if a series of underlying values in millions of dollars is 0.0054, 0.0054, 0.0054, the CSM will round each to 0.005—losing 0.0004, or roughly 8 percent in each case, which may be significant. If these values were expressed in thousands of dollars (5.400 instead of 0.0054), none of the underlying values would be lost due to rounding.

### Reliable Subsidy Calculations Also Require Quality Cash Flow Data, Proper Use of the CSM, and Management Oversight

When assessing the reliability of the CSM's subsidy rate calculations, we found it useful to remember the important but limited role that the CSM has in the credit reform process. Reliable subsidy calculations also require quality cash flow data, clear guidance from OMB and proper use of the CSM by credit agencies, and close management oversight by both the credit agency and OMB.

Because the CSM is essentially a calculator that processes estimated cash flows provided by the credit agency, its subsidy calculation is only as reliable as the agency-generated cash flow data. In the audits of credit agencies' financial statements for fiscal year 1995, significant weaknesses were identified with the quality of cash flow estimates and supporting data. For example, the Department of Agriculture, which has the federal government's largest balance of loans receivable, received a qualified audit opinion on its Rural Development component financial statements, in part, because of inadequately supported cash flows. Fiscal year 1996 financial statement audit results available as of July 1997 indicate that generally credit agencies are still having difficulty preparing quality, well-supported cash flows that comply with FCRA and SFFAS No. 2 requirements. Staff from

<sup>6</sup>OMB's assertions in appendix I discuss the CSM's allocation of cohort level cash flows to disbursement years and the averaging of discount rates (disbursement-weighted average discount rate) in paragraphs A.1 through A.3 and C.5(b).

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GAO, OMB, and credit agencies are currently working together to develop approaches to improve cash flow estimates.

Although the basic function of the CSM—to discount cash flows to the year of disbursement—is conceptually straightforward, use of the CSM can be complex because of the various options available and types of data to be entered. Consequently, proper use of the CSM requires sufficient, clear guidance from OMB on what the CSM options are and how best to use them to reflect the characteristics of credit agency loan programs. Also, credit agency officials must recognize that use of the CSM requires not only adequate knowledge of credit agency loan programs but familiarity with the concepts contained in FCRA and SFFAS No. 2. Moreover, given the complexity inherent in developing cash flow spreadsheets and using them with the CSM in subsidy calculations, agency management must exercise proper oversight to ensure that cash flow data is of high quality, the CSM is used properly, and controls surrounding the preparation of cash flows and the calculation of subsidies are adequate and operating as intended. Finally, given the role assigned to it by FCRA, OMB must oversee agencies' credit reform implementation even though responsibility for preparing cash flows is with the credit agencies.

We recently had the opportunity to illustrate the need for adequate oversight by credit agencies and OMB. In our July 16, 1997, testimony before the House Committee on Small Business,<sup>7</sup> we reported on the estimates of credit subsidy for the Small Business Administration's (SBA) guaranteed business loan and certified development company programs—more commonly called the “7(a)” and “504” programs, respectively. We reported on an error in SBA's cash flow spreadsheet that we had uncovered in the calculation of the fiscal year 1997 subsidy costs for the 7(a) program. A critical cell in SBA's cash flow spreadsheet was based on the number of dollars guaranteed instead of the number of dollars disbursed, that is, the total face amount of the loans. (SBA projected that it would guarantee on average about 76 percent of the fiscal year 1997 loan cohort.) As a result of this error, SBA's estimated credit subsidy rate was higher by about 32 percent (1 divided by 0.76, the average guaranteed portion of loans disbursed by private lenders).

This error went unnoticed by both SBA and OMB staff responsible for reviewing the 7(a) credit subsidy rate estimate. If those staff had compared the component data generated by the CSM for the erroneous

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<sup>7</sup>Small Business Administration: Credit Subsidy Estimates for the Sections 7(a) and 504 Business Loan Programs (GAO/T-RCED-97-197, July 16, 1997).

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fiscal year 1997 estimate with the components of the fiscal year 1996 estimate, they would have seen an unexplainable increase in the fee revenue component (there was no increase in the fee rates charged). According to SFFAS No. 2, subsidy estimate component data should be used to monitor and make decisions about the federal government's credit programs.

In 1995, the Governmentwide Credit Reform Subgroup was formed to resolve issues faced by (1) agencies in implementing credit reform and preparing quality cash flow data and (2) auditors reviewing credit subsidy estimates. An issue paper prepared by the Subgroup, Preparing and Auditing Direct Loan and Loan Guarantee Subsidies Under the Federal Credit Reform Act, is expected to be issued during fiscal year 1998.

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## Controls and Documentation Should Be Improved

Ernst & Young's report includes the following control weaknesses surrounding the development, maintenance, and use of the CSM. First, the CSM was not designed, and is not maintained, in accordance with the validation, verification, and testing (vv&t) approach to software development. vv&t is a process of review, analysis, and testing employed throughout a structured system development lifecycle to ensure the production and maintenance of quality, reliable software. Second, the CSM program was developed and tested by a single programmer and was not independently tested to ensure that its functionality met the initial design request. Ernst & Young noted that the loss or absence of the original programmer may substantially hinder significant modification of the current program. Third, documentation provided to CSM users contains several errors and omissions, and exists in several pieces. Fourth, OMB's storage of the program source code is insufficient to protect against loss, destruction, and corruption. Fifth, agencies visited by Ernst & Young were using the CSM without logical access controls to prevent unauthorized access. Finally, because it is difficult to verify which data the CSM used to calculate the subsidy, the CSM printed output should be enhanced.

Three recommendations were made to improve controls over the CSM, and OMB credit reform staff generally agreed with them. Specifically, OMB staff agreed that (1) future revisions to the CSM will be accompanied by more detailed and complete documentation of the validation, verification, and testing of software, (2) documentation will be improved and expanded to correct for errors and omissions, and (3) the CSM printed output should be enhanced to provide an audit trail showing which data the CSM used to calculate the subsidy.

