

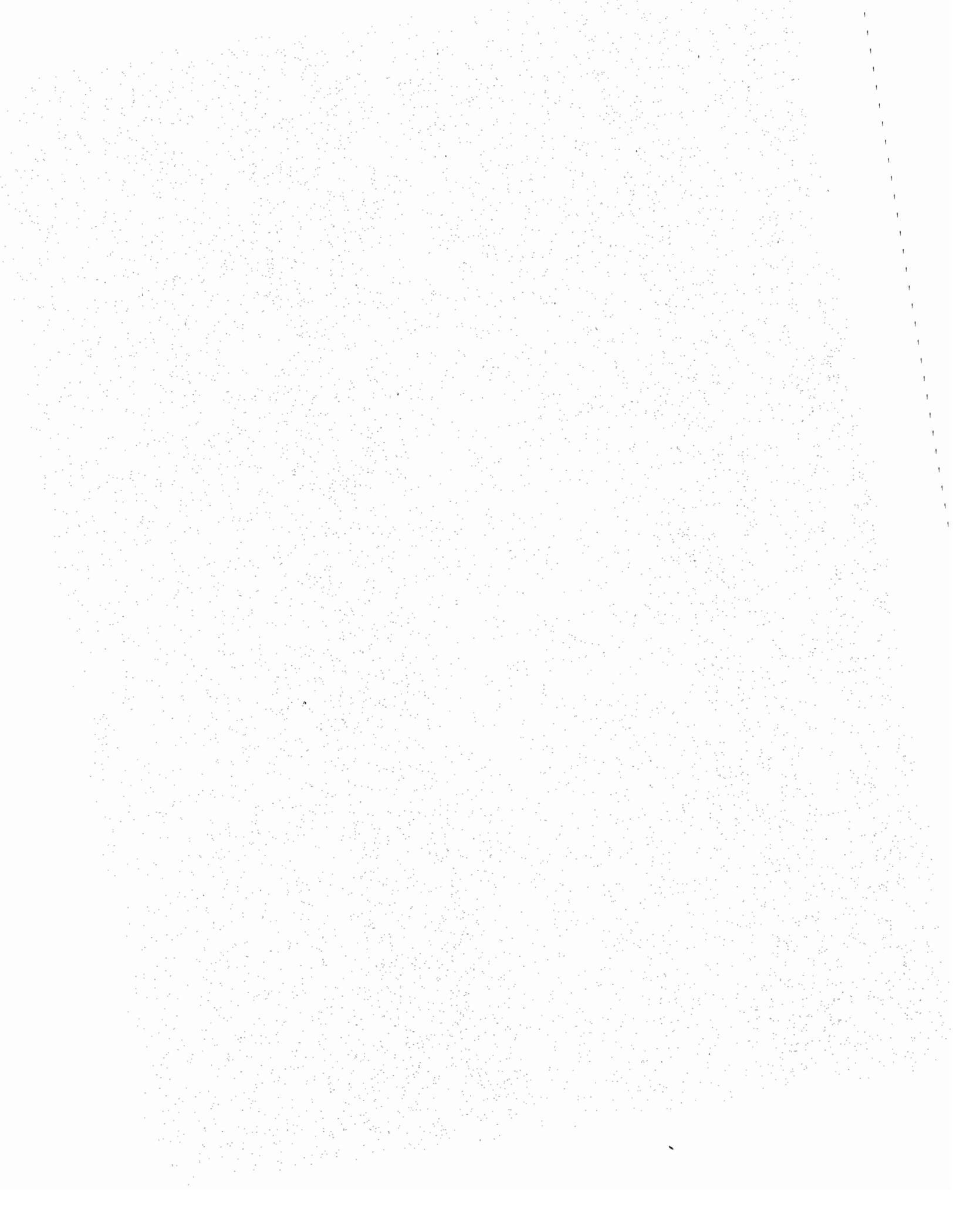
**Conference on the Economics of
Federal Credit Activity
Part I—Proceedings**

Special Study
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CONGRESSIONAL BUDGET OFFICE



CONFERENCE ON THE ECONOMICS OF FEDERAL CREDIT ACTIVITY

PART I - PROCEEDINGS

April 10-11, 1980

The Congress of the United States

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PREFACE

At the request of the House Budget Committee's Task Force on the Budget Process and the House Banking Committee's Subcommittee on Economic Stabilization, the Congressional Budget Office (CBO) conducted a conference on the Economics of Federal Credit Activity on April 10-11, 1980, in Washington, D.C.

Knowledge of the economic consequences of federal credit activity--in particular, the consequences of direct loans and loan guarantees--is fragmented and incomplete. Recent events have emphasized the need to improve understanding of the effects of credit programs on economic activity and the capital markets.

In 1980, for the first time, an Administration has proposed and the Congress has considered targets for the total level of federal credit. These first steps toward a federal credit budget reflect a realization that current budget techniques, with their focus on direct spending and taxes, have not provided adequate means of controlling the annual levels of federal credit programs, which have grown more rapidly in recent years than have direct expenditures.

The conference had two goals. The first was to encourage empirical research into the economic effects of federal credit. The papers prepared for the conference represent a first step toward filling in understanding of the effects of credit programs. The second goal was to bring together researchers with an interest in federal credit and those who operate federal credit programs, to stimulate dialogue between researchers and policymakers. CBO believes the conference was successful in achieving both goals.

The proceedings of the conference are being published in two parts. This volume, Part I, contains the summaries of the prepared papers by their authors, the formal comments offered by the discussants, and the discussion between the authors, discussants, and members of the audience for each of the conference's topical sessions. The first session presents an overview of federal credit activity and the issues it raises. It also contains a brief summary of the papers and the discussion presented in the seven

topical sessions. Part II of the proceedings, to be published shortly, will contain the text of the prepared papers.

John D. Shillingburg of CBO's Budget Process Unit was the conference coordinator. Marvin Phaup of the Fiscal Analysis Division served as chairman of the conference sessions and editor of the proceedings. Patricia H. Johnston provided additional editorial assistance and Debra M. Blagburn typed this volume for publication.

Alice M. Rivlin
Director

December 1980

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SESSION I. A GENERAL OVERVIEW OF FEDERAL CREDIT ACTIVITY AND
SUMMARY OF CONFERENCE PROCEEDINGS

Marvin Phaup, Congressional Budget Office, presented a general overview of federal credit activities at the opening session of the conference. He also prepared a brief summary of the conference proceedings for this publication.

OVERVIEW

Yesterday a friend called me and said, "You are going to have to be careful about what you say at that conference tomorrow because not much is known about the effects of federal credit. In fact, you ought to try to follow the example of former Senator and Secretary of State Cordell Hull, who was the absolute master of the careful and precise statement. Once Cordell Hull was riding the train through Montana when a companion pointed to a herd of sheep and said, 'Those sheep have just been sheared.' Hull looked at the sheep and said, 'Yes, sheared on this side, at least.'"

So with a measure of Cordell Hull's caution, I offer these remarks about the uncertain area of the economics of federal credit.

Much, if not most, government activity attempts to modify the allocation of resources among uses and the distribution of income and wealth among individuals. At least four types of instruments are used to effect these changes: expenditures, taxes, regulations, and credit policies. This conference is concerned with two kinds of the last activity: direct loans and loan guarantees issued by the federal government.

Most analysts and policymakers have a view or general impression about the merit and effectiveness of federal credit activities, but it is clear that these opinions vary widely. For example, some appear to believe that federal credit is a reasoned and reasonable approach to correct commonly observed market failures. Others allege that these activities are an unwarranted intrusion by government into well-functioning credit markets.

Many Congressmen view federal credit programs as an appropriate response to legitimate constituent needs, and many observers regard these programs as something government ought to do to aid those in special and adverse circumstances. Others, however, regard these programs as just another means by which the politically favored are aided at the expense of the disfavored.

I suspect that what is common to all of these views about federal credit is a growing uncertainty about the exact nature of these programs and their effects. This uncertainty might be expressed as follows: We have a diverse set of government activities which, for convenience, we lump under the general heading of federal credit. These activities are numerous, large in dollar terms, and growing rapidly. We are not certain why this growth is occurring but we have suspicions, some darker than others. Because of their size and growth and because of the nature of these activities, we believe that the consequences for the economy and for individual citizens may be significant, but we are not even certain of that. Moreover, while some of these suspected consequences are regarded as beneficial, others are clearly harmful and we are not sure that the benefits outweigh the harms.

Ordinarily, if the bad effects of an activity exceed the good effects, it would be expected that either market or government action would suppress those activities, but in this case there are fears that the costs, or "bads," are too dimly perceived to trigger a remedy if, indeed, a remedy is required. The problem is to resolve some of these uncertainties in order to determine if remedial action is required.

Let me be more specific.

One indication of the size of federal credit activity is provided in Table 1. In fiscal year 1979, new direct loan obligations and new loan guarantee commitments totaled \$138 billion. This total, which excludes the federally sponsored, privately owned credit enterprises such as the Federal National Mortgage Association (FNMA), is larger than the national defense budget and equals about 35 percent of gross private domestic investment. Assuming that the recipients of credit assistance could have borrowed without government help at an interest rate of 13 percent, the present value of new commitments made in 1979 is estimated to have been \$24 billion.

TABLE 1. FEDERAL CREDIT ACTIVITY, SELECTED FISCAL YEARS (Billions of dollars)

	Actual			Estimated	
	1970	1976	1979	1980	1981
New Direct Loan Obligations	10.6	17.2	51.4	61.2	63.1
New Loan Guarantee Commitments <u>a/</u>	<u>27.5</u>	<u>26.1</u>	<u>86.9</u>	<u>90.2</u>	<u>100.6</u>
Total	38.1	43.3	138.3	151.4	163.7

SOURCE: Budget of the United States Government, Special Analyses, various years.

a/ Primary guarantees. Secondary guarantees and guarantees acquired by on- and off-budget agencies have been deducted to avoid double counting.

But what do these numbers mean? They certainly mean that the size of federal credit is not trivial. Yet, simply summing the face value of new loans and guarantees does not provide a measure of the force of federal credit. The aggregation is too heterogeneous. It includes, for example, the following:

- o The basic home mortgage insurance program of the Federal Home Administration (FHA) in which almost all the risk and cost is borne by borrowers;
- o Low-income rental housing guarantees in which almost all the interest and principal is paid by taxpayers;
- o Rural Electrification Administration (REA) loans, which have a low probability of default but carry a low interest rate of five percent (in fact, an interest subsidy); and
- o Commodity Credit Corporation (CCC) price support, nonrecourse loans to farmers.

One of the sources of difficulties in measuring these diverse activities is an ambiguity in what the measure is supposed to reflect. The dominant objective in the past seems to have been to measure, for a single budget year, the government's financing requirement generated by credit activities. Thus, new loans are netted against repayments in the unified budget and only the administrative costs of guarantees are shown at the time of commitment. Suggestions for budgetary reform have focused on extending the time horizon by estimating the probability of default, the government's contingent liability, and the future cost of interest subsidies. 1/

Only the most tentative steps have been taken, however, to implement such changes because it is technically very difficult to make credible estimates of these magnitudes. One reason is that the risk attached to a government loan or guarantee is not independent of other actions government can take to avoid a default, such as regulatory waivers to aid a particular borrower.

But there are clearly more important magnitudes than the government's financing costs to be measured in federal credit. These include the effects on resource allocation, on the level of income, and on the distribution of income. These magnitudes are, at best, dimly reflected in current federal credit statements.

Federal credit is extended for a variety of purposes as shown by budget function in Table 2; but, for reasons that are not altogether clear, it is concentrated in housing credit, agriculture, international assistance, veterans' benefits, and income security--the latter two consisting mostly of housing assistance.

The number of discrete credit activities within certain budget functions is very large, as is demonstrated in the incomplete but lengthy listing of domestic credit programs contained in

1/ See, for example, Testimony of Barry Bosworth in Loan Guarantees and Off-Budget Financing, Hearing before the Subcommittee on Economic Stabilization of the House Banking Committee, Subcommittee on Oversight of the Ways and Means Committee, and the Tax Expenditure Task Force of the House Budget Committee (November 1976), pp. 39-42. (Cited subsequently by title of testimony.)

TABLE 2. FEDERAL CREDIT ACTIVITY BY FUNCTION, FISCAL YEAR 1979
(Billions of dollars)

	New Direct Loan Obligations	New Loan Guarantee Commitments
International Affairs (150)	5.5	12.2
General Science, Space, and Technology (250)	--	0.2
Energy (270)	1.3	6.0
Agriculture (350)	14.2	5.8
Commerce and Housing Credit (370)	24.4	85.1
Transportation (400)	0.9	1.1
Community and Regional Development (450)	3.3	2.9
Education, Training, Employment and Social Services (500)	0.7	3.3
Health (550)	0.1	<u>a/</u>
Income Security (600)	0.3	13.0
Veterans Benefits and Services (500)	0.6	17.6
General Purpose Fiscal Assistance (850)	0.1	0.5
	<hr/>	<hr/>
Total	51.4	147.7
Less Secondary Guarantees and Guarantees of Direct Loans	--	- 60.7
		<hr/>
		87.0
Rounding Error	--	- 0.1
	<hr/>	<hr/>
Total	51.4	86.9

SOURCE: Office of Management and Budget.

a/ Less than \$50 million.

the Community Services Administration file on the Geographic Distribution of Federal Funds (see Table 3). In the Department of Agriculture, for example, credit assistance is available for housing, purchasing and improving farm land, purchasing a business, constructing and improving community facilities, financing disaster rehabilitation, converting farms to recreational enterprises, acquiring building sites, increasing farm efficiency, improving timber production, and for other purposes.

Additional credit assistance programs are shown in Table 3 and some new credit programs in Table 4. The information supplied in these tables leads naturally to the question: Why are there so many credit programs and how did they get so big?

One way to frame an answer is to consider the most frequently cited objectives of government credit. These include:

- o To correct market imperfections arising out of incomplete knowledge, which leads to biased estimates of risk by private market agents.
- o To correct for discrepancies between the social value of an investment and its private value (or "externalities").
- o To redistribute income and wealth.
- o To assist in stabilizing economic activity.
- o To compensate for the unintended effects of other government policies and regulations, such as emission control standards and interest rate ceilings.

Given these objectives, one might argue that as the demand for correcting market and government failures, for redistributing income, and for economic stability has increased so has federal credit activity.