However, OMB staff expressed concerns about some of the findings and one recommendation relating to controls over the CSM. Although OMB acknowledged in its assertions that it did not have a structured and documented V&T process for developing and testing the CSM, OMB staff told us that the CSM had been developed through extensive discussions among OMB and agency staffs and had been tested over several years by CSM users at credit agencies as well as by OMB credit reform staff. OMB staff also emphasized that computer access controls are an agency's responsibility and noted that current versions of desktop operating systems have password protection and other controls. Moreover, OMB said that the source code is stored on-site and off-site, in digital tape, fixed disk, and CD-ROM formats and that these storage media are adequate to prevent loss, destruction, or corruption. Finally, OMB's position is that the loss of the original CSM programmer would not seriously affect future modifications of the program since (1) there is no immediate or urgent need for modifications to the CSM, so replacement staff would have ample time to familiarize themselves with the CSM, (2) other OMB staff or contract personnel could easily make such modifications by using the existing source code, knowledge of the programming language, and familiarity with credit reform concepts, and (3) the CSM is more likely to be replaced than modified.

We believe that the improvements to the control environment surrounding the CSM agreed to by OMB, especially the use of V&T or a similar process, will resolve the major control issues raised by Ernst & Young. Although we recognize that user agencies have ultimate responsibility for computer access controls, agencies clearly need guidance on properly controlling access to the CSM—Ernst & Young's visits to seven user agencies found that none of them had logical access controls over the personal computers containing the CSM. We believe that OMB guidance on proper controls over access to the official agency copy of the CSM can be easily and quickly communicated to agency staff. In addition, since the completion of Ernst & Young's work, we have confirmed that OMB has adequate storage of the CSM source code to prevent loss, destruction, or corruption.

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## Revised CSM to Be Released After June 1998

OMB staff told us that they are considering improvements to the CSM, including a refinement of methods, more detailed output, improved documentation, and other improvements identified in the management assertions and, where appropriate, recommendations from the Ernst & Young report. Also, before releasing this improved version, OMB staff are considering whether to have an audit of the CSM calculations. OMB staff told

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us that the release of the new version of the CSM will be no earlier than June 1998.

OMB staff also told us that they would recommend an interim release of the CSM, prior to the major release described above, if there were a change in law or other requirements or if a significant defect in the calculations was identified. However, in the OMB staff's judgment, the relatively minor improvements that they believe could be accomplished in an interim update must be weighed against what they believe will be a substantial effort, mainly by agencies, to reinstall the model on hundreds of computers and train staff in the changes from the previous release. As of July 1997, OMB staff told us that they have found no evidence that an interim update is required. Further, OMB staff noted that OMB's management assertions, which Ernst & Young concluded are "fairly stated in all material respects," state that the effect of limitations in the current release of the CSM, based on cases reviewed to date, "have not revealed any instance in which such differences were significant."

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## Procedures Auditors Should Perform to Ensure Proper Use of the Credit Subsidy Model

OMB's assertions and Ernst & Young's report pointed out that proper use of the CSM is the responsibility of the user agencies. This responsibility includes using proper cash flow data, correctly installing the appropriate CSM version, and making correct choices from available CSM options to accurately reflect specific credit program characteristics. In contracting with Ernst & Young, we did not ask the firm to determine whether agencies are properly using the CSM. Therefore, to ensure that CSM subsidy calculations are correct, auditors will need to, among other things, obtain assurance that agencies are using the CSM properly. With assistance from the Federal Audit Executive Council, credit agencies' inspectors general, representatives of the Governmentwide Credit Reform Subgroup, and OMB's credit reform staff, we identified supplemental audit procedures to be performed in audits of federal credit agencies and subsidy calculations. These procedures are listed in appendix II.

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## Conclusions

Taken together, OMB's assertions on the CSM's capabilities, Ernst & Young's report, and the audit procedures included in this report should provide federal credit agencies and their auditors with a better understanding of how the CSM functions and additional guidance on proper use of the CSM. Although generally agreeing with Ernst & Young's recommended steps for improving the CSM, OMB staff believe that an immediate release of a revised, improved CSM would not be worth the costs involved. OMB staff further

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note that they have found no evidence that the limitations in the current release of the CSM have had a material impact on subsidy calculations. Thus, they propose waiting until they have decided upon various policy matters and other changes to the CSM before they issue a revised version of the CSM. While this may be reasonable, we believe that the lack of adequate access controls at user agencies should be corrected immediately.

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## Recommendations

Based on our review of OMB's assertions and Ernst & Young's report, we recommend that the Director of OMB ensure that guidance is provided to user agencies to establish logical access controls surrounding use of the CSM. In addition, we recommend that the Director of OMB ensure that the following steps are taken in developing the next revision to the CSM:

- revise the discounting equations in the CSM to follow standard finance theory,
- strengthen controls over the CSM by implementing a VV&T or similar process,
- improve the CSM documentation to correct for the mistakes and omissions noted in OMB's assertions and Ernst & Young's report, and
- enhance the CSM printout with additional data so that users and auditors are able to specifically identify which data were used by the CSM in the subsidy calculations.

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Within 60 days of the date of this letter, we would appreciate receiving a written statement on actions taken to address our recommendations.

We are sending copies of this report to the Senate and House Appropriations and Budget Committees, the Senate Committee on Governmental Affairs, and the House Committee on Government Reform and Oversight. We are also sending copies to the chief financial officers and budget officials at federal credit agencies; the inspectors general with audit responsibilities for these agencies; and other interested parties. Copies will also be made available to others upon request.



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If you have any questions about this report, please call McCoy Williams, Assistant Director, at (202) 512-6906. Major contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in cursive script that reads "Linda M. Calbom".