Another explanation for the growth of federal credit focuses on the asymmetry between the well-defined, localized benefits of federal credit and its diffused, hidden costs. Because of the way credit programs are treated in the federal budget, it is possible to grant one dollar to a beneficiary without the dollar showing up in the budget. Not only are new direct loans netted

TABLE 3. SELECTED FEDERAL DOMESTIC CREDIT ASSISTANCE PROGRAMS,
FISCAL YEAR 1979

Assistance Program	Catalog of Federal Domestic Assistance, Index Numbers
Department of Agriculture	
Commodity loans, CCC	10.051
Rural telephone bank loans, Rural Electrification Administration (REA)	10.852
Self-help housing land development loans, Farmers' Home Administration (FMHA)	10.411
Storage facility and equipment loans, Commodity Credit Corporation (CCC)	10.056
Very low-income housing repair loans, FMHA	10.417
Above moderate-income housing loans, FMHA	10.429
Business and industrial loans, FMHA	10.422
Community facilities loans, FMHA	10.423
Economic emergency loans, FMHA	10.428
Emergency disaster loans, FMHA	10.404
Emergency livestock loans, FMHA	10.425
Farm labor housing loans, FMHA	10.405
Farm operating loans, FMHA	10.406
Farm ownership loans, FMHA	10.407
Farm ownership nonfarm enterprise loans, FMHA	10.407
Financing PL-480 credit sales, CCC	none
Grazing association loans, FMHA	10.408
Indian tribes & tribal corp. loans, FMHA	10.421
Irrigation/drain & other sewer and water construction loans, FMHA	10.409
Low- to moderate-income housing loans, FMHA	10.410
Recreation facility loans, FMHA	10.413
Resource construction and development loans, FMHA	10.414
Rural electric loans and loan guarantees, REA	10.850
Rural housing site loans, FMHA	10.411
Rural rental housing loans, FMHA	10.415
Rural telephone loan guarantees, REA	10.851
Soil and water loans to individuals, FMHA	10.416

(Continued)

TABLE 3. (Continued)

Assistance Programs	Catalog of Federal Domestic Assistance, Index Numbers
Department of Agriculture (continued)	
Water and waste disposal systems loans, FMHA	10.418
Watershed protection loans, FMHA	10.419
Department of Commerce	
Economic development-business development assistance, loans and guarantees, Economic Development Administration (EDA)	11.301
Economic development trade adjustment assistance, EDA	11.309
Federal ship financing guarantees, Maritime Administration (Mar)	11.502
Fishermen-reimbursement of losses, National Marine Fisheries Service (NMFS)	11.410
Fishery vessel obligation guarantees, NMFS	11.415
Department of Health, Education, and Welfare	
National direct student loans, Office of Education (OE)	13.471
Health education assistance loans, OE	13.574
Higher education act insured loans, OE	13.460
Medical facilities construction - loans and loan guarantees, Health Resources Administration (HRS)	13.253
Department of Housing and Urban Development	
Section 312 rehabilitation loans, Community Planning and Development (CPD)	14.220
Loan insurance--major home improvements, Housing (H)	14.108
Mobile home loan insurance, H	14.110
----- (Continued)	

TABLE 3. (Continued)

Assistance Programs	Catalog of Federal Domestic Assistance, Index Numbers
Department of Housing and Urban Development (continued)	
Mortgage Insurance (Mtge. Ins.)--condominium homes, H	14.133
Mtge. Ins.--experimental homes, H	14.152
Mtge. Ins.--home coinsurance program, H	14.161
Mtge. Ins.--homes, H	14.117
Mtge. Ins.--hospitals, H	14.128
Mtge. Ins.--mobile home parks, H	14.127
Mtge. Ins.--nursing homes, H	14.129
Mtge. Ins.--redevelopment homes, H	14.122
Mtge. Ins.--group practice, H	14.116
Mtge. Ins.--condominium housing projects, H	14.112
Mtge. Ins.--graduated payment mortgage program, H	14.159
Mtge. Ins.--homes for certified veterans, H	14.118
Mtge. Ins.--homes for special credit risks, H	14.140
Mtge. Ins.--homes in declining areas, H	14.123
Mtge. Ins.--homes in outlying areas, H	14.121
Mtge. Ins.--land development and new communities, H	14.125
Mtge. Ins.--low/moderate-income housing-market interest rate, H	14.137
Mtge. Ins.--low/moderate-income family homes, H	14.120
Mtge. Ins.--lower-income family homes, H	14.105
Mtge. Ins.--multifamily supplemental loans, H	14.151
Mtge. Ins.--purchase/refinish existing housing, H	14.155
Mtge. Ins.--redevelopment housing projects, H	14.139
Mtge. Ins.--rental housing assistance projects, H	14.103
Mtge. Ins.--rental housing for the elderly, H	14.138
Mtge. Ins.--rental housing projects, H	14.134
Mtge. Ins.--sales type cooperative projects, H	14.115
Mtge. Ins.--sales type cooperative homes, H	14.132
Property improvement loan insurance, H	14.142

(Continued)

TABLE 3. (Continued)

Assistance Programs	Catalog of Federal Domestic Assistance, Index Numbers
Department of the Interior	
Irrigation distribution system loans, Bureau of Reclamation (LBR)	15.501
Irrigation systems rehabilitation and betterment, LBR	15.502
Indian loans, claims assistance, Bureau of Indian Affairs (BIA)	15.123
Small reclamation projects, LBR	15.503
Indian loans, economic development, BIA	15.124
Small Business Administration	
Air pollution control loans and guarantees	59.025
Base closing economic injury loans and guarantees	59.020
Consumer protection loans and guarantees	59.017
Displaced business loans and guarantees	59.001
Economic dislocation loans and guarantees	59.027
Economic injury disaster loans and guarantees	59.002
Economic opportunity loans and guarantees	59.003
Emergency energy shortage loans and guarantees	59.022
Handicaped assistance loans and guarantees	59.021
Occupational safety and health loans and guarantees	59.018
Physical disaster loans	59.008
Regulatory--other loans	59.028
Small business energy loans and guarantees	59.030
Small business investment companies	59.011
Small business loans and guarantees	59.012
State and local development company loans and guarantees	59.013
Water pollution control loans and guarantees	59.024

(Continued)

TABLE 3. (Continued)

Assistance Programs	Catalog of Federal Domestic Assistance, Index Numbers
Veterans Administration	
Disabled veterans' direct home loans	64.118
Veterans' direct loans	64.113
Mobile home loans	64.119
Veterans' guaranteed and insured loans	64.114

SOURCE: Community Services Administration, Geographic Distribution of Federal Funds, 1979.

NOTE: Some notable credit activities missing from this listing are: international assistance funds, Government National Mortgage Association, Department of Transportation Railroad programs, New York City guarantees, and the Export-Import Bank. The Catalog of Federal Loan Guarantee Programs, printed by the Subcommittee on Economic Stabilization of the House Committee on Banking, Finance and Urban Affairs, September 1977, listed 164 guarantee programs (some had not been implemented and a few had been discontinued).

TABLE 4. NEW CREDIT PROGRAMS BEGINNING IN FISCAL YEAR 1980, FIRST YEAR OBLIGATIONS (Estimated, millions of dollars)

Program	Obligation
Direct Loans	
Energy Security Trust Fund	50
National Consumer Cooperative Bank	54
Guarantees	
Energy Security Trust Fund	333
Energy Security Reserve	1,500
Energy Security Corporation	800
Chrysler Corporation	940
TVA Seven States Energy Corporation	1,371

SOURCE: Budget of the United States Government Fiscal Year 1981, Special Analysis F.

against repayments, but these are reduced further in the budget by loan sales to the off-budget Federal Financing Bank. ^{2/} Also, loan guarantees have trivial budgetary effects in the year in which they are issued. Thus, as Bruce MacLaury has observed, federal credit has ". . . permitted Congress and the Administration to claim that wonder of wonders--something for nothing, or almost nothing." ^{3/}

^{2/} Congressional Budget Office, Federal Credit Activities: An Analysis of the President's Credit Budget for 1981, Staff Working Paper (February 1980), pp. 13-18.

^{3/} Bruce K. MacLaury, "Federal Credit Programs--the Issues They Raise," Issues in Federal Debt Management, Conference Series No. 10, Federal Reserve Bank of Boston (1973), p. 214.

But, of course, federal credit does have costs. These include, first of all, the investment opportunity cost. To the extent that federal credit activity changes the composition of investment without increasing its level, a different income flow results. Federal credit assistance is thought to encourage capital-intensive processes and the undertaking of more risky projects than would otherwise occur. ^{4/} Income will be reduced if less productive projects are implemented. Coincidentally, the sharp increase in federal credit since 1976 has accompanied a slowdown in U.S. productivity growth.

A second cost of federal credit activity is the deadweight loss resulting from the taxes necessary to finance the cost of program administration, the subsidy, and the government's liability in case of default. A third cost of federal credit is the cost of government actions taken to prevent a threatened default from occurring. A fourth is the diminished ability of credit markets to evaluate risk as more and more transactions bear a government guarantee. Finally, there is the risk that, once the legitimacy of federal credit is established, it will become an instrument of narrow political interests.

Though these costs may be significant, they are extremely difficult to quantify. Thus, what is most needed is knowledge and measurement of the consequences of federal credit activities. CBO believes that the papers presented at this conference contribute to meeting this need.

A BRIEF SUMMARY OF THE CONFERENCE PROCEEDINGS

In the first paper, "Macroeconomic Consequences of Federal Credit Activity," Mary Kay Plantes and David Small consider, within a general equilibrium framework, those factors that tend to diminish the ability of federal credit programs to increase the flow of credit and resources into those sectors that the government wants to assist. Their analysis identifies a number of possible induced behavioral changes, including financial disintermediation and the

^{4/} Allen Ferguson, Loan Guarantees and Off-Budget Financing, pp. 47-50.

crowding out of equity positions in the targeted sector, that can offset and reverse the intended flow of resources.

The discussant, George von Furstenberg, argued, however, that previous efforts at general equilibrium analysis of federal credit, similar to that of Plantés and Small, have not found substantially different resource allocation effects from those identified by more narrow partial-equilibrium approaches. In both cases, federal credit programs have been found to be either partly or wholly ineffective in reallocating resources. According to von Furstenberg, the political usefulness of a credit program depends mostly on its ability to deliver a subsidy, rather than its success in changing resource allocation.

Herbert Kaufman, in "Loan Guarantees and Crowding Out," investigates the extent to which federal credit activities crowd out investment in nonfavored sectors. By applying the existing crowding-out model of federal debt to federal loan guarantees, Kaufman estimates that a \$1 billion increase in federal loan guarantees displaces between \$0.7 billion and \$1.6 billion in other investment.

Discussant Kevin Villani disputed the applicability of the federal debt crowding-out model to loan guarantees. According to Villani, federal debt issues to finance government expenditures remove funds from the flow of saving, principally for the purpose of financing consumption. Guarantees do not. Instead, they only change the characteristics of securities which finance investment. Guarantees may change the composition of investment but they do not reduce it in aggregate as federal debt does. Villani argued that an analytic framework for federal guarantees must distinguish actuarially sound programs from subsidy programs. Actuarially sound guarantees, those for which fee income is equal to default losses and other costs, constitute a capital market-perfecting intervention by government, if they survive in the face of unconstrained competition by private suppliers. Such programs increase the efficiency of the capital stock and should not be subject to nonmarket limitation. Subsidized programs, in contrast, tend to reduce capital efficiency and may need to be restricted.

The third paper, "Subsidies in Government Credit Programs" by William Silber and Deborah Black, assesses the incidence of federal credit program benefits. It asks, who benefits and what determines the distribution of benefits? Silber and Black identify two

variables, the extent of the subsidy and the elasticity of supply of credit, that, though frequently unknown, are crucial to identifying the incidence of benefits. They urge increased efforts at empirical measurement of these variables. Discussants Anthony Downs and Kevin Villani objected to the Silber-Black procedure of classifying actuarially sound credit programs as "implicit" subsidies. According to Downs and Villani, if a program costs nothing, it is not a subsidy and should not be so analyzed. Thus, according to this argument, the FHA basic insurance program and the secondary market operations of GNMA, for example, do not fit into the Silber-Black "general theory of subsidies in government credit." Others disagreed that "actuarially sound" programs lack a subsidy element.

The James Barth, Joseph Cordes, and Anthony Yezer paper, "Federal Government Attempts to Influence Mortgage Credit," analyzes the activities of FHA as an experimental method of generating data about the riskiness of various types of mortgages. Where FHA succeeds in identifying unexploited, profitable lending opportunities, private firms follow the FHA lead as they did, for example, in making high loan-to-value mortgages in the 1930s and 1940s. However, the heavy loss experience of FHA on some types of inner-city loans has had a predictable, if undesired, demonstration effect on private lenders. Discussant John Tuccillo emphasized that efforts to compel private institutions to repeat the FHA inner-city experience, such as the Community Reinvestment Act, amount to imposing the cost of a public policy on private mortgage institutions.

In "Moral Hazard, Adverse Selection, and SBA Business Loan Guarantees," William Hunter, drawing on earlier studies of private market failure in the provision of insurance, characterizes an ideal insurance system and compares an SBA business loan guarantee program to this ideal. He argues that the SBA insurance system could be improved by replacing the fixed fee (1 percent of the amount insured) with a variable fee structure in which the premium varies with risk.

Discussant Ira Kaminow disagreed with Hunter's judgement that SBA guarantees are intended to correct a failure of private insurance markets. Instead, Kaminow argued, SBA is simply a mechanism for delivering subsidies to small businesses. For Kaminow, the relevant analytical issue is whether SBA is efficient at providing subsidies.

In "The Effect of Federal Loan Guarantees on Small Entrepreneurs," Christopher Baum examines the electric and hybrid vehicle loan guarantee program to determine the likelihood that it will succeed in its objective of eliciting an ongoing, large-scale production of electric vehicles. Baum argues that the effective guarantee ceiling of \$3 million per firm is too low to permit the program to succeed. He recommends that either the guarantee be increased to \$8 million or that the program be terminated. Discussant Daniel Reingold objected to Baum's analysis on the grounds that if an \$8 million guarantee would clearly assure the future profitability of an electric vehicle producer, private capital markets would finance the venture without guarantees.

Philip Jones and Scott Mason, in "Valuation of Loan Guarantees," use a contingent claims method to estimate the market value of debt guarantees and to investigate the incentive effects of guaranteeing different classes of junior and senior debt. As an example, Jones and Mason estimate that the guarantee of \$750 million of Chrysler debt had a cash equivalent value of \$450 million. Discussant Howard Sosin questioned the appropriateness of government guarantees of business debt which, he said, subsidize shareholders rather than projects.