Linda M. Calbom  
Director, Civil Audits

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# Contents

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Letter	1
Appendix I Ernst & Young's Report Including OMB's Assertions	18
Appendix II Audit Procedures to Verify Proper Use of the Credit Subsidy Model	30
Appendix III Major Contributors to This Report	36

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## Abbreviations

AICPA	American Institute of Certified Public Accountants
CSM	Credit Subsidy Model
FASAB	Federal Accounting Standards Advisory Board
FCRA	Federal Credit Reform Act of 1990
GAO	General Accounting Office
OMB	Office of Management and Budget
SBA	Small Business Administration
SFFAS	Statement of Federal Financial Accounting Standards
VV&T	Validation, Verification, and Testing

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# Ernst & Young's Report Including OMB's Assertions



■ 1225 Connecticut Avenue, N.W.  
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## Independent Accountants' Report

Mr. James F. Hinchman  
Acting Comptroller General of the United States  
General Accounting Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Hinchman:

We have examined management assertions about the capabilities and limitations in the Office of Management and Budget's (OMB) Credit Subsidy Model as described in the accompanying OMB Statement of Capabilities of the Credit Subsidy Model. Management of OMB is responsible for ensuring that the Credit Subsidy Model calculates credit subsidies in accordance with relevant provisions of the Federal Credit Reform Act of 1990 ("FCRA"), the Statement of Federal Financial Accounting Standards No. 2 Accounting for Direct Loans and Loan Guarantees, OMB Circulars A-11 and A-34 (Preparation and Submission of Budget Estimates and Instructions on Budget Execution, respectively), and the OMB User's Guide to Version r.8 of the Credit Subsidy Model, including the supplements for version r.9. Our responsibility is to express an opinion on management's assertions regarding the capabilities and limitations of the OMB Credit Subsidy Model relative to these provisions based on our examination.

Our examination was made in accordance with standards established by the American Institute of Certified Public Accountants, and, accordingly, included examining on a test basis evidence about OMB's assertions regarding the OMB Credit Subsidy Model, and performing such other procedures as we considered necessary in the circumstances. We believe that our examination provides a reasonable basis for our opinion.

In our opinion, management's assertions regarding the capabilities and limitations of the OMB Credit Subsidy Model in calculating credit subsidies in compliance with the aforementioned provisions are fairly stated in all material respects.

The accompanying Appendix To Independent Accountants' Report provides certain additional information on our scope, methodology, observations, and findings.

March 12, 1997

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**Appendix I  
Ernst & Young's Report Including OMB's  
Assertions**



EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET  
WASHINGTON, D.C. 20503

March 10, 1997

Mr. James F. Hinchman  
Acting Comptroller General of the United States  
General Accounting Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Hinchman:

As part of the General Accounting Office's audit of the Office of Management and Budget's credit subsidy model, your staff requested that we make certain representations about the credit subsidy model. These representations are enclosed in the attached "Statement of Capabilities of the OMB Credit Subsidy Model."

We understand your audit is substantially complete and that copies of the audit will be sent to us for comment in the near future. My staff look forward to receiving the final audit report.

If you have any questions concerning these assertions, please direct them to Bill Menth (395-5154) or Art Stigile (395-4521) of my staff.

Sincerely,

A handwritten signature in black ink, appearing to read "Barry B. Anderson".

Barry B. Anderson  
Assistant Director  
for Budget

Enclosure

cc: Dr. Thomas S. Neubig  
Partner, National Director of Tax Policy Economics  
Ernst & Young LLP  
1225 Connecticut Avenue, NW  
Washington, DC 20036



EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET  
WASHINGTON, D. C. 20503

### Statement of Capabilities of the OMB Credit Subsidy Model

#### Background

The purpose of the credit subsidy model is to provide common services to credit agencies for the computation of credit subsidies, that is, discounting cash flows to present values and then calculating a subsidy rate. Credit subsidies and several key aspects of their calculation are defined in the Federal Credit Reform Act of 1990 (FCRA). OMB Circulars A-11 and A-34 provide further requirements for the treatment of Federal credit programs in the Federal budget. Accounting standards are provided in Statement of Federal Financial Accounting Standards No. 2, Accounting for Direct Loans and Loan Guarantees (SFFAS No. 2).

When Federal credit programs were converted from a cash basis to a present value basis, beginning with fiscal year 1992, there was a general belief that a common subsidy calculator was needed. Federal agencies did not have a detailed understanding of the proposed changes or of the principles for estimating cost-to-government subsidies. Much of the guidance for implementing credit reform was yet to be written. There was a broad sense that credit reform would introduce an extensive burden on agencies with responsibility for Federal credit programs. With software to perform common services for calculating subsidies from user-supplied cash flows, agency staff could focus on preparing cash flow estimates. There were economies of scale in developing a common model. It was important that estimates from different agencies be comparable and OMB had statutory responsibilities for coordinating the estimates. OMB, which has a central role in implementing FCRA, decided to develop software to provide these common calculation services.

The capabilities of the credit subsidy model (CSM) are based on the recognition of two distinct steps in calculating subsidies:

First is the preparation of estimated disbursements and collections (cash flows) for credit programs by someone with detailed knowledge of the program. These estimated cash flows are placed in an electronic spreadsheet, along with certain identifying information and the discount rates to use in computing present values. This task is the responsibility of the agency implementing the program with consultation and, in some instances, review and approval, from OMB,

Second is the calculation of the total subsidy percentage, the subsidy percentages for various components of the cash flows, and some related measures, such as undiscounted lifetime net defaults as percentages of disbursements, based on the information contained in the user-supplied electronic spreadsheet. The CSM is used only to calculate subsidies taking user-supplied cash flows as given. These

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

calculations are common to all programs and require no understanding of programmatic details. This task is performed by centrally developed software.

The software and documentation were last updated on August 1, 1994. The model does not require revision except to (1) address changes in law or guidance, (2) correct limitations or defects (such as those identified below), or (3) add enhancements. At this time, no revisions have been scheduled. The material distributed to agencies consists of a binary executable version of the model (source code is not provided), software to install the binary executable version of the model on an MS-DOS compatible personal computer, and a User's Guide. The binary executable version of the model was last revised on August 1, 1994 (the updated version is labeled version r.9).

The User's Guide consists of the User's Guide to Version r.8 of the OMB Credit Subsidy Model (October 22, 1993) and User's Guide for the OMB Credit Subsidy Model, Supplement for version r.9 (August 1, 1994). In response to continuing training and technical support needs, management has contracted with an outside firm to review the existing documentation and training materials and propose improvements. Management expects to update the documentation and welcomes comments and suggestions for improvements in documentation.

The following assertions pertain to the version of the software and documentation cited above.

**Management Assertions**

A. Capabilities of the OMB Credit Subsidy Model:

1. The Federal Credit Reform Act of 1990 (FCRA), OMB Circulars A-11 and A-34, and the accounting standards in SFFAS No. 2, define the cost of a direct loan or loan guarantee as the estimated long-term cost to the Government on a net present value basis, at the time when a loan is disbursed. The value excludes administrative costs and any incidental effects on government receipts or outlays. The operation of the CSM conforms with this definition in that the model computes a subsidy cost calculating the estimated net present value, at the time of loan disbursement, of agency-generated cash flows.

Several limitations of the model are discussed in section "C" below. These limitations result from (1) complexity caused by the FCRA requirement that the net present value be calculated with respect to the time of disbursement, (2) efforts to simplify the CSM while at the same time making it flexible enough to fit all federal credit programs, (3) inherent limitations of discounting methods and financial models, such as rounding definitions, and (4) the use of discounting formulas that differ slightly from standard methods. Because of these limitations, the subsidy percentage calculated by the CSM may differ from a more "theoretically precise" result, though the cases reviewed to date have not revealed any instance in which such differences were significant. In addition, these differences cannot be precisely predicted because they vary with, among other factors, the

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

scale used for cash flows (value in dollars, thousands, or millions) and whether the timing options chosen differ materially from the actual cash flows.

Whenever special circumstances exist, whether due to the above circumstances or for other reasons, agency officials and OMB staff should discuss those conditions and reach agreement on the appropriate subsidy percentage to use.

2. The CSM computes a "disbursement-weighted average discount rate" for discounting cash flows for "cohorts." "Cohorts" are described in Circular A-11 sections on credit data. The "disbursement-weighted average discount rate" is calculated as the sum of the disbursement amount in each fiscal year (in the cohort) times the user-supplied discount rate for that year, divided by total disbursements. For the special case in which all disbursements occur during a single fiscal year, the user-supplied discount rate for that year is equal to the disbursement-weighted average discount rate and is used directly. Options also exist for using obligation year discount rates and disbursement year discount rates (as described in the User's Guide Supplement, pages 3 and 5-7) although the User's Guide recommends not doing so.

3. The CSM meets the FCRA requirement that cash flows be discounted to the point of disbursement. OMB interprets FCRA "time of disbursement" for calculation purposes as the "fiscal year of disbursement." In those cases where the credit agency cannot allocate cohort year cash flows to a particular disbursement year, the OMB has developed an allocation rule. For "cohorts" that disburse in a single fiscal year, no special considerations are required to allocate cash flows to the appropriate fiscal year of disbursement. In all other cases, the user can (1) estimate "disbursement-year" cash flows (where cash flow lines attributable to disbursements in each fiscal year are shown separately); (2) use the CSM option to allocate "cohort" cash flows (where aggregate cash flows include amounts attributable to all disbursement years); or (3) certain combinations of (1) and (2). See User's Guide Supplement, page 2.

4. The CSM provides users with options to prepare cash flows on the basis of several alternative timing assumptions as defined in the User's Guide. The default option is the "continuous" option. "Continuous" is used here to contrast cash flows occurring throughout the fiscal year with cash flows that are assumed to occur at a single point in time in the fiscal year. In actual practice, cash flows occur on all or nearly all business days. The exact discounting of such detailed events would entail the discounting of daily cash flows from the specific day when they occur to the beginning of the fiscal year. Instead of this detailed calculation, an approximation is used. The "continuous" discounting is implemented using the "quarterly, middle of period" methods described in the User's Guide (page VIII-22). Whenever the timing of disbursements or payments in the cash flows of a program does not fit the "continuous" assumption, it is a user responsibility to specify the actual timing of disbursements and payments. User-selectable options exist for many alternatives as described in the User's Guide, such as the beginning-of-year option when transactions occur principally at the beginning of the year.



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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

5. The CSM calculates and displays the total subsidy and subsidy components, based on user supplied cash flows, discount rates, and other assumptions and specifications described in the User's Guide. The CSM calculates a subsidy percentage using the methods described in the User's Guide (section VIII). In the following summary, "discounted cash flows" refers to cash flows that are disaggregated to disbursement years and discounted to the beginning of the fiscal year in which the disbursement to which they are attributed occurred; and "discounted disbursements" refers to the sum of disbursements where each disbursement is discounted to the beginning of the fiscal year in which it occurred.

Subsidy percentage is defined as the subsidy amount as a percent of disbursements. The subsidy amount is calculated as the sum of discounted cash flows, where outflows are added and inflows are subtracted. The subsidy percentage is calculated as the subsidy amount as a percentage of discounted disbursements.

Financing subsidy percentage, defined as the portion of the subsidy percentage attributable to subsidizing the borrower's interest costs by charging lower rates than the discount rate in certain direct loan programs or by direct interest subsidy payments in certain loan guarantee programs. For direct loans, this is calculated as the discounted disbursements less the discounted cash flows for scheduled principal and interest payments, as a percentage of discounted disbursements. For loan guarantees, this is calculated by taking the discounted cash flows for interest subsidy payments, as a percentage of discounted disbursements.

Defaults, net of recovery, subsidy percentage, defined as the portion of the subsidy percentage attributable to unrecovered defaults. It is calculated as the sum of discounted cash flows for defaults and recoveries, as a percentage of discounted disbursements.

Fee subsidy percentage, defined as the portion of the subsidy percentage attributable to upfront and annual fees paid to the government. Because these fees are inflows to the Government, this subsidy component makes the total subsidy either less positive or more negative. It is calculated as the sum of the discounted cash flows for the various cash flows for fees, as a percentage of discounted disbursements; and,

Other subsidy percentage, defined as the residual subsidy percentage not attributed to financing, defaults net of recoveries, or fees. It is calculated as a residual.