At the concluding session, participants were invited to suggest priorities for research into federal credit. The conference was also asked to speak to the following questions:

- o Given the extent to which the effects of federal credit are unknown, how should CBO respond to Congressional requests for analyses of credit programs, singly and in aggregate?
- o Where should CBO concentrate the limited research resources that it can devote to federal credit?
- o What benefits, if any, are to be expected from placing a limit on the annual growth of federal credit?

Participants' views varied widely. Some suggested that more detailed and timely data on the operation of individual credit programs were needed. Some urged continued efforts at the development of general macroeconomic-models incorporating a federal credit sector. Others believed that microeconomic-program analysis should

be the first priority. Several suggested that CBO should emphasize the cost of federal credit and leave the documentation of benefits to others.

The imposition of an effective ceiling on federal credit, even if derived somewhat arbitrarily, was applauded by many participants. Most seemed persuaded that these programs involve waste and inefficiency. A cap was seen as a means of creating pressures to identify and eliminate ineffective features of federal credit.

One of the findings of the conference that seems potentially very fruitful is the necessity of distinguishing actuarially sound, capital market-perfecting programs from other federal credit activities. When government is able to provide a financial service, unprotected from competition by private suppliers, at a price which covers the cost of administration, defaults, and an appropriate return to capital, the allocation of capital moves closer to a perfect markets outcome (Villani, Downs). Such a government intervention is Pareto-optimal--that is, potentially at least, it can make some people better off without making anyone else worse off. The essential question, however, is whether any such interventions exist now or could be instituted in the future. Claims have been made that the FHA basic homeownership guarantee program, FNMA, and GNMA constitute capital market-perfecting, actuarially sound interventions. This claim should be assessed.

Clearly, many federal credit programs are not self-supporting but rather involve substantial, but hard to measure, subsidies, that is, "economic assistance provided to the producers or consumers of a product, at the expense of others..." (Downs). It is the magnitude and incidence of these subsidies, with attendant reallocation effects, that is the object of the move to "control" federal credit. The conference seemed to suggest that one way to achieve such control, without restricting the possibility of Pareto-optimal interventions, would be to price federal credit services on an actuarially sound, full-cost basis and to grant explicit cash subsidies to target groups and activities.

SESSION II. MACROECONOMIC CONSEQUENCES OF FEDERAL CREDIT ACTIVITY

Mary Kay Plantes and David Small, University of Wisconsin, Madison, prepared the paper for this session. Ms. Plantes summarized their findings. (The full paper is printed in Part II.)

George von Furstenberg, International Monetary Fund, offered formal comments on the paper.

SUMMARY OF PAPER

The goal of our research has been to develop a general framework that allows us to think systematically about the macroeconomic consequences of federal credit activity. In no way is this a complete analysis with all the final answers about what federal credit activity does to output and prices. It is just a beginning, but we hope a fruitful beginning.

In our current research we are focusing specifically on the following question: Can federal credit programs reallocate credit flows and, if so, what is the effect of this reallocation on output and prices?

When analysts discuss federal credit programs, they often presume that the programs can in fact reallocate credit and, through this means, reallocate real resources. For example, if unutilized resources exist, as happens during recessions, federal credit programs are presumed to channel excess savings to the targeted sectors. At full employment, on the other hand, federal credit programs are presumed to reallocate credit from one sector to another, from a sector that would have received a lot of credit without the government program to another sector that would have received very little credit without the government program.

Our paper demonstrates that the model underlying this presumption is in fact a very naive model.

Let's think about how a federal credit program works in general. Suppose, for example, that the government wants to increase the supply of housing in the United States. Rather than paying someone to produce more houses, it chooses a credit program that changes the amount of credit financial markets allocate to housing. For example, the government may guarantee mortgages. Because the guarantee reduces the risk of lending, banks are presumed to supply more mortgage funds to the housing sector.

The important point of our paper is that the value of the housing stock may change by less than the amount of the loan, or the housing stock may not change at all despite the loan or the guarantee of the government.

Before describing why this might occur, let's outline the three activities available to the government for changing the financial sector's allocation of credit: direct lending, loan guarantees, and the creation of secondary markets.

A direct loan arises when the private sector lends money to the government through a government bond or a Treasury bill and the government uses the proceeds to lend money to the private sector. A direct loan will initially increase the supply of loans to the targeted sector if individuals will lend more to the government than they would to private borrowers at a given interest rate.

With a loan guarantee the government makes private loans less risky and, therefore, we expect an initial increase in the supply of loans to the targeted sector.

Finally, when the government creates a secondary market by buying and selling existing assets such as mortgages, the government reduces the liquidity risks associated with holding a mortgage, and that should increase the supply of loans to the mortgage market.

These activities may or may not contain a subsidy element. The delivery mechanism for these programs is highly complex. Many programs are delivered off-budget, and there is a Federal Financing Bank which effectively transforms on-budget activities into off-budget activities.

Our strategy for modeling this complex process was to treat all government credit activities, whether they are on-budget or off-budget, whether they operate through a federally sponsored

credit agency or not, as being part of one entity called the Treasury, and to assume that the Treasury acts like a bank. It borrows from the public and relends to the public. It issues loan guarantees and it buys and sells existing assets, thereby creating a secondary market. Whether or not the Treasury acting as a bank can affect real resource allocation depends on whether or not the programs affect the price signals that producers of capital receive from the financial sector.

Let's think about the naive model which tells us that federal programs work. Consider Figure II-1. In the naive model, the federal credit program shifts the supply of housing loans outward from S_0 to S_1 . The program thus lowers the rate on mortgages from r_0 to r_1 . With lower mortgage rates, the quantity of funds borrowed will increase to Q_0 from Q_1 . With a larger quantity of housing being demanded, the price of housing begins to go up. This higher price signals producers to supply more houses.

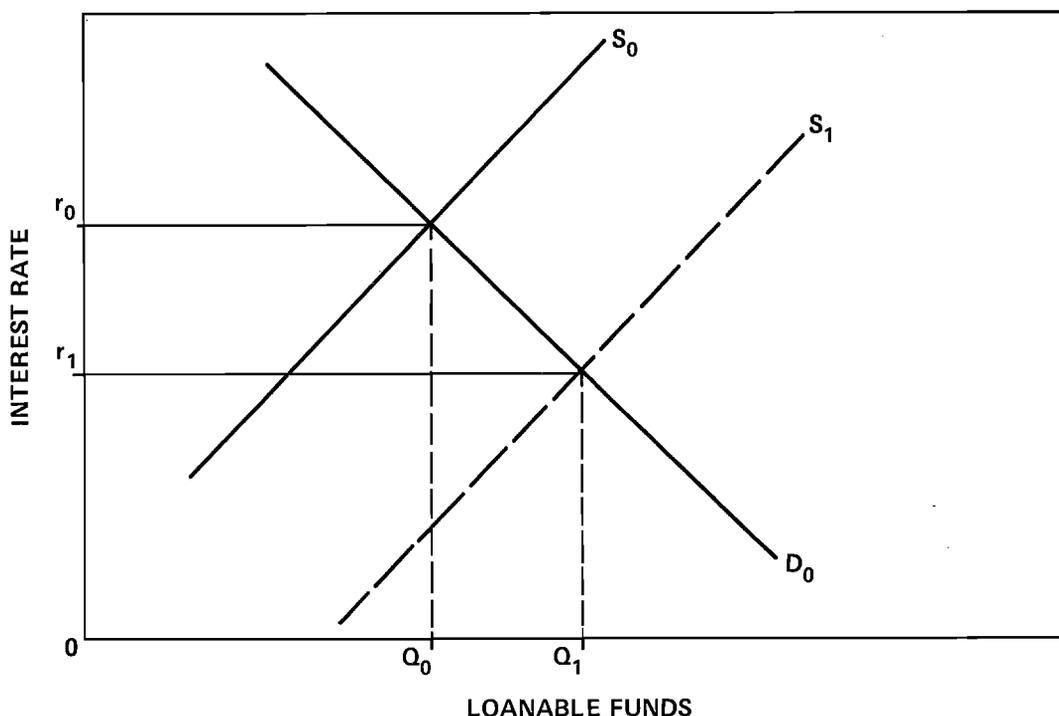
Our model differs from this very simple model in a number of ways. First of all, this simple model considers only two markets: the mortgage market and the housing market. What we are proposing, instead, is a general equilibrium approach. This means that we are going to take account of how these changes affect other markets and how the feedback from these markets affects the mortgage and the housing markets. These feedback effects will offset and may negate the move toward lower interest rates and the increased flow of funds suggested by the naive model illustrated in Figure II-1. Effects occur in other markets that also have macroeconomic implications. For example, if a bank is supplying more loans to housing, it will be supplying fewer funds to some other sector.

Secondly, we want to take account of the fact that some credit programs require the government to increase the supply of government debt. This increase in debt will have effects on the housing and mortgage market.

Additionally, we recognize that new production takes time. Thus, at any single point in time, the stock of housing is fixed. We also assume that households view housing as a capital asset. Households evaluate this asset relative to other assets such as government bonds or deposits in financial institutions.

In our model, federal credit activity has the following transmission mechanism. A larger volume of loans to the targeted sector will reduce the loan rate in that sector. That will lead to

Figure II-1.



a higher level of demand for assets in that sector, raise asset prices, and signal producers to supply more of these assets, such as housing.

In the present paper, we are looking solely at the financial sector. Using our model we find a number of ways in which the private sector undoes what the government hopes to do with these credit programs. These include reductions in private lending in response to federal credit programs and the diversion by households of loan proceeds to purposes other than those intended by the government. These two behavioral responses might be big enough to reverse totally the intent of the government credit program.

Consider, for example, a rural housing development program administered by the Farmers' Home Administration, whose goal is to increase the number of homes in rural areas. It will help if we

think about rural housing demand as consisting of two parts: equity demand, the demand that is financed by wealth, and debt demand, that which is financed either by a loan from the government through a federal credit program or by a loan from the private sector.

In the naive model, when the government increases loans to rural homeowners by \$10 billion, you get a \$10 billion increase in demand, and that extra demand will signal producers to supply more rural homes. This won't happen when you take a general equilibrium approach. First of all, the federal credit program may lead to a smaller amount of private-sector loans for rural housing development. To see how this occurs, consider how the government financed the extra loans. It had to issue more bonds. Issuing more bonds drives up the rate of return on bonds. When the bond rate goes up, individual households pull money out of banks because bonds are now more attractive. This is what we mean by disintermediation. In turn, banks have fewer funds available to lend to rural housing (and for all other purposes) and as a result the \$10 billion extra government loans may crowd out two or three billion dollars of private-sector loans.

The more regulations, such as Regulation Q, we have for our financial institutions the worse is disintermediation. It is also worse the more substitutable deposits are with government bonds.

Another thing is going on also. When the individual banker who used to supply loans to rural housing sees that the government bond rate has gone up but that the loan rate is being held down because of the government involvement in this sector, he realizes that bonds are a more profitable investment and may pull out of loans and put his assets into government debt rather than rural housing loans.

The net effect of government lending on the debt-financed portion of rural housing demand is thus smaller than the initial change in government loans, and it may be substantially smaller or negative, especially during periods of full employment.

Additionally, the equity-financed portion may decline in response to the federal credit program. This is called crowding out, and we identify two types of crowding out that might go on in response to the government credit activity.

The first is that the higher bond rates make bonds more attractive relative to equity holdings of housing. Thus, some households may choose to reduce their equity-financed investment in housing and put it into bonds and other assets whose returns are keeping up with the rate on bonds.

A second type of crowding out is more interesting. It arises if individuals who receive the federal loans cheat on the loans a little. "Cheating" works in the following way: Borrowers use loans in place of their own equity finance. For example, when loan rates go down, a number of people take out second mortgages on their homes. Loans are cheaper and they can use the finances received from the second mortgage to invest in assets whose real returns are high.

If individuals who receive government loans do this--that is, use their government loans to replace part of their equity demand for the targeted capital--then their freed wealth may be used to purchase other assets or consumption goods. The government cannot control precisely how the loan is in fact used. When this occurs, when extra government loans reduce private equity, we say that credit is fungible, and in the example I just mentioned it is fungible for the specific individual.

This is going to be very unlikely in the case of the "credit-starved" sector. For example, if small business is truly credit-starved, it is unlikely that the recipient of a small business loan will in fact use that loan to reduce his equity and put the funds into another asset. However, think about student loan guarantees, and the freed wealth of students and parents that might be used to purchase something other than education.

Even if credit is not fungible for the individual, it may be fungible in the aggregate. Fungibility again means that extra loans displace equity and, therefore, crowd out the demand for housing or the targeted capital. Aggregate fungibility will occur if the following conditions are met:

- o If there is a market for existing assets in the targeted sector. That is, there must be a competitive market for existing houses, for example, so that they can be bought and sold easily;
- o If the person who gets the loan uses it to buy an existing house rather than a new house; and

- o If the person who sells the existing house uses the proceeds from the sale to buy an asset other than a house.

When this happens, the extra demand generated by the government loan is met not by new houses but merely by a change in ownership of the housing stock. Thus, the government loan cannot assure an increased demand for housing or higher prices for producers or a larger housing stock. The degree to which the government-financed demand is met by changes in ownership depends on how substitutable home equity is with other assets.

For some programs this fungibility in the aggregate is very unlikely. For example, the borrower who receives a loan for synthetic fuel development is unlikely to find a lot of existing synthetic fuel plants. Therefore, this loan can lead to more synthetic fuel plants. But there is still the question of individual fungibility. Did this investor in the synthetic fuel plant reduce the equity component of his demand in response to the government loan?

In some sectors, there are highly developed markets for existing assets. A lot of federal credit programs go to purchasers of homes and we know that there is a large existing stock of homes that are bought and sold. In this case the loan guarantees and the direct loans and the creation of secondary markets may not increase the stock of housing at all but may encourage investors, especially large institutional investors, to pull out of the housing market in response to lower loan rates and higher government bond rates.

I should note that it is very difficult to devise policies to reduce effectively the fungibility of credit. Better targeting of loans, so that they apply to "credit-starved" persons, and restricting federally backed home loans to first mortgages or new homes may reduce fungibility, but cannot guarantee that no fungibility will occur.

To summarize, federal credit programs attempt to increase the loan supply, and in doing so increase the demand for the targeted capital. It is hoped that this higher demand signals producers to increase the stock of the targeted capital and the government gets what it wants. The message of our paper, however, is that private-sector responses may mitigate the excess demand pressure and thus reduce or even preclude the price increase that we wish producers

to receive. The two offsetting forces are, first, disintermediation and other forces that reduce private debt finance for the targeted capital; and second, crowding out of equity finance because of higher bond rates and credit fungibility.