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

**B. User Responsibilities**

1. The CSM processes data provided by agencies, generally in the form of spreadsheet files. Errors, omission, or defects in these inputs are the responsibility of the preparer. Though the CSM provides messages to indicate input data items that are suspect or erroneous in certain ways, OMB management makes no assertion that the CSM tests all potential error conditions or that the absence of an error message is, in any way, an endorsement of the inputs or an indication of their quality or acceptability.
2. The CSM does not address the FCRA definition of cash flows because the content and preparation of the cash flows is a user responsibility.
3. The CSM does not address the FCRA definition of the Treasury rates on similar maturities because discount rates are part of the input data prepared by the user. Use of the correct discount rates is a user responsibility.
4. Correctly installing the model and ensuring that it has not been corrupted is an agency responsibility.
5. Choosing the appropriate scale (millions of dollars or thousands of dollars) for cash flow values is a user responsibility.
6. Choosing the appropriate level of detail for cash flows (whether to use aggregated cash flows that combine disbursement years or to use individual disbursement year cash flows) is a user responsibility.

**C. Limitations**

1. The CSM provides an option to perform the error checking functions of the model and sends a list of errors to a printer, without calculating subsidies. The CSM gives a count of error messages but does not print the detailed error list.
2. The current documentation for the CSM exists in several parts and needs to be fully integrated. There are several typographical errors and omissions including, but not limited to, keywords shown on documentation pages III-26 and III-27, the "W096" message, the example at the bottom of page VIII-6, a discussion of the use of quarterly factors, a full discussion of how the timing options work, assumptions about the distribution of cash flows within the year, and the typographical error on page VIII-22 where "rate/8" should be "rate/4." In addition, changes in discounting methods made for the 1995 version of the model were not documented in the addendum to the documentation. Specifically the shift from discounting to the middle of the fiscal year to discounting to the beginning of the fiscal year, which was done to make the discounting methods more consistent with usual discounting conventions, needs to be discussed. This change also involved a change in the denominator for the subsidy percentage calculation

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

to the "discounted disbursements" described above. OMB has contracted with documentation specialists to improve and expand the User's Guide.

3. In the discounting of cash flows based on timing other than the "simple annual" method (as described in the User's Guide), the initial discount factor is adjusted for partial periods, in most instances, by dividing the discount rate by a factor. The partial period adjustments should be made exponentially to conform with standard discounting conventions. For example, on page VIII-21 of the User's Guide (top of page), the initial discount factor (shown as "d[1]" in the User's Guide) is determined by  $(1 + \text{rate}/2)$  where, by conventional methods, it should be the square root of  $(1 + \text{rate})$ . Discount factors calculated according to the User's Guide would be a little higher than discount factors calculated using conventional methods.

4. The User's Guide needs to clarify the use of the term "continuous" as described above and how it is implemented in the model.

5. Changing the loan volume, or scale, of the loan program can, in some instances, have a small effect on the subsidy rate calculated by the model. Also, a calculation anomaly is described on page VIII-23 in which a program that has a zero financing subsidy would have a small subsidy calculated by the model. These two instances where computational artifacts can result in a minor change in the calculated subsidy are described:

- (a) Subsidies can change slightly with the scale of the loan program due to rounding. The scale of the loan program is affected by the loan volume or degree of values used in the cash flow spreadsheet. For example, two loan programs with similar per loan characteristics (i.e., principal paid, interest paid, defaults, time and number of disbursements, etc.) are different only in scale if one program has a loan volume of one and the other program has a loan volume of ten. Similarly, if actual cash flows of a loan program are in millions of dollars, but cash flows are entered in the spreadsheet model in thousands, the two cash flows only differ in scale.

The model rounds cash flows to three decimal places when read from the spreadsheet files. Because of the rounding, and particularly in programs that have disbursements over several years, the calculated subsidy can change slightly with the scale of the program. This effect is most pronounced when many of the cash flow items are very small after rounding (.005 or .011, for instance). Small values are especially sensitive to the hazards of rounding. If a series of underlying values were 0.0054, 0.0054, 0.0054, ... each would be rounded to 0.005, ... However, if the program were scaled up an order of magnitude (i.e., multiplied by ten) so that the underlying values were 0.054, 0.054, ..., no amounts would be lost in the rounding. In this particular example, the present value of this stream of numbers would be roughly eight (8) percent larger, but this estimation can not be standardized and is particular to each case.

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

Selecting the appropriate scale (thousands or millions of dollars) is a user responsibility, as described above.

- (b) The disbursement-weighted average can produce a slight non-zero subsidy, even when the borrower's rate and the discount rate are the same. The use of the disbursement-weighted average is a simplification put in place a few years after credit reform was enacted in response to concerns about the complexity of recordkeeping under credit reform. Because the disbursement-weighted average is a linear average and many of the computations underlying cash flows are non-linear, the use of any single average will produce results that differ slightly from calculations made by applying individual disbursement year discount rates to disbursement year cash flows. As a result, for programs in which the borrower's interest payments are calculated with the same interest rate as is used for discounting (such programs, by definition, have no financing subsidy) and, further, disburse over 2 or more years, in which individual fiscal year discount rates are not constant, the financing subsidy may differ slightly from zero.
6. Federal Information Processing Standards (FIPS) publication no. 101, "Guidelines for lifecycle validation, verification, and testing of computer software" was not used in the development, testing, and maintenance of the CSM. FIPS Publication no. 101 describes non-mandatory guidelines for ensuring software quality. Future revisions to the CSM will be accompanied by more specific and complete documentation of the validation, verification, and testing of the software.
7. The model calculates subsidies for 12 program years at a time as long as the initial budget year is between 1993 and 2000. If the budget year is 2000, estimates can be computed through the year 2011. The model is limited to declaring the initial budget year to be between 1993 and 2000. The model will become obsolete when calculations for initial budget year 2001 need to be calculated. A new version of the model is presumably to be completed before this limitation is an issue.