Our paper is not empirical. It is hard to get data on how much disintermediation occurs, but what we show is that you can't be sure that these offsetting influences are small enough so that federal credit programs can produce their desired effects. In fact, we show that there are conditions under which exactly the opposite will happen in response to the credit program.

A lot of what I have said relies upon the government using bonds to finance the federal credit program, but we show in our paper that you really don't need extra debt issues to get these offsetting influences. For example, if the government imposes guarantees on loans you can still get these offsetting influences. You still have this whole fungibility issue, but secondly you have the fact that, when the banks lend more for loans to the targeted sector, they may reduce their demand for government bonds, and the reduced demand for government bonds on the part of the banks will increase the bond rate leading to the kinds of crowding out and disintermediation I have talked about. It is less likely that loan guarantees would work in a perverse way during a recession when banks have a lot of excess reserves, so that when they lend more they aren't reducing their demand for bonds.

We clearly have a lot to do. First of all, we want to find out how much our results depend on financial regulation. Then we want to consider, given that the price does change in response to the program, how that changes the supply of capital and what is the long-run effect of extra supply. For example, these programs might actually increase the housing stock, but, if they reduce the supply of machines and equipment, we might get a very different path of potential output than we do in the absence of these programs.

When we finish our whole model, we think we will be able to look at specific programs and comment on the possibility of crowding out, fungibility on the individual level, and so on, and thereby be of some assistance to the designers of programs.

We also want to look at effects other than reallocation. Many are concerned that federal credit programs may have a large effect on monetary policy. For example, these programs may increase the money supply. Banks currently have repurchase agreements that

allow them essentially to escape reserve requirements, and the higher the stock of government debt and agency debt, the more repurchase agreements they can make.

Secondly, we want to see how these programs affect the transmission mechanism of monetary policy. It might be that, in light of the large increase in federal credit programs in the last 10 years, a given interest rate now represents a looser economy in terms of how much credit is available than it did in past years. So we might want to rethink how monetary policy is working in light of these programs.

In summary, we find this a fascinating area. All we have tried to do is see how this thing works so that we can get a framework for future research that is more specific.

COMMENTS BY DISCUSSANT

George von Furstenberg. Without intending to detract from a generally very fine paper, I think it is no longer correct to claim that general equilibrium analyses of federal credit programs are rare. May I give just a few recent examples? A 1978 study, commissioned by the General Accounting Office, CED-78-155, entitled What Was the Effect of the Emergency Housing Program on Single-Family Housing Construction?, contains several papers in which a variety of macroeconomic offsets are considered and modeled though they are not found to be the main cause of the low "effectiveness" of the program.

Even recent evaluations of such instruments as mortgage revenue bonds, tax-exempt bonds for single-family housing, and Regulation Q show traces of general equilibrium thinking that range from mild to very pronounced.

For years officials at the Treasury and at OMB have rightly complained that it is impermissible to estimate the cost of federally subsidized lending by the difference between the subsidized rate specified in a program and the rate on Treasury securities currently prevailing. They were and are quite aware of the impact on federal borrowing costs of additional loan supply.

I would, therefore, recommend that the authors update their references beyond the Penner and Silber article published in 1973 and take a more generous view of what others have thought and written about.

Also in this vein, may one perhaps ask that James G. Witte be given credit for getting the point across in his 1963 Journal of Political Economy article on the "Microfoundations of the Social Investment Function" that there is no demand for investment but only for the capital stock, if newly produced and existing capital goods are perfect substitutes at a one-to-one rate? However, Tobin's recent work on the q ratio for nonfinancial corporations and ongoing research on tax factors discriminating between new and existing investments have tended to cast doubt on the notion that these are perfect substitutes.

Continuing with Tobin, the authors use his financial model, which is based on the assumption of gross substitutability among portfolio assets with respect to rates of return. The use of such models has become quite common. In the International Monetary Fund, for instance, they have been employed to analyze the probable effects of financial reforms in less developed countries (LDCs).

To make such models operational, one must attempt to get past the many Jacobian matrices whose determinants cannot be signed a priori and simultaneously attempt to reduce the coefficient set to empirically manageable dimensions while adding constraints and pertinent institutional specifics. One can then start linearizing some of the behavioral equations involving endogenous changes in portfolio fractions through Taylor-series approximations to see whether one can make a go.

One may also give careful thought to whether to treat business debt as a close substitute for government debt or as a close substitute for equity. Indeed, in recent work Tobin and Buiter have chosen to lump business debt together with shares to represent the sum total of claims to a business and to contrast this total, "equity," with government debt and money in a three-asset model. After concluding this analysis, Tobin-Buiter point out that no shortcuts are available in sweeping a priori claims because "the major policy issues cannot be solved by theoretical analysis alone but require empirical estimates of economic structure and behavior.

The present authors would undoubtedly subscribe to this assessment. Nevertheless, they have not pushed their analysis to be as conclusive as possible even on their own, purely theoretical terms. For instance, in the last part of their paper (Exercise 2) the authors appear to disclaim ability to ascertain whether the interest rate paid by borrowers (R_1) will rise or fall when an unrestricted subsidy which is fixed in percentage points and

payable to lenders is introduced for the particular type of loan (for Type 1 capital).

There is no question that the gross rate received by lenders must rise if they are to increase their investment in this type of loan. However, for the net-of-subsidy rate to rise on account of the subsidy, implies, it would seem to me, a violation of coefficient restrictions and stability requirements; it certainly disturbs my sense of general equilibrium. Carrying the analysis a little further might have shown that such perverse cases can be ruled out on purely technical grounds.

This example may also help show that the relation of the specifications chosen by the authors to the specifications appropriate for the analysis of the effects of specific federal credit programs may be quite remote. Federal credit programs often involve quantity constraints, use requirements, or eligibility standards, and hedges and features other than price. An amount of x billion dollars of extended tandem funds that may be committed for home mortgages on newly built principal residences in amounts not to exceed y dollars per mortgage at an interest rate fixed at z percent until the entire x billion has been committed subject to regional and lender distribution guidelines may serve as a practical example.

The Export-Import Bank, the Rural Telephone Bank, the federal shipbuilding program, and the Energy Security Administration would undoubtedly help further to enrich the professional imagination. Some of these programs work in that they enable activities to be conducted that would otherwise be hopelessly unprofitable.

If you make an unlimited supply of 5 percent money available for a particularly narrowly defined purpose, then of course there is no question, as the authors pointed out, that the gross marginal product required by private investors in that particular activity will be far below the gross marginal product required for investment in any other activity. This is obvious since complete debt financing is assumed by the authors.

For the government to subsidize programs that are hopelessly unprofitable, however, would entail waste. There are some programs that clearly are effective on their own terms, as the authors would have it.

Many other federal credit programs work in a different way-- not primarily by affecting resource allocation but by delivering subsidies, which, in turn, are part waste and part cash-equivalent transfer. The more they reach intramarginal rather than marginal borrowers, the more cash equivalent they become. Subsidized programs that are too small to supplant market-rate financing, such as those that have frequently been used in housing recessions, tend to be of the latter variety.

Yet nobody has complained too much about the gravy, even if it drips selectively. Who is to say that programs that redistribute income are ineffective because they do not contribute to the misallocation of resources as much as the abstract programs the authors would call effective? Congress certainly has not said so, and that leaves the resource allocation standard of effectiveness chosen by the authors somewhat in doubt.

In sum, the calisthenics prescribed by the authors are useful conditioning for the mind but provide not much action. The authors have promised not to treat such warming-up exercises as an end in themselves but to move up to the federal credit bog that lies inside the tax expenditure swamp. I could not think of a better equipped team to do so, though even they may become mired. It is beginning to dawn on me that leaving things purely theoretical has much to recommend it in this terrain after all.

RESPONSE BY AUTHOR

David Small. The point of this paper is to press ourselves in all directions and to think of all the possible sets of outcomes. Then, with a well-developed theory, we can apply formal statistical methods to test for the empirical relevance of each of our theoretical possibilities.

It seems to me that specifying a highly specific theory and formally testing all the possibilities in that theory is much superior to casual cynicism and empiricism without theory.

We haven't assigned any probabilities to our conclusions. We have not said what the probability is that the effects of the federal credit program will be reversed. We do not say that there is a probability of 90 percent that resource flows are going to be reversed. At present, we are just looking at conceptual possibilities; we are going to let our formal statistical methods do our testing and assign those probabilities.

We are saying that all outcomes are conceptually there in the model. We want them to be there formally so that they can be rejected empirically.

George von Furstenberg seemed to suggest that the resource allocation approach to federal credit may not be fruitful, perhaps, with the implication that we should focus on resource utilization. A theory or a particular model is useful not only for exactly what it says about one question, say, resource allocation, but also how easily it can be modified to answer a variety of additional questions.

We wanted to start out with the utilization model. But we didn't want to start with a model that had both allocation and utilization questions tied up together. So we started out with a model that has one impact, allocation. We study the conditions under which the allocation procedures are effective, and then once we have studied that we can lay on top of it the utilization story. To get utilization results out of this model will not be difficult, conceptually.

We specify a labor market and proceed with normal Keynesian assumptions of sticky wages and assume adjustment costs on investment functions so we get adjustment costs on the production or on the use of new capital equipment. Thus, we get out investment functions more common to the Tobin Q or Keynesian models than, I think, George would prefer.

DISCUSSION

Joe Scherer, Federal Reserve Bank of New York. I am troubled by the credit market ramifications spelled out in the model, especially the assumption that federal loans are financed by additional government borrowing. In some past years, credit programs, in part at least, were financed by taxes. Moreover, we have been told that we are going to have a balanced budget in fiscal 1981 and, presumably, a fairly large direct lending program.

Suppose future federal credit was financed by the oil import duty, and by the windfall profits tax. Then you would get an entirely different set of consequences of federal credit, especially as to the source of the loan funds and the effect on interest rates.

I am also a little bothered by the assumption that additional government borrowing, if it takes place, comes from the banks. While the banks are important, they are not that important. My guess is if you look at growth in direct loans, and commercial bank investment in U.S. Government securities, I think they would go in different directions at various times. So the interest rate and channels of credit consequences that you describe seem to me highly influenced by the particular kind of way that the credit programs are financed.

Mary Kay Plantes. I think your concerns are valid and worthwhile. There are clearly three ways to finance these programs if they require any financing. One is bonds, two is taxes, and three is money-supply increases. What we assume is that any financing, if it occurs, happens through bonds. We have not yet worked out the tax and money creation financing cases.

Additionally, we do not assume that all debt increases come from bank funds. The debt could be issued to the household or it could be issued to the bank. We were saying in the case of guarantees that a bank, if it has its reserves at the minimum level and if it decides to lend more to the targeted sector, is going to have less to lend for other purposes, holding deposits constant.

John Atlee, Institute for Economic Analysis. The authors assume full employment. That is an unrealistic assumption in this country, of course. We haven't had full employment except in wartime, but beyond that, we have had high unemployment so frequently that when we approach full employment, we run into bottleneck shortages, before we get to general full employment.

You are assuming that an increase in housing runs into a supply problem and increases in prices. That will depend on the particular situation in the housing market. And that depends heavily on what the previous recession did to capacity. In these other loan programs, it also will depend on the particular situation in those markets.

Ms. Plantes. Clearly, what happens to the housing stock, if in fact these programs do create an excess demand for the target type of capital, depends upon the producer response. If you have bottlenecks, say there is no more labor to be had or there is no more capital to be had, all that these programs will do is increase prices and not increase output.

It is very interesting to consider what will happen to these programs if you are not at full employment, but as David Small said, we aren't to that point yet in our analysis; they are more likely to have an effect if you aren't at full employment, than at full employment. And, they may have output effects independent of any specific reallocation. That is as far as we can go right now.

Allen Unsworth, House Budget Committee. I would suggest that one way of eliminating a lot of so-called perverse cases might be to look at the tax consequences. For example, in the case in which the seller of an existing house uses the proceeds to buy some other type of asset, that would probably be a very bad investment for most people, at least if they are under 55, because of the tax consequences of that action.

David Small. I think the way we formally do that is in terms of how substitutable is the housing stock for, say, bonds. In our paper, that substitutability is controlled by the preferences of the individual and the rates of return, including the capital gain or loss. We could make that substitution also depend on the tax rates in question.

Ms. Plantes. But even taking taxes into account, the transaction may not be unattractive to a mutual life insurance company, and may induce it to get out of the housing market in response to interest rate and price changes.

Frank de Leeuw, Bureau of Economic Analysis, Department of Commerce. I would like to comment on Mr. von Furstenberg's comment. With reference to the possibility that a federal credit subsidy program might have no impact on the aggregate amount of subsidized credit, he first made that outcome seem extremely unlikely because it would require implausible elasticities.

Later in his comment, however, he referred to a special case which seems to me quite likely to occur, and which has about the same effect. That is the case of a federal credit subsidy program with an upper limit to the amount of credit available. In this case, the money may go largely to intramarginal borrowers--that is, people who would borrow anyway. The program amounts to a cash subsidy to borrowers but it has no effect on the total amount of subsidized credit.

In that case, as in the case that he made sound very unlikely, it could easily happen that the allocation effect is very small. I

think we should not dismiss this outcome to the extent that his initial remarks suggested we should. For some kinds of credit programs, the main effect may be a cash subsidy, rather than an expansion of subsidized credit.

George von Furstenberg. I think many programs are ineffective for reasons that have nothing to do with general equilibrium, but because of program design. Many programs are not really designed to reach marginal borrowers, and one frequently suspects they aren't necessarily intended to reach marginal borrowers. I doubt that one really gets dramatic modifications of partial equilibrium results for very small, targeted, quantity-limited programs, if one runs them through the general equilibrium machine, because the credit supply effects on activities other than those targeted are widely disposed.

Generally, at least those who have tried that with the housing programs I referred to in my prepared remarks, have found that the macroeconomic offsets are not very dramatic for most of these kinds of moves like giving \$3 billion worth of Ginnie Mae tandem funds. Rather, many programs are ineffective, or comparatively ineffective, because they place credit in the hands of borrowers who otherwise would have been willing and able to borrow at market rates. Thus, I was just trying to point out that it is fairly easy to get an effect close to zero, but getting a perverse effect requires, in economic terms, extreme assumptions about elasticities. Furthermore, perversity is sometimes operationally indistinguishable from no effect. To say the effect is negative, it is sufficient to have a tiny perversity in theory. In practice such a perversity need not be something to worry about.

What in fact is happening is that the program has little or no effect. That is the more substantive message than the one that reflecting on these perversities would tend to convey. When we raise the alarm that the effect is the opposite of the intent, the emphasis is misplaced. But this is, as Mr. Small would say, casual empiricism.

SESSION III. LOAN GUARANTEES AND CROWDING OUT

Herbert M. Kaufman, Arizona State University, prepared the paper for this session. (The full paper is printed in Part II.)

Kevin Villani, Department of Housing and Urban Development, offered formal comments on the paper.

SUMMARY OF PAPER

In this paper I am interested in developing a framework for analyzing the impact of guarantees on financial markets and the allocation of resources in the economy. It has more of a financial market perspective than the Plantes-Small paper.

Federal guarantee programs have particular appeal in the political process in that they have minimal impact on the federal budget in the absence of default. However, the paper shows that from an economy-wide point of view the relative costlessness may be an illusion.

Many years ago Richard Musgrave made a substantial contribution to the theory of public finance when he distinguished the various functions served by the federal budget. I found the Musgrave framework useful in putting loan guarantees into context. Musgrave identified three functions that are served by the federal budget: stabilization, distribution, and allocation. While it is clear that guarantees have some distributional characteristics, I find the allocation framework Musgrave developed most useful.

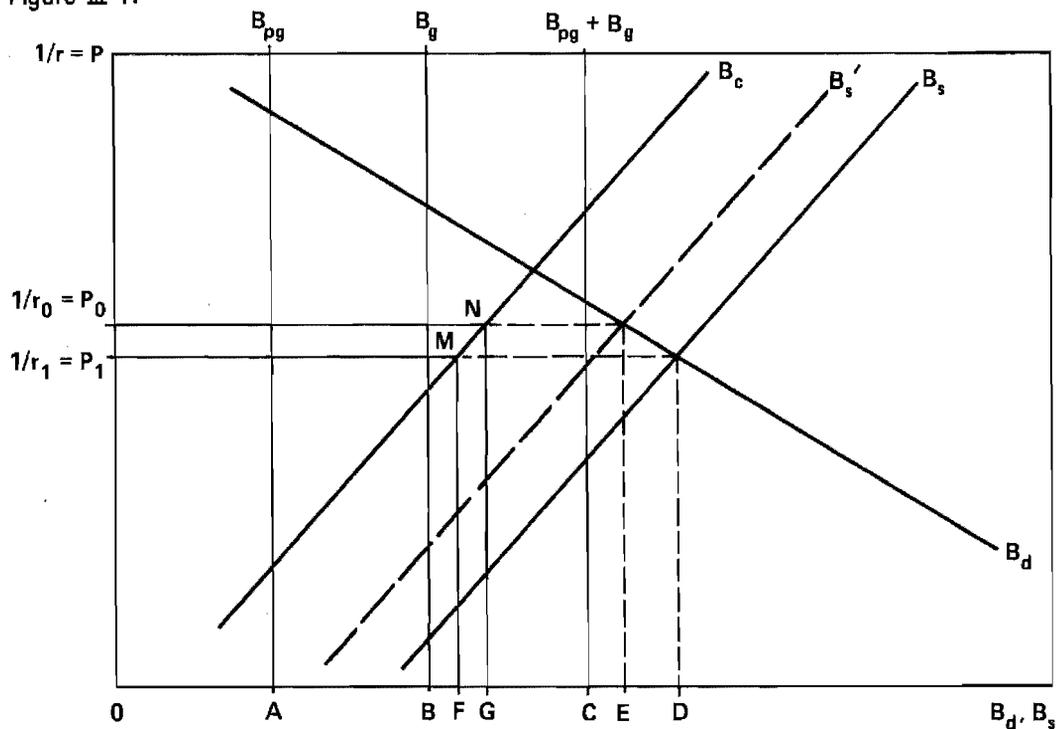
Musgrave identified two types of wants to be satisfied through the allocation function of government. Social wants are those government services that are consumed in equal amount by all, and, because nonpayers cannot be excluded from their benefits, the market presumably cannot satisfy these kinds of wants. The typical example is defense.

On the other hand, merit wants can be satisfied by the market. The reason, therefore, for the government role in satisfying merit wants is, in his words, "to correct individual choice." It seems to me that it is in the merit want category that government guarantees fit most easily. Yet, by the definition of merit wants, they can be satisfied by the market; imposition of guarantees on loans for merit goods leads to an alteration in market preferences.

Guarantees may in fact crowd out completely nonguaranteed projects that would be financed if guaranteed issues did not come to market, put upward pressure on interest rates, and receive preference in financing because of their status as guaranteed securities.

That is essentially the context in which the analysis proceeds. The first task was to develop a model that would yield insights into what guarantees do. Such a model has been developed, and a flavor of that can be obtained from Figure III-1.

Figure III-1.



The figure is specified in terms of the inverse of the interest rate. B_{pg} is the supply of guaranteed securities coming to market. B_{pg} is assumed to be fixed and unrelated to the interest rate. B_g is the supply of government securities coming to market, and is also assumed to be independent of the interest rate. The horizontal summation of those two yields the schedule B_{pg} plus B_g .

The function B_c is the supply of private securities coming to market, and is assumed to be related to the interest rate. It is a positive function of price or the inverse of the interest rate. B_s is the horizontal summation of B_{pg} , B_g and B_c .

The bond demand function is downward sloping, and the intersection of the bond supply and bond demand functions yields the market clearing interest rate r_1 . Thus, reading off the B_c curve, the amount of private financing that occurs is OF , and the value of that is given by the rectangle OP_1MF .

Now, if I assume that in the absence of those guarantees, these securities would not come to market at all, the total supply of bonds in the absence of guarantees would be B_s' .

The intersection with the demand function yields the market clearing interest rate, r_0 , and the amount of private financing is the rectangle OP_0NG .

Clearly the amount of private financing is larger in the absence of guarantees. The difference in the area of these two rectangles is the amount of crowding out. The amount of crowding out depends on the bond supply and demand elasticities with respect to the interest rate as well as monetary policy.

One factor that is often overlooked in crowding out is the strategy of monetary policy. In particular, I am referring to the Federal Reserve (Fed) strategy of moderating short-run changes in interest rates. That is, at least prior to October 6, 1979, if the interest rate rose above a targeted range, the Fed would inject reserves to keep the interest rate within that range.

If the money supply grows too rapidly as a result of this strategy, the Fed may raise the interest rate target, but there are significant lags in this process, and these monetary expansions can be cumulative.

As a result of its operating strategy, the Fed may accommodate an increased demand for funds through money supply growth. Now, what does all this have to do with guarantees? Well, it is clear from Figure III-1 that the key factors on which an evaluation of crowding out depend are supply and demand elasticities with respect to the interest rate. The Fed strategy of moderating interest rate increases, including those that arise from guaranteed financing, can reduce or eliminate the crowding out explicit in Figure III-1. This is accomplished by moving the demand curve for bonds to the right. However, this money-financed increase in the demand for bonds by the Fed has inflationary implications.

If the Fed's new post-October 6 strategy is truly to follow a reserve aggregate strategy, however, such monetary accommodation will not be forthcoming in the future and the analysis of Figure III-1 will be unchanged.

A formal model showing the dependency of the amount of crowding out on the supply and demand elasticities was developed. I used the model to simulate crowding out with different assumptions about the elasticity of supply and demand. These elasticities are all less than one to accord with previous work on financial market elasticities. The simulations were all done for an increase of \$1 billion in guaranteed financing.

Table III-1 shows the results of the various simulations. You can see from the fifth column of the table that significant amounts of crowding out are indicated. In fact, where the elasticity of demand is very low, we get "overcrowding out." That is, more than \$1 billion of private financing is crowded out.

I am not arguing that, if I considered every factor that could possibly affect this result, any of these values would be the received estimate. But in terms of qualitative judgment, these numbers point to a significant impact of guarantees on financial markets and on the economy.

Following the simulations, I use aggregate supply and demand analysis to indicate the implications of guarantees for the economy through time as a result of the crowding-out effects. The conclusion is that guaranteed financing implies less efficient use of resources. As a result, there is less output growth and higher inflation than would occur in the absence of guarantees.

TABLE III-1. SIMULATION RESULTS FOR A \$1 BILLION INCREASE IN GUARANTEED SECURITIES

Case	η_s	η_d	θ_s	Δ Private Financing (Billions of Dollars)
1	.2	.8	.56	-0.736
2	.2	.3	.56	-1.63
3	.9	.8	.56	-0.816
4	.9	.3	.56	-1.32

If the Fed policy strategy is accommodative, the effects of crowding out on output may be diminished, but there will be more inflation.

In conclusion, then, what I have tried to do in the paper is provide a framework for analysis of the financial and economic impacts of guarantees. I have identified some critical parameters, and given some rough estimates of the extent of crowding out under various assumptions about the relevant elasticities. Clearly, the analytical framework can be expanded substantially to include such important elements as the various financing channels open to guaranteed borrowers. Also, the model does not treat the issue of asset substitutability in holder portfolios.

Further work should be directed at developing and estimating the expanded model.

COMMENTS BY DISCUSSANT

Kevin Villani. The fact that I am an employee of an agency that last year insured \$34 billion of FHA loans, guaranteed \$250 billion in market securities, approved another \$20 billion in quasi-guaranteed Fannie Mae debt, borrowed \$10 billion from the Federal Financing Bank, and issued billions more in guaranteed securities, shows the great courage of the sponsors of this conference in inviting me.

The extent to which the papers presented at the conference draw on the mortgage market is an indication of the important role that federal guarantees play in the provision of housing.

My specific assignment is to discuss the paper just presented by Herb Kaufman. The stated purpose of the paper is to provide a framework for analyzing the impact of federal guarantees on the allocation of credit, and by implication the composition and efficiency of the capital stock. This is a particularly timely concern, in my view.

The use of federal guarantees has been growing at an extremely rapid rate in recent years, as illustrated in the recently published CBO analysis of the President's fiscal 1981 credit budget. Simultaneous with this growth has been a general decline in U.S. productivity growth, so one hypothesis worth investigating is that the selective use of federal guarantees has resulted in an inefficient allocation of capital with resulting productivity declines.

This is fundamentally an empirical question. The fundamental empirical question concerns the differences between the allocation and efficiency of the existing capital stock today as compared to the hypothetical stock in a world without or with fewer of these credit guarantees. There are very complex theoretical issues that must be successfully resolved before the more fundamental empirical issue may be addressed.

I am somewhat sympathetic to those who are grappling with these theoretical issues because of the magnitude of the tasks that must be accomplished before we can attempt quantitative measurement. At one point I had agreed to participate in this conference by providing a paper containing those empirical measurements. I now agree with George von Furstenburg that it was an incredible folly for me to have suggested writing such a paper in the first place. So I am glad that the sponsors graciously allowed me to bow out of that task and take on the much easier job of criticizing the work of others. It is with this in mind that I turn to the Kaufman paper.

The paper does not attempt to develop a new framework in which to analyze the impact of federal guarantees. Rather, it attempts to use an existing framework of crowding out to measure these effects. This is done simply by extending the definition of Treasury securities used to finance government deficits to include all government-guaranteed securities.

Unfortunately, Treasury deficit financing and federally insured securities are not comparable, and the crowding-out model is not applicable to the issue of the impact of federal guarantees on the size and the efficiency of the capital stock. That is a pretty strong statement, so first let me briefly describe why I hold this view, and then I will go back to a few comments on the model that was presented.

I think if you read the Kaufman paper substituting the words "treasury debt to finance government expenditures" everywhere the paper mentions "federally guaranteed securities," then the paper makes more sense. That is, it reverts to a model of crowding out by government debt to finance expenditures.

Let me explain why I do not think the model applies to the issue of federal guarantees. The term "crowding out," as used in the paper and elsewhere, simply refers to the fact that when the government borrows to finance its expenditures it reduces the savings available to finance the investment demands of others. Whether or not private investment declines by exactly as much as the increase in deficit-financed government expenditures depends on a number of factors such as capacity utilization, interest elasticity of aggregate savings, liquidity preferences, and so forth.

The important point here is that deficit financing represents dissaving on the part of the government. Government guarantees do not fit this model. They merely change the characteristic of the securities which finance private and, in some cases, public investment. This may rearrange the capital stock but it does not reduce it as federal dissaving does. In fact, the existence of guarantees may well raise aggregate savings.

Now I wish to say a few words about the model as a model of crowding out. A point of some interest in the crowding-out literature is that crowding out may be less than 1 to 1. That is, deficit-financed expenditures may not lead to an equal reduction in private investment, because of the wealth effects of additional government debt.

If people feel wealthier, they will act accordingly. It has been pointed out that to the extent that public debt finances current expenditures, the additional wealth (as perceived by bondholders) is illusory because it is offset by additional future tax liabilities. The author points out here that the future tax effect is irrelevant to the analysis of guaranteed debt. I think

that this point is correct, precisely because the government guarantee finances investment which represents wealth as opposed to government consumption.

Let me now comment on the monetary policy section of the paper. In effect, the monetary authorities are assumed to be tricked by the deficit-induced rise in interest rates. Parenthetically, it bears repeating that financing deficits puts upward pressure on interest rates in a way that is not applicable to guarantees.

My only comment here is that Chairman Volker is apparently more aware of this interest rate trickery than some of his predecessors and therefore is less likely to be fooled. And at any rate, the effect here is more appropriately attributed to monetary policies than to credit policies.

Next assume that a potential conclusion of the crowding-out models is that credit guarantees could crowd out private investment one-for-one. I wish to show by way of an illustration why I think we get extreme results if we apply the crowding-out model to guarantees.

Total funds raised in the credit market last year were about \$400 billion. The Treasury borrowed about 10 percent of this amount in round numbers, about \$37 billion. The increase in federal guarantees of financial assets, including federally insured deposits, was about \$250 billion.

The point here is simply that the \$250 billion did not crowd out private investment in the way that would be predicted by the Kaufman model of crowding out when you add that \$250 billion to the government deficit. If it did, we would be suggesting that federal guarantees crowded out more than eight times what Treasury deficit financing crowded out in the capital markets. There would have been little left for private investment. This is the fundamental point. Federal guarantees leave the money in the savings and investment streams, while federal deficits take it out and dissipate it.