**APPENDIX TO INDEPENDENT ACCOUNTANTS' REPORT**

In connection with our examination of the Office of Management and Budget's (OMB) assertions regarding the OMB Credit Subsidy Model, Ernst & Young LLP (E&Y):

- Reviewed the OMB Credit Subsidy Model's (CSM) methodology outlined in the User's Guide.
- Tested the calculations of the CSM under various constructed cash flows.
- Reviewed the OMB Statement of Capabilities of the Credit Subsidy Model (OMB Management Assertions).
- Interviewed personnel at certain Federal agencies to review the security of the CSM computer code, and to review any operational and computational problems with the CSM. Interviews were conducted at seven Federal agencies: Education Department (ED), Housing and Urban Development (HUD), United States Department of Agriculture (USDA), Veterans Administration (VA), the Small Business Administration (SBA), Export Import Bank (ExIm-Bank), and Department of Transportation (DOT).

We reviewed the Federal Credit Reform Act of 1990 and the Statement of Federal Financial Accounting Standards No. 2. to ensure compliance of the CSM with relevant provisions of these documents. No material differences were found.

We reviewed the assumptions and equations used by OMB in developing the CSM as defined in the User's Guide. Discussions were also held with OMB staff to gain an understanding of the assumptions and equations in the User's Guide. This review identified several inconsistencies between the equations in the User's Guide and standard finance theory. The OMB Management Assertions mentions these inconsistencies as a limitation of the CSM.

In those cases where the user of the CSM cannot allocate cash flows to specific disbursement years, the CSM uses a rule to allocate "cohort" cash flows to specific disbursement years. No conventional standard exists to perform this allocation task.

We calculated subsidies using the CSM for several constructed cash flows, different cash flow timing (Semiannual-mid, Annual-end, Annual-mid) options, and cash flow allocation (pro-rata, constant factor, disbursement) options. We were able to duplicate the results of the CSM using a Lotus 1-2-3 spreadsheet model (to within several hundredths of one percent).

We tested the CSM's error and warning messages, by calculating subsidy rates for various constructed cash flows. The "W096" warning was not documented (Note: "W096" warnings occur when total repayments of principal differ from disbursements). We also noted the CSM only calculates subsidies when the initial budget year is between 1993 and 2000. In addition, subsidies can only be calculated for 12 program years. These limitations are listed in the OMB Management Assertions.

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**

 **ERNST & YOUNG LLP**

Our tests of the CSM and discussions with some of the Federal agencies and OMB identified certain anomalies in the CSM. These anomalies are: (a) the near zero anomaly (even when the true subsidy rate is zero, the CSM calculates a small positive subsidy) and (b) the changing loan volume anomaly (in some instances, the subsidy rate changes when the loan volume changes). We confirmed the existence of these anomalies by using CSM to calculate subsidy rates for specially constructed cash flows. These anomalies are documented in the OMB Management Assertions as a limitation.

Our review of the *User's Guide* identified several documentation errors and omissions, including a typographical error related to the option on quarterly weights. These errors and omissions are discussed in OMB Management Assertions as a limitation.

From discussions with OMB, we found that in developing the CSM the OMB did not follow the Federal Information Processing Standard related to Lifecycle Validation, Verification, and Testing of Computer Software (FIPS PUB 101). Lifecycle validation, verification, and testing (VV&T) is a process of review, analysis, and testing employed throughout the software lifecycle to ensure the production of quality, reliable software. This limitation is mentioned in the OMB Management Assertions.

The CSM was not designed, and is not maintained, in accordance with a structured system development life cycle (SDLC). A structured SDLC includes a concept development, a request for system design, a feasibility study, general system design, development of detailed system specifications, program development and testing, system testing, system conversion planning, system acceptance and approval, and system maintenance. While the level of detail included in each step may vary based on the size and function of an application, the execution and documentation of each step helps provide reasonable assurance that the application operates as initially intended. Documentation also supports future modifications and provides supporting information in the event of a system failure. System documentation should provide sufficient information such that any skilled reader can obtain a reasonable understanding of the methods and logic used in developing the system.

The program was developed and tested by a single programmer with minimal written documentation. OMB has not independently tested the CSM to ensure that its functionality met the initial design request. Additionally, the program source code is managed and stored exclusively by the initial programmer. The loss or absence of the original programmer may substantially hinder significant modification of the current program.

After discussions with the seven Federal agencies and a review of how the model is used at those agencies, we found no logical access security controls at the agencies to prevent unauthorized access to the CSM. After the personal computer (PC) which contains the CSM is booted up, there are no access security software to protect the CSM from unauthorized users.

We reviewed the CSM source code to determine how date issues are addressed in anticipation of the year 2000. The date values in the CSM were found to be only used for display purposes and are not used in the calculation of credit subsidies.

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**Appendix I**  
**Ernst & Young's Report Including OMB's**  
**Assertions**



To confirm that each of the interviewed agencies was using the most current version of the CSM, for each interviewed Federal agency we collected the CSM's executable file size and creation date using a DIR command (a command that displays directory and file information) at the DOS prompt and printing the screen. These were compared to the file size and creation date of the original version 9 of the OMB executable file. No differences were found.

We could not verify that data entered in the spreadsheet was that used in the credit subsidy calculations. Although the filename and range name used in the calculations are included in the model's output, this presents a difficult mechanism of verification and can lead to inaccuracies if ranges are redefined during the time between the model's calculations and verifications.

**Recommendations**

We recommend that OMB take the following four steps:

1. Revise the NPV equations in the CSM to follow standard finance theory. Because the impact of using nonstandard formulas depends on the type, length, dollar amount and payment schedule of the specific program analyzed, it is not possible to quantify in general the difference in the subsidy rate calculation between using standard and nonstandard formulas.
2. Reduce the likelihood of significant system loss by documenting current programming logic and performing future application development based on an SDLC. In addition, logical access controls, at user agencies, should be implemented to prevent unauthorized modification to production copies of an application. Controls should also sufficiently protect source code from loss, destruction, and modification. OMB should provide guidance for user agencies in implementing such controls.
3. Improve the documentation to correct for mistakes and omissions, including but not limited to the following: correctly define the methodology to specify quarter inflow/outflow weights; include all definitions for error and warning flags; include a full discussion on how the timing options work; include a discussion about the distribution of cash flows within the year; and include a discussion of any changes in discounting methodology for the 1995 version of the CSM.
4. In order to verify that the user is inputting correct data, the model displays the range name among the output fields. This feature should be enhanced. Enhancements could include the following. First, in addition to displaying the range name among the output fields, the model output could also include the coordinates that define the range name. This feature provides the user an easy reference to confirm that the range defined includes all relevant information. Second, in addition to displaying the range name among the output fields, the model output could include a print out of the range used in the calculations. This feature would allow the user to easily confirm that all relevant data is being used.