Now, I wish to offer a comment on a paper not yet presented, that of Silber and Black, which attempts to analyze federal guarantees in the framework previously developed in Silber and Penner to analyze interest rate subsidies. Although the former paper was

pathbreaking, I do not think that the subsidy model applies to the analysis of federal guarantees.

The point is that there are subsidy elements in many federal guarantee programs, and to the extent you have identified it you can analyze guarantees as subsidies. But to the extent they are guarantees for which an actuarially sound fee is paid by the borrower then the subsidy model does not apply.

Because I have rejected a number of existing models and argued against the usefulness of others in analyzing guarantees, I feel some obligation to provide the rudiments of what I would consider to be an appropriate model.

The essence of a federal guarantee is an intermediation service between ultimate borrowers and lenders. A general framework for analyzing intermediation services is provided in Hendershot and Villani, 1980. ^{1/} Here I will discuss the supply of and demand for credit guarantees, or more specifically, default insurance. I will first consider the case for actuarially-sound insurance. And that is what I am going to define as a no-subsidy program. Then I will say a little about how implicit subsidies may get built into the insurance programs.

Looking at the supply side, insuring default risk is conceptually the same as insuring casualty risk. The insurer makes an actuarial calculation of the expected default losses and calculates his premiums accordingly.

We should expect in perfect capital markets, including the market for insuring default risk, that default insurance would be generally available at a premium just sufficient to cover expected losses. This is exactly the intent of actuarially-sound government insurance programs.

I want to emphasize that these government insurance programs make the capital markets more efficient and, in the absence of other inducements to inefficiencies, result in a more efficient

^{1/} Patric Hendershot and Kevin Villani, "Secondary Residential Mortgage Markets and the Relative Cost of Mortgage Funds," Journal of American Real Estate and Urban Economics Association, Vol. 8, No. 2 (Summer 1980).

allocation of capital than would be the case in their absence. This raises an obvious question. If it is a perfect capital markets test we are applying here, why does the government have to supply the service, if it is in fact available in the private sector?

I think the answer is, in many cases, that it may not be necessary for the government to supply the insurance. In the mortgage market, for example, the private mortgage insurance industry has grown much more rapidly than Federal Housing Administration insurance.

Moreover, this industry is more efficient than FHA in many respects in that it is not encumbered by the legal and regulatory burdens put on FHA. But a weakness of the industry is that the risk is not diversifiable with respect to some variables, in particular general economic conditions.

Early work by Arrow and others showed that the government may be in a unique position to diversify this risk, through the ability to tax to cover temporary reserve deficits. Thus the government may simply have a competitive advantage over the private sector in supplying default insurance. Perhaps that is why there is such a large government presence.

Looking at the demand side of the default insurance market, I think insurance is demanded solely by lenders. Borrowers are not affected one way or the other by the provision of this service to lenders. Hence, the supply of bonds is not shifted by federal guarantees as is postulated in the Kaufman model. The relevant question is, why do lenders demand insurance?

I think there is a simple answer here. It is basically because they are, in general, not able to diversify all default risk and therefore are averse to it. As a result, some investors are willing to pay a price over and above the actuarially-determined expected default loss.

What I am saying is that the government can provide insurance at a price below what the average investor-lender is willing to pay for it.

This means that investors will accept less on guaranteed securities by more than the amount of the actuarially determined insurance premium. If the government charges this premium, the

difference is passed on to the borrower. Some have termed this an implicit subsidy in federal insurance programs. It is not. Rather, the resulting interest rate charged to the borrower is the rate that would be charged in perfect capital markets. By definition, the level of investment at that interest rate is the efficient level of investment as compared to the perfect capital markets outcome.

Moreover, there is a limit to the amount of insurance perfect capital markets would provide, determined by the point at which the cost to the insurer equals the value to the investor. This occurs when the marginal investor choosing between the insured and noninsured securities is risk neutral. He will be indifferent as to whether he takes the risk or not and the premium will exactly offset this risk.

The insured rate rises until the difference between it and the uninsured rate is simply the expected default loss. So there is no premium for risk. It is just exactly what we expect to lose on a riskier bond in terms of default.

One obvious result is that, as federal default insurance increases to this point, Treasury borrowing costs will rise. From the viewpoint of capital market efficiency, this should not be a concern. All this means is that the Treasury will no longer reap the benefits of the risk-aversion of the marginal investor that is generated by inefficient capital markets. The Treasury rate rises as the government is no longer able to exploit the opportunities afforded it by imperfect capital markets. This is a perfect capital markets outcome.

In setting out my preferred framework for analyzing federal guarantees, I want, first, to list some of the benefits of guarantees, lest they be forgotten in the current mood. Then I will discuss a few of the hazards involved in the use of guarantees, and finally I will say a little about the fundamental issue--the efficiency of the capital stock.

A first benefit is that actuarially sound federal default insurance programs improve the efficiency of the capital markets at no government cost.

Second, because the average saver has historically been extremely risk-averse, federal guarantees have provided a substantial boost to savings over time. This aversion is evidenced most

recently by the fact that about one-quarter of thrift institution deposits are still in passbook accounts in spite of the low yields.

As a third benefit, federal guarantees make financial instruments more homogeneous. This is at no cost to the government. This is the primary requirement for active secondary market trading, which in turn reduces the transactions cost of trades and improves market efficiency. Thus, homogeneity was a major reason for the creation of FHA.

William Silber's studies of the GNMA market suggest it is this market efficiency that is reducing FHA rates as GNMA makes the security generally more marketable and therefore lowers the premium charge for marketability.

The major danger in the use of guarantees is the potential to subsidize the insurance by setting the premium below an actuarially sound level. What is initially sold to the public as a cost-free program may, in fact, have planned losses which eventually are financed out of taxes. The test here is not whether the program ever requires Treasury borrowing, but whether the excess losses are ever paid back. The Treasury is basically the backstop in the insurance fund so that reserves at any one time could be negative, but if they are paid out of additional reserves later I do not think that is a problem.

With respect to implicitly subsidized programs, I think the record is probably mixed on different programs. FHA, for example, has a high risk insurance fund for which Congress explicitly recognized the potential need for subsidies. But in other cases, I am sure that potential need has been made much less clear. This is not to say that a subsidized insurance program is under no circumstances the preferred government policy. It is preferable to direct subsidies in the most obvious case where the ability of the borrower to repay is uncertain, but some repayment is better than none. One example of this may be the student loan program.

To cite another case, it may minimize losses to provide default insurance at subsidized rates when the government already faces losses in the absence of insurance. From a strictly actuarial point of view, it may be cheaper to insure Chrysler than to pay the many direct and indirect costs associated with bankruptcy. I am not saying that this is the case in this instance. The point

is that, from a purely financial standpoint, the government may have to include costs outside of its insuring function to make these actuarial calculations.

Of course, the most common reason cited for subsidized federal default insurance is that it achieves some broader social goal. Whether or not this is an efficient subsidy mechanism is beyond the scope of my comment. And there is clearly the issue of budgetary control which is of concern to CBO.

And now to the fundamental issue: Is the capital stock more or less efficient as a result of federal credit programs? If it is less efficient, how much less efficient?

With respect to the many actuarially sound insurance programs, it is more efficient. With respect to those that insure at subsidized rates (this would probably include some of the newest programs, but they are dwarfed in comparison to the volume of the older programs), it is less efficient.

I think this gets back to George von Furstenburg's question whether, in the end, it is possible to get beyond theory and to measure the efficiency of the capital stock vis-a-vis some standard of perfect capital markets.

How does the existing efficiency of the capital stock compare to that which would have resulted from perfect capital markets free of influence by implicit or explicit subsidies?

To answer the fundamental question, it is necessary to compare the marginal productivity of alternative investments. If we consider the government's broader role, we may want to compare marginal social products. In any event, the comparison raises interesting second-best sorts of problems.

It may be, for example, that inefficiency is preferred in a particular market to offset the stimulative effects of subsidies or other nonmarket inducements. The danger of restricting federal guarantees and preventing new programs from being adopted is that this could result in a third-best solution to capital stock efficiency.

RESPONSE BY AUTHOR

Herbert Kaufman. Kevin Villani minimizes the importance of guarantees by understating the extent to which guarantees change the characteristics of securities. This change is fundamental, so that there is a different perception of these securities in the market, which is crucial.

I admit, however, to the empirical nature of the essential question: To what extent do guarantees increase the demand for funds in a net sense?

It is clear to me that if guarantees result in significant additional credit demands, then treating guarantees within the framework of the crowding-out model is appropriate.

DISCUSSION

John Clapp, University of California, Los Angeles, and the General Accounting Office. I think there is an important element missing from the discussion of loan guarantees. And that element is related to the recent literature on the effects of asymmetrical information on insurance markets. I am referring to the problem of adverse selection and moral hazard in insurance.

The problem arises because insurers are less well-informed than those seeking insurance. They are missing information on the risks of default from various classes of potentially insured people.

This important body of literature suggests a completely different line of policy analysis and empirical work in this area. It suggests that insurance markets can break down; that they can fail because of lack of information. There are no transactions, no market prices set for certain classes of borrowers. Only the most creditworthy borrowers or best insurance risks will receive funding or insurance in the market.

The appropriate role for government under this regime of asymmetrical information then becomes to identify information on risk and to attempt to develop an information bank, for example, about risks associated with various classes of borrowers. By doing so, government can make the market more efficient.

Some of Kevin Villani's comments get close to this issue. Government should make the market more efficient by providing information that would not ordinarily be available to private economic agents. Furthermore, there is a role for the government to step in and insure the lowest, the least creditworthy borrowers, or the highest-risk individuals, and to correct for the market failure.

Government is in a unique position to do this because of its ability to compel the provision of data to a central data bank. The government can also audit that information in a way that private insurance cannot.

Mr. Villani. While this is theoretically true, there are many specific cases in which the private sector has an advantage over government. For instance, with FHA insurance we have one premium determined by Congress. There is no flexibility in that rate structure. There is a certain amount of moral hazard and adverse selection in that, whereas private mortgage insurance can have a very flexible premium structure and identify risks and set premiums accordingly, leaving the most risky loans to FHA. The problem extends to FNMA, which claims that loans sold to it are subject to adverse selection. This results because there are costs associated with foreclosure which are borne by FNMA, but these same costs are borne by the mortgage banker when he sells in the GNMA market.

I agree with John Clapp that rate structure is the direction to go in investigating the supply of default insurance.

I would also like to make a comment that was suggested by Marvin Phaup's introductory remarks. Some of the discussion about market failure in the case of federal credit is misdirected. In fact, in some cases it is market success that triggers federal credit. For example, consider the Chrysler case. The fact is that without the guarantee, Chrysler would have gone under. I would argue that this would have been a credit-market success.

Mr. Clapp. The problem with the Chrysler example is that, since it is a publicly-owned company, with publicly-available information, there is no asymmetrical information problem. We know as much about the risks in this case as the Chrysler management does.

There is a clear rationale for government to try to supply otherwise unavailable information and to make the market more

There is a clear rationale for government to try to supply otherwise unavailable information and to make the market more efficient. This is one of the few examples in the economics literature that I know of where there is a clear role for government to do something in the private economy.

John Atlee, Institute for Economic Analysis. There is an important point that was not touched on by Mr. Villani in his analysis of the actuarial basis of credit insurance, and that is, the government can control the economy. The government has the power to cause recessions and the political responsibility to prevent recessions. That is a risk factor for which there is no reliable actuarial basis, but which is very important in the credit market. The government can take on that risk far more easily than private investors. So that is the risk which government should assume.

Mr. Villani. I would never say that the government can control the economy.

SESSION IV. SUBSIDIES IN GOVERNMENT CREDIT PROGRAMS: GENERAL
THEORY WITH ILLUSTRATIONS FROM THE MORTGAGE MARKET

William L. Silber and Deborah Black, New York University, prepared the paper for this session. Mr. Silber summarized their findings. (The full paper is printed in Part II.)

Anthony Downs, the Brookings Institution, offered formal comments on the paper.

SUMMARY OF PAPER

About 10 years ago when I was at the Council of Economic Advisers working on monetary policy, we could never figure out whether credit programs were monetary policy or fiscal policy. Rudy Penner, in charge of fiscal policy at the time, and I used to fight over who should be in charge of the credit programs. The loser was in charge. We eventually split the responsibility and wound up writing a paper in the American Economic Review on the subject. In that paper we pointed out that it is useful to think of federal credit programs the same way that we think of the shifting and incidence of taxation. We concentrated on the relationship between the elasticity of the supply of credit and the efficacy of different kinds of credit programs, where the benefits were measured in terms of a reduction in some interest rate.

We found that credit programs of the portfolio-restriction type, such as those imposed on S&Ls, are less successful in expanding mortgage credit and lowering interest rates, the greater the elasticity of the supply of credit. We found, however, that direct interest rate subsidies, for example the 235 program or Section 8, are more effective the greater the elasticity of supply of credit.

About a year ago, Deborah Black asked me some questions about credit allocation which, as it turned out, I could not answer. The key problem that bothered Deborah and, subsequently, me

was: Why should different kinds of subsidies be related differently to the elasticity of the supply of credit? This violated what we know about the incidence of taxes. It does not make a difference who you place a tax on, and it should not make a difference who you give the subsidy to. The answer turned out to be: It depends on whether a credit program shifts the curves horizontally or vertically.

I would like to summarize some of our main results, which essentially are a taxonomy. We came up with a series of prescriptions or suggestions for thinking about how these programs work and what determines their effectiveness.

The first thing to recognize when we are evaluating credit programs is that programs have different objectives. One objective is resource reallocation. Another is income redistribution. The effectiveness of a credit program depends on what the objective is. That is not surprising except that it often seems to be ignored. A program can succeed, in redistributing income for example, without reducing market interest rates.

One important step to take before attempting to evaluate whether a program is achieving its objective is to categorize the program as to how it affects behavior. What turns out to be crucial is not whether we call it a portfolio restriction or an interest rate subsidy but rather how market participants perceive it, or how the subsidy can be enjoyed, or how the restriction is imposed. Some programs are per-unit programs. That means the subsidy is only enjoyed on a unit-by-unit basis in terms of how many dollars you borrow. That is perfectly analogous to an excise tax, a tax per unit of the good. Programs like 235 and section 8 are per-unit programs.

Another set of programs consists of quantity-oriented programs. The quantity part comes from the fact that these programs shift the curves along the quantity axis, whereas the per-unit subsidies shift the curves vertically. But the quantity programs, are really lump-sum subsidies as opposed to per-unit subsidies. They are lump-sum in the sense that S&Ls have to hold mortgages and they get a subsidy in return. The subsidy is not dependent, though, on the volume of mortgages that they make. If they call themselves an S&L, they get a lump-sum subsidy.

The difference between these two types of subsidies is illustrated in Figures IV-2-A and IV-3-B. The per-unit subsidy, shown

Figure IV-2.

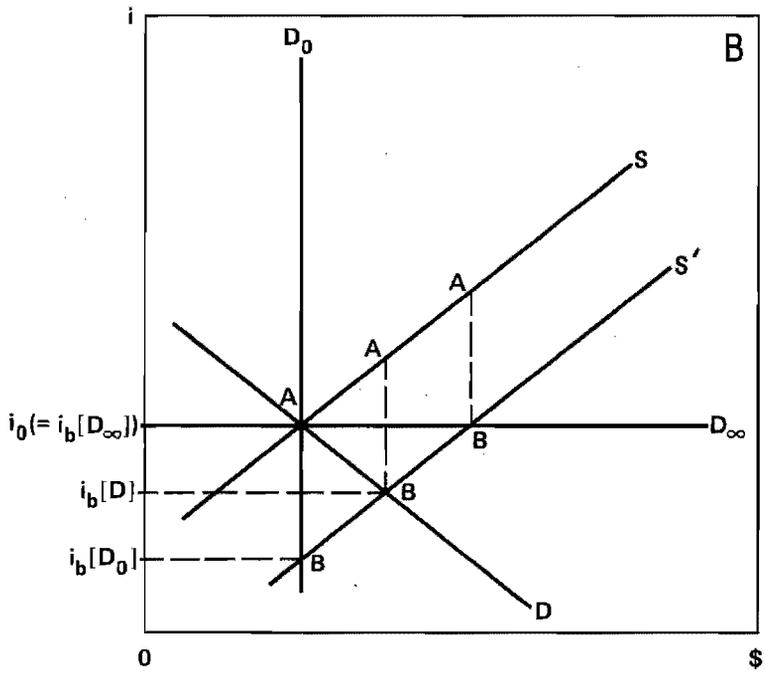
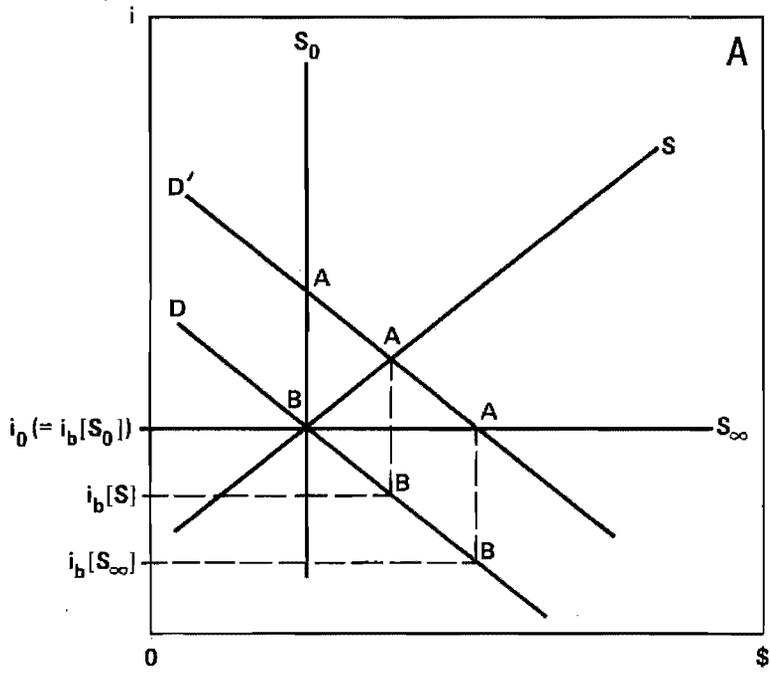
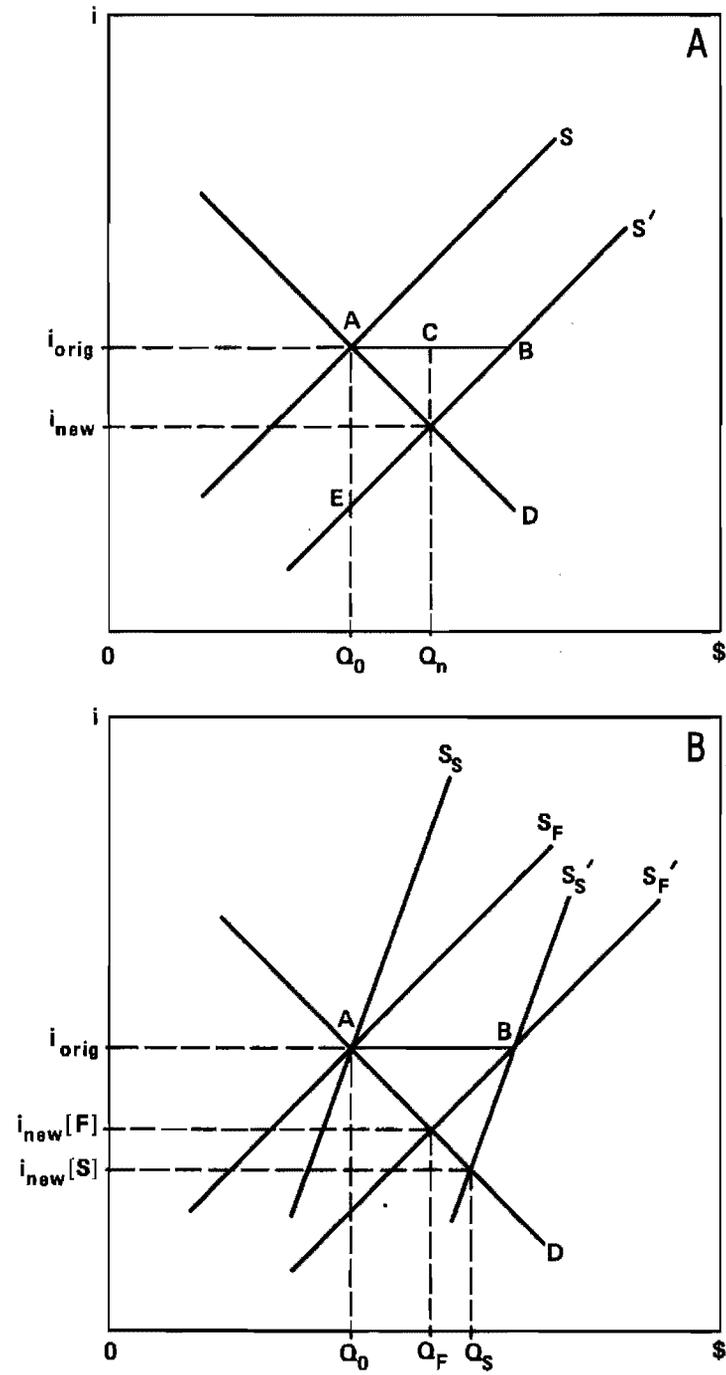


Figure IV-3.



in Figure IV-2-A, is more effective the greater the elasticity of supply. In contrast, a quantity subsidy that shifts those curves horizontally to the right, as shown in Figure IV-3-B, is more effective the less the elasticity of supply.

Per-unit subsidies push up the interest rate; they become more effective the greater the elasticity of supply because funds move into that market. The quantity-oriented subsidies or lump-sum subsidies shift the quantities of the mortgages supplied initially, but there is offsetting behavior because some lenders leave the market; that offsetting behavior is greater, the greater the elasticity of supply. That is why you get the different relationships to the elasticity of the supply curve. That means it is important to know what is the elasticity of supply of credit to particular uses, if you are going to try to evaluate the impact of the programs on mortgage rates.

An important point to recognize is that it really should not make any difference, though. One can design an equivalent per-unit subsidy that will do exactly what a quantity-oriented subsidy could do. How do I do that? I provide a subsidy equal to A-E in Figure IV-3-A which would produce the same rightward shift in the curve. So what is so important about per-unit or quantity-oriented subsidies?

What is so important is that we do not know what the elasticity of supply is. There is uncertainty. In our kind of world there is a problem in evaluating the benefits in terms of reduced mortgage rates and, presumably, real effects.

It is important to identify implicit versus explicit subsidies. Quantity subsidies, including portfolio restrictions, lending by the Federal Home Loan Banks, and Regulation Q, do not contain an explicit subsidy. There may or may not be an implicit subsidy. But you have to identify the implicit subsidies in order to evaluate the impact of the programs.

Many per-unit subsidies are also implicit. No explicit budget appropriation is required for the GNMA pass-through program. There may be an implicit subsidy in that program but there is no explicit subsidy. FHA insurance may contain an implicit subsidy; it is not explicit.

As Kevin Villani said earlier, the GNMA pass-through program may not cost the government anything. That does not mean, however,

that it has no impact, or that it has no benefit. It may cost something to the Treasury if defaults plus administrative costs exceed the premiums charged.

Even per-unit subsidies that are explicit, Sections 8 and 235 for example, vary considerably in their initial impacts because the subsidy is not a fixed amount. So it is not a trivial matter to identify subsidies. Certainly this is true in the case of implicit subsidies, but also with explicit subsidies.

Probably more important is that most programs are subsector programs. They do not apply to everyone. They apply to subsectors, especially when the objective is to redistribute income.

Interestingly, all explicit subsidies are subsector programs because all of them are budget-limited. That is the way you would expect the political process to work; namely, if it is an explicit subsidy we have to limit it. Marketwide subsidies are all implicit subsidies, which is again not surprising; since we do not know what we are subsidizing, why limit it?

The categorization of subsidies is difficult. Some subsidies look like lump-sum quantity subsidies, but they are not even though they have quantity dimensions to them. FHA insurance, secondary market operations of GNMA, FMMA, FHLB lending, all have quantity dimensions such as the number of mortgages issued, the number of GNMA pools formed, which might lead you to suspect that they are quantity subsidies, when in fact they are not. If you think about it, the mortgage market gets those subsidies only per dollar loaned or borrowed.

All this appears in the paper. It is summarized for you in Table IV-1, which categorizes the various programs by some of these issues. The table lists the various mortgage market programs, whether a subsidy is per unit or quantity, and the objectives of each program based on "educated speculation."

The table specifies an agenda for empirical research. Unless we get measures of implicit subsidies, and unless we know what the various elasticities of the functions are, we will not have any measure of the costs or the benefits of the programs. In that case, we do not have any guidelines for determining whether we should close them down and let them be in the private sector, or expand them. We need those parameters before we can make intelligent decisions about the programs.

COMMENTS BY DISCUSSANT

Anthony Downs. My comments today do not constitute an overall disagreement with the basic analysis in the paper. Rather they are a series of discrete responses and the identification of issues that I believe need clarification. Using the terminology of the paper and depending on how seriously one regards my criticisms, this might be considered an implicit endorsement of the basic analysis, although I do not know what "implicit endorsement" really means.

The first criticism springs from my bias toward an Aristotelian approach to analysis: I like to start with definitions of the key concepts involved. But there is nowhere in this paper a definition of "subsidy." I believe that leads to some confusion because the paper's title has to do with the general theory of subsidies.

In an earlier book of my own, among the extensive unread literature I have produced, I defined a subsidy as "any form of economic assistance provided to the producers or consumers of a product, at the expense of others in the economy, in order to lower the price or costs of that product, or factors related to it, so as to encourage the output, supply, and use of that product."

The requirement that a subsidy impose a cost on someone else is critical to the meaning of the term "subsidy." Perhaps I am wrong, but since no other definition is offered in the paper, I am going to use my definition until corrected. I do not believe that all the forms of activity listed as subsidies in this paper meet that requirement.

FHA insurance, for example, was for many years a self-supporting program and even a profitable one. Hence it provided benefits to those insured by reducing risk, but not at anyone else's expense. Instead, there was a real increase in the efficiency of the economy shared by those people who paid the cost; they received benefits in excess of what they paid.

Similarly, the creation of a secondary market increases liquidity and thereby reduces risk. If it is self-supporting (as much of it is in FNMA), then I do not see why it should be considered a subsidy. Insofar as restrictions on portfolio assets compel some institutions to offer lower returns to savers, as in the savings and loan industry under regulation Q, that does cause

TABLE IV-1. (Continued)

Program	CHARACTERISTICS		
	V	VI	VII
	Subsidy is market-wide or subsector	Appropriation limits force the rationing of the subsidy (Yes or No)	An effect on market interest rates is likely: yes, no or uncertain. If no because: (a) Appropriation limit (b) Subsector subsidy and nonsubsidized sector is very elastic
(1) Section 8	subsector	Yes	No, because (a) and maybe (b)
(2) Section 235 and 236	subsector	Yes	No, because (a) and maybe (b)
(3) Tax Incentives	market-wide	No	Yes
(4) Tandem			
(a) Subsidized	subsector	Yes	No, because (b) and (a)
(b) Unsubsidized	market-wide	Yes	No, because (a)
(5) FHA Insurance	subsector	No	Uncertain
(6) Secondary Market			
(a) FNMA(MBB)	subsector	Yes, but self-imposed	Uncertain
(b) GNMA and FHLMC (Pass-through)	market-wide	No	Yes
(7) Portfolio Restriction			
(a) S&L Assets	subsector	No	No, in long run because (b)
(b) Regulation Q differential	subsector	No	No, in long run because (b)
(c) FHLB Lending	subsector	No	No, in long run because (b)

TABLE IV-1.

Program	CHARACTERISTICS			
	I	II	III	IV
		Objective is:		
		(a) Resource Reallocation	Potential confusion in I	
		b) Income Re-Distribution	because quantity appears	
	Subsidy is per unit or quantity	(c) Income Re-Distribution (lenders)	in program specification: (Yes or No)	Subsidy is implicit or explicit
(1) Section 8	Per unit	(b)	No	explicit
(2) Section 235 and 236	Per unit	(b)	No	explicit
(3) Tax Incentives	Per unit	(a)	No	implicit
(4) Tandem				
(a) Subsidized	Per unit	(b) and (a)	Yes	explicit
(b) Unsubsidized	Per unit	(a)	Yes	explicit
(5) FHA Insurance	Per unit	(a)	Yes	implicit
(6) Secondary Market				
(a) FNMA(MBB)	Per unit	(a)	Yes	implicit
(b) GNMA and FHLMC (Pass-through)	Per unit	(a)	Yes	implicit
(7) Portfolio Restriction				
(a) S&L Assets	Quantity	(a)	n.a.	implicit
(b) Regulation Q differential	Quantity	(c)	n.a.	implicit
(c) FHLB Lending	Quantity	(c)	n.a.	implicit

(Continued)

an expense to other people. Thus, it qualifies as a subsidy by my definition. Perhaps I have used an entirely mistaken definition of subsidy, and we could clear up this point by agreeing that "subsidy" means something else.