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# Audit Procedures to Verify Proper Use of the Credit Subsidy Model

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Proper use of OMB's Credit Subsidy Model (CSM) requires that user agencies correctly install the appropriate CSM version, make correct choices from available CSM options and commands to accurately reflect specific credit program characteristics, control access to the CSM, and understand the CSM's capabilities and limitations.

With assistance from the Federal Audit Executive Council, credit agencies' inspectors general, representatives of the Governmentwide Credit Reform Subgroup, and OMB's credit reform staff, we identified the following audit procedures that should be performed to ensure proper use of the CSM. Comprehensive guidance on auditing credit reform subsidy estimates is included in Preparing and Auditing Direct Loan and Loan Guarantee Subsidies Under the Federal Credit Reform Act, a draft issue paper prepared by the Governmentwide Credit Reform Subgroup, which is expected to be issued during fiscal year 1998. The audit procedures discussed in the following sections should be used in conjunction with those presented in the issue paper. Additionally, these procedures are intended to provide audit guidance that may or may not be applicable in all situations. The auditors should use professional judgment in determining which are applicable to the agency they are auditing.

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## Ensure Use of an Appropriate and Unmodified Version of the CSM

Since 1990, OMB has periodically revised the CSM to add enhancements, make methodology changes, and otherwise improve its operation. Different versions of the CSM may produce slightly different subsidy rates. As of July 1997, the current version of the CSM was Version r.9, dated August 1, 1994. We expect that OMB will, on occasion, release new versions of the CSM. In addition, although it may be unlikely, the agency's computer file of the CSM may become modified intentionally or accidentally. Therefore, the auditor should obtain the appropriate version of the CSM for the fiscal year under audit by contacting the agency's OMB budget examiner.<sup>1</sup> This version should be compared with the version used by the agency in its subsidy calculations. To verify that the agency's version of the CSM is unmodified, the auditor should use the "file compare" feature of desktop operating software to compare the agency's version with the OMB official, approved version. If the two versions are the same, the auditor can conclude that the agency's version is unmodified. If they differ, the auditor should bring this to the attention of agency management and the OMB budget examiner and obtain an explanation for the differences. Finally, as the ultimate check, the auditor can calculate the subsidy rate using the

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<sup>1</sup>The auditor may also wish to obtain from the OMB budget examiner information on past errors in agency use of the CSM and a copy of the most recent or appropriate version of the CSM User's Guide.



agency's cash flows, the agency's version of the CSM, and OMB's version of the CSM and compare the results.

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**Verify That Approved Cash Flow Data Is the Same Data Used by the CSM to Calculate the Subsidy Rate**

The user agency should provide the auditor with the approved cash flow data that support its credit program subsidy rate for each of the credit programs selected for internal control and substantive testing. (Cash flow data will be available from electronic spreadsheet files in a format prescribed by the CSM User's Guide.) The auditor should verify that these data were, in fact, the same data used by the CSM to calculate the applicable subsidy rate. The spreadsheet file name, the range name, and the date and time the spreadsheet was last changed are included in the printed CSM output. The auditor can check this information against the named spreadsheet file provided by the agency to verify the cash flow data used in the CSM's subsidy calculation. However, if the spreadsheet file provided by the agency was changed after the subsidy calculation, the date and time stamp on the spreadsheet file will not match what is on the CSM output. In this case, the CSM output will not provide sufficient information to verify the cash flow data used by the CSM. Therefore, the auditor will need to use other methods. One method is to recalculate the subsidy rate using the cash flow data provided by the agency and the auditor's copy of the appropriate version of the CSM obtained from the applicable agency's OMB budget examiner. If the recalculated subsidy rate is the same as the subsidy rate under audit, the auditor should be able to conclude that the cash flow data provided by the user agency was the same data used by the CSM. If the recalculated subsidy rate is different, the auditor should bring this to the attention of agency management and the OMB budget examiner and obtain an explanation for the difference.

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**Follow Up on Error Messages**

Prior to calculating a subsidy rate, the CSM performs several edits on agency-generated cash flows to help ensure that cash flow data do not contain obvious errors. If the CSM edit process identifies a serious error, the CSM will issue an error message and terminate its operation without calculating a subsidy. However, if the CSM edit process determines an error to be less serious, it will issue a "warning" but will not terminate the program. Warnings will be listed with the subsidy rate calculation on CSM output sent to a printer. The auditor should review CSM output to identify whether any warning messages are listed and follow up with agency management to determine why the situation causing the warning message was not resolved and whether not eliminating the error could have any impact on the subsidy rate calculation.

In addition, the CSM provides options for the user to suppress certain warning messages. For example, when cumulative scheduled principal payments do not equal disbursements, a warning message is normally issued. If the agency has suppressed this warning, auditors should determine whether this suppression is appropriate. This concern applies to other warning messages as well. Specifically, the auditor should check the agency's cash flow spreadsheet to determine whether the "suppress warnings" command was used. If so, the auditor should request that the agency explain why warning messages were suppressed and, if certain warning messages are suppressed, whether conditions exist that would cause those messages to be generated, and whether the warning indicates a material problem in the cash flows.