I am not convinced that this problem is eliminated by the concept of an implicit subsidy. That seems to be any action that has the same effect in analytic terms as a subsidy, and therefore is considered to be a subsidy by the authors. If looking at a picture of a steak causes your mouth to water, just as eating the steak does, does that mean the picture is an implicit steak? Although one could live very well on steaks, I do not think a diet of implicit steaks would be conducive to health over the long run. Even if two actions have at least one effect in common, but are different in other respects, they are not necessarily part of the same overall class of actions. Though FHA guarantees may lower interest rates because they reduce risk, that does not mean they must be subsidies. Whether you call an FHA guarantee a subsidy or some other thing, it does not impose expenses on someone else in the same way that Section 8 grants do, even though they also reduce interest rates.

Thus, in my opinion, if an action reduces interest rates but does not impose costs on others, it is not a subsidy. The fact that lenders get less interest is not necessarily a cost to them since in this case they face less risk.

I think there are indeed implicit subsidies, if the word "implicit" is taken to mean not right out there in the open, the opposite of "explicit." The nontaxing of imputed rent on homeowners is an example. That imposes a cost on other people, and it is not easily visible as an explicit subsidy is. So I think there is such a thing as an implicit subsidy in that sense. As the term is used in this paper, however, it is not a homogeneous category, because not all things called implicit subsidies impose costs on other people. Therefore, in my view, they are not subsidies.

My second criticism arises from the assumption that the supply of securities, particularly mortgage credit instruments, is perfectly elastic. That may be true for an individual lender, such as one insurance company. But why would it be true for the entire market?

Furthermore, I think there are significant institutional rigidities relevant to the supply of specific types of credit, at least in the short run. However, they are not important in the long run; so it is perhaps proper for the authors to disregard them.

Even if one rejects perfect elasticity of credit supply, that does not completely invalidate the analysis of the paper. It simply alters the conclusions somewhat. I am sure the authors can handle that by changing the curve slightly.

Another particular issue lies in the assumption made by the authors that, "if the intramarginal borrowers are at the head of the queue" when there is a budget limitation, then a subsidy program can work without affecting interest rates or credit quantities overall.

That assumption is simply made, and from then on the authors assume that the curve, for example, has all of the people who are aimed at by this specific program at the head of the queue. The curve they deal with has an inelastic portion at the beginning and a perfectly elastic portion at the end, as though all the buyers or users of the credit were lined up in that fashion.

I don't see why that is necessarily the case. I regard this as proof by assertion. They may be right, but I think that some modicum of argument or justification is needed for that procedure. If it is produced and plausible, I will immediately give way on this point.

My last point is admittedly trivial, which may put it in the category of the foregoing points. In the appendix description of Housing Credit Programs, it is stated that the deduction of mortgage interest and state and local real estate payments for owner-occupied housing reduces the cost of buying relative to renting. I believe this is false, though it is a widespread assumption. Landlords can also make the same deductions, and the tax savings they achieve ought to be passed on to tenants in the form of lower rents.

Whether all these points can be said to affect the paper's basic thrust to a major degree is uncertain in my own mind. If many of the programs analyzed are not in fact subsidies, that might change the menu for empirical research, or its significance.

On the other hand, the authors could clarify by relabeling those programs as something else. They are programs that should be analyzed, so it may not have all that much significance.

Moreover, I am not sure that the authors are correct in their own terms when they say, "The impact upon mortgage interest rates is crucial to judging the ultimate effectiveness of these credit programs." If they are correct in stating that the supply of mortgage funds is perfectly elastic, then their own analysis shows that most such programs will not affect interest rates at all. Yet those programs might alter income distribution or other variables and therefore, be considered effective at attaining other goals. Hence, the effectiveness of these programs does not necessarily depend solely upon their interest rate impacts.

To conclude, I believe the "general theory" offered in this paper, while both interesting and clarifying, is not really a general theory of subsidies in government credit programs. Rather, it is a theory of how certain aspects of credit programs operate and might be analyzed. As such, it adds to our understanding of how such programs might be compared, subject to the limitations I have mentioned.

I close in the tradition of the famous saying: "Those who ignore the past are condemned to repeat its mistakes; while those who study the past will invent new and better ways to make mistakes."

RESPONSE BY AUTHOR

William Silber. I consider one of the four points to be a friendly amendment. The others I disagree with. The one friendly amendment is that FHA and GNMA secondary market operations may not have a subsidy element. By implicit subsidy I mean not up front. By subsidy I mean exactly what Downs means: any expense that is incurred by government.

The implicit subsidy in FHA and GNMA is the excess of the default experience over and above the paid-in premiums. Now you can tell me that for the past 30 years FHA has always been running a surplus, but there is a line of credit at the Treasury that FHA and GNMA can draw upon. There is an expected value to that line of credit. That is exactly what I mean by implicit subsidy.

I don't see anything wrong with that definition and I don't think you can appeal to historical experience to say there is no expected value. There is. If the expected value is zero, of course then there is no implicit subsidy.

Let me take it one step further. There are benefits to GNMA or FHA programs that exceed the direct costs of the government. There are benefits in terms of the homogenization of financial markets in the case of GNMA. There are benefits in terms of creating or eliminating the need to evaluate credit risk on a case-by-case basis.

These benefits again need not be--in fact are not, in the case of homogenization--direct costs, although there may be administrative costs associated with them. You can then say, the government can now step away and let the private sector do it.

I am not really arguing with you on the case of the implicit subsidies. I am just saying they may be there or they may not be there.

There were no proofs by assertion in the paper. The paper never said supply is perfectly elastic and it never said that about intramarginal borrowers. The paper said if. The rest of the analysis never assumed it. It just said if that is the case, these results follow. I think that is a reasonable way to proceed.

DISCUSSION

Kevin Villani, Department of Housing and Urban Development. My objection to the Silber-Black paper is that it includes every housing credit program. I would argue that if a program is actuarially sound over time it should not be described as a subsidy.

The only difference between an actuarially sound public credit activity and a private activity is that there is an implicit subsidy in the federal backstop or last-resort support of a public program. But government is a potential lender of last resort to private enterprises and we do not define that as a subsidy, if the implicit commitment is never activated.

If an implicit commitment to lend never costs the government anything then I would not define that as a subsidy.

Mary Kay Plantes, University of Wisconsin. My question is, how do you implement an actuarially sound program? "Soundness" depends on, for example, the trend in housing prices and mortgage rates.

Mr. Villani. I think that is precisely the question to ask. One big concern is that, with loan-to-value ratios of up to 97 percent, house prices could stop rising. We could take a lot of losses. I think the private mortgage insurance industry is at the greatest risk. The risk of a decline in house prices is a risk they cannot diversify away. If house prices do plummet, the entire industry will be in trouble because defaults will be correlated with house prices.

FHA may also be in big trouble. But it has an advantage because it could borrow temporarily from the Treasury. This is how FHA has a competitive advantage in providing unsubsidized, over time, insurance.

Ron Hoffman, U.S. Treasury. I can't understand how one calculates a premium that "in the long run" is actuarially sound if it turns out that some backup is needed.

How do you calculate a premium that in the short run may not be actuarially sound and that in the long run is?

James Barth, George Washington University. I would like to ask if a subsidy should be defined ex ante or ex post. After the fact, a program may turn out to contain a subsidy because there are losses, whereas ex ante you did not expect there to be losses and therefore you did not classify the program as a subsidy.

Mr. Silber. I agree with Kevin Villani when he says that FHA has a competitive advantage because it has backup borrowing authority, and once that is said it means there is an implicit subsidy in the program.

The extent to which a subsidy is ex post is beside the point. FHA needs no capital to back up its mistakes. But a private mortgage insurer needs that capital. There is the subsidy.

In valuing the benefits of a GNMA passthrough, one must include, as a benefit, homogenization of the market, which costs nothing once it is done. That, too, causes those curves to

shift downward, by changing the character of the debt. That is a benefit to the program. It does not correspond to any implicit subsidy aside from that of administering the program, which may be small.

Elinor Bachrach, Senate Banking Committee. I do not understand why actuarially sound means no subsidy. A borrower is getting money at a lower cost than he would have in the absence of FHA insurance. If Chrysler were able to borrow at the Treasury rate, even for an actuarially sound fee, I would consider that a subsidy.

Anthony Downs. We are talking about how to define certain words, and if you want to define the term "subsidy" as assistance regardless of its cost, then you may do so. In the case of FHA there is a benefit to people but it does not have a cost, unless there is some administrative cost that isn't collected from the people receiving the benefits.

Ms. Bachrach. But there may be another borrower who cannot get the money. There is some finite limit to the availability of credit. Someone who has an FHA guarantee is going to get a mortgage and someone without FHA insurance will be denied a mortgage.

Mr. Downs. If you want to insist on your definition of a subsidy, that is your privilege. But it seems to me you must relate it either to a cost for someone or a benefit for somebody else.

All I am asking for is a clear, consistent definition of those terms and a distinction between the extremely low probability of a cost as in FHA, and an immediate and very large cost as in the case of the implicit subsidy arising out of the failure to tax imputed rent.

Mr. Silber. There may be benefits in FHA and GNMA that don't correspond to current actuarial costs of the guarantee. There was an initial setup cost involved in the establishment of FHA. The experimentation cost involved in the establishment of FHA can be interpreted as an implicit subsidy.

Mr. Villani. If the GNMA market were opened up to other than FHA-insured mortgages, there would be no more FHA insurance

under the general insurance fund. It would be completely eliminated by private competition. At least, that was a real concern of those who were interested in a continuation of FHA. The question is: If this were done, without any change in structure at FHA, what would become of the implicit subsidy? Maybe it is in the GNMA market.

David Gillogly, Office of Management and Budget. I have a little sign hanging in my office that says: Nobody gets something for nothing unless someone gets nothing for something.

Anthony Downs is wrong when he says that an improvement in efficiency means there is no cost. There is a cost. It is the profit foregone by the government. We only charge our actual costs. No lender or private insurer is going to accept a risk without getting a premium for uncertainty. FHA is also subject to that uncertainty, but they are only charging their actual costs and not taking a profit. The government is bearing that cost, and it is exactly equal to the benefit provided.

SESSION V. FEDERAL GOVERNMENT ATTEMPTS TO INFLUENCE MORTGAGE
CREDIT: FHA MORTGAGE INSURANCE AND GOVERNMENT REGULA-
TION

James Barth, Joseph Cordes, and Anthony Yezer, George Washington University, prepared the paper for this session. Mr. Yezer summarized their findings. (The full paper is printed in Part II.)

John Tuccillo, the Urban Institute, offered formal comments on the paper.

SUMMARY OF PAPER

I have two admissions or confessions to make. The first is that the paper does not really concern itself with the real effects of credit programs on housing markets. There are two reasons for that.

First, as evidenced by the comments of Plantes, Small, and von Furstenburg, it is extremely difficult, if not impossible, to assess the real impacts of some credit insurance programs, even in a world without usury rate ceilings or other regulations.

The second reason for not considering the real impact of the programs is that if you view the mortgage credit programs as attempting to influence the quantity of capital devoted to the housing sector in the United States, it is not clear whether you want to applaud increasing that amount of capital or to cry over it.

The second admission is that our paper makes no forecast for the future and largely focuses on the past, so in Tony Downs' terms we are trying to promote new mistakes rather than repeating old ones.

What does the paper do? It analyzes the FHA mortgage guarantee program as experiments; experiments that generate information about the distribution of default losses in high-risk mortgage lending.

In this sense, it builds on earlier work by Henry Aaron and George von Furstenburg.

Basically, there is a problem in the economics of information concerning the evaluation of risk in high-risk lending. Namely, it would be very difficult to get a private lender to conduct an experiment that would generate a proper data base for analyzing default loss on high-risk loans.

The lender would have to make loans to anyone who walked in the door, and once this became common knowledge the adverse selection problems and other difficulties referred to by John Clapp would drive the lender into bankruptcy.

This is an expanding area of theory, but there seems to be a consensus that there are genuine difficulties in expecting private lenders to invest in information on the default experience in high-risk lending because of the lender's inability to capitalize on gains from such information. But a second reason the private lender can't do this is because he is regulated.

There are usury rate ceilings that limit the menu of loan terms that can be offered. In addition, you might imagine yourself explaining to a bank examiner that you are going to spend the next year conducting an experiment in high-risk lending.

Thus, due to regulation and certain market problems, we have difficulty in assembling information on the losses associated with high-risk lending. This generates one rationale, apart from real impacts, for guarantee and insurance programs such as the mortgage insurance programs of FHA.

I am going to take this idea and make two points about it. The first is historical and refers to the early experience with FHA. The second is more recent and emphasizes the rationale for the program as an experiment in high-risk lending.

FHA was instituted at a time when mortgage and housing markets were in collapse. It was also instituted in the period when conventional lending for housing mortgages was mainly restricted to loans with low loan-to-value ratios, that is, requiring a large down payment. You may think that odd, but in Germany, for example, the vast bulk of mortgage finance today is conducted at a low loan-to-value ratio.

In part, what the FHA did was to expand the loan-to-value ratio at which loans were being made and, lo and behold, there was not a great increase in defaults.

Indeed, another program that has not received much attention, the Homeowners Loan Corporation, bought loans that were foreclosed or being foreclosed in the 1930s, amid widespread anticipation that this would result in big losses and a big subsidy. In fact, when the Homeowners Loan Corporation went out of business in World War II, the corporation showed a profit, although there may have been some creative bookkeeping going on there.

In any event, the FHA provided some experimental evidence that high loan-to-value ratios do not equal high rates of default. Over time, the private sector recognized that there were unexploited gains to be made by making loans at high loan-to-value ratios. You could make loans at higher loan-to-value ratios, and increase the quantity of your lending and/or the interest rate, without a substantial increase in default loss. That was a valuable lesson.

I should also mention, however, that in addition to the private sector learning something, the regulators learned something from the FHA. There were regulations that prevented private lenders from making high loan-to-value loans, even if they had wanted to at that time. Indeed in some of the legislative debate over the FHA, one of the rationales for the Section 203(b) mortgage insurance was that it would be exempt from state regulations on loan-to-value ratios.

The net result was, whether the regulators learned that they should allow private lenders to increase loan-to-value ratios, or whether private lenders learned about profitable opportunities, private lenders started offering