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**Ensure That Options  
Chosen Properly Reflect  
Specific Characteristics of  
Each Credit Program**

Proper use of the CSM requires that the agencies select the appropriate options from those available (see Chapter III of the CSM User's Guide, Version r.9) and use the appropriate Treasury rate to discount cash flows to net present value. Particular care should be used in reviewing the choice of timing options for the principal and interest payments in direct loan programs. When a row of cash flows for scheduled principal or interest payments is prepared using standard financial formulas (which assume disbursements at the beginning of the period and payments at the end of the period), the "simple annual" option should be used. In contrast, when estimates of interest and principal payments are based on the assumption that these payments occur continuously throughout the year, the timing option row of cash flows should be "continuous." When the wrong timing option is used for scheduled principal or interest payments, the financing subsidy may be materially distorted. The auditor may also want to review the choice of timing options for payments and receipts other than principal and interest, although the effects of these distortions are generally smaller.

Care should also be exercised when reviewing cash flows for loan guarantee programs that guarantee less than 100 percent of the face value. As indicated in the User's Guide, the amount in the cash flow row for "disbursement of loans by private lenders" is the total amount disbursed by the lenders, regardless of how much is guaranteed by the credit agency. The amount of disbursed loans guaranteed by the government is included in the row of the cash flow representing the estimate of claims made against the government. For example, if an agency has a program that guarantees 75 percent of loans disbursed, and the lenders disburse \$100,000 in loans that immediately default, the agency should put \$100,000

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in the disbursement by private lenders cash flow row and \$75,000 in the cash flow row for defaults.

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**Ensure Proper Scale Has  
Been Used in Cash Flow  
Spreadsheets**

OMB's assertions state, "The model rounds cash flows to three decimal places when read from spreadsheet files. Because of the rounding, and particularly in programs that have disbursements over several years, the calculated subsidy can change slightly with the scale of the program. This effect is most pronounced when many of the cash flow items are very small after rounding (.005 or .011, for instance). Small values are especially sensitive to the hazards of rounding." Therefore, agency controls should be in place to ensure that rounding to three decimal places has no significant effect on the spreadsheet values and, in turn, the calculated subsidy. For example, if a series of underlying values, in millions of dollars, are 0.0054, 0.0054, 0.0054, the CSM will round each to 0.005—losing 0.0004 in each case, which could be significant. In this situation, the agency should express values in thousands of dollars so that the underlying values are 5.400, 5.400, 5.400—losing nothing in the rounding—in order to obtain a more precise subsidy rate calculation. The auditor should confirm that management controls are adequate to ensure that the cash flows contain the proper scale and that rounding has no significant effect on the subsidy calculation. If these controls are not adequate, the auditors should review the cash flow spreadsheet to ensure that the scale used is appropriate. The auditor should also bring the situation to the attention of agency management.

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**Determine Whether Cash  
Flows Are Prepared at  
Appropriate Level of Detail**

The CSM permits spreadsheet cash flow data to be prepared on a disbursement year basis or a cohort basis. (A disbursement year consists of all loans from a given cohort that are disbursed in a given fiscal year.) For the special case in which all disbursements occur during a single fiscal year, the disbursement year includes the entire cohort and these bases do not differ. However, for loan programs with cohorts that disburse over more than one year, the disbursement year includes just part of the cohort. For such programs, the cash flows for each disbursement year of a given cohort are necessary to precisely calculate subsidies at the time of disbursement. Because agencies cannot always provide such detail, the CSM permits less detailed cohort level data—combinations of 2 or more disbursement years—to be used as an approximation. But the use of cohort level data can introduce distortions. For example, a loan program can be expected to have a zero financing (interest rate) subsidy if the borrower rate is the same as the discount rate. However, if a program

disburses loans over 2 or more years, cohort rather than disbursement year cash flows are used, and the discount rates are not held constant in all disbursement years, the CSM will calculate a non-zero subsidy.

Therefore, whenever a loan program has substantial disbursements in 2 or more years and the agency has prepared cash flows using cohort level rather than disbursement year data, the auditor should determine why disbursement year cash flows were not used. Specifically, if there are reasons why disbursement year cash flows cannot be prepared, these reasons should be documented. On the other hand, if disbursement year cash flows are available, the auditor should determine whether the use of cohort level cash flows has had a material effect on the subsidy calculation. A determination that an effect is material should take into account the size of the difference in absolute terms and relative to the subsidy, the effect on the level of loans supported by the subsidy, and other factors the auditor may consider important. If the auditor determines that the effect is material, the auditor should recommend that the agency prepare cash flows on a disbursement year basis to eliminate the problem. If the agency is unable to do this, the auditor should exercise professional judgment to determine whether there is a potential for material misstatement and whether this situation would affect the ability to conclude on the fairness of the amounts in related accounts.

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### **Compare Cash Flow Spreadsheet and Related Subsidy Rate With Prior Years**

Credit reform and the CSM require credit agencies to develop spreadsheets of projected cash flows, which must be presented in a prescribed format and require the spreadsheet preparer to choose among various commands and options that properly characterize each credit program. Once an auditor has determined that a spreadsheet contains the proper format, commands, options, etc. for the credit program, then the auditor can have some assurance about future years' cash flows with the same formats, commands, options, etc. If changes in formats or commands on the cash flow spreadsheets have been made, auditors should discuss with agency officials why such changes were made, including what the changes are intended to accomplish. An auditor may wish to use analytical procedures each year to confirm that any changes to the credit program are properly reflected in the spreadsheet and that changes to the spreadsheet and associated subsidy rate, including components, are reasonable. For example, if an agency's fee structure has not changed, the auditor should expect the subsidy rate component attributable to fees to remain the same.

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**Evaluate Agency Security**  
**Controls Over CSM Access**

OMB's assertions state that agencies are responsible for ensuring that the CSM has not been corrupted or otherwise inappropriately changed. Such assurance requires that agencies have procedures in place to limit access to the CSM to authorized personnel only.<sup>2</sup> For example, the auditor might expect to find procedures to ensure confirm password protection on the desktop workstation where the CSM resides. The auditor should review these procedures and determine if they are in place to verify that they adequately protect the CSM from unauthorized use and corruption.

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<sup>2</sup>Agency access controls should be implemented for the CSM copy that is used to produce the agency's official subsidy rate calculations.

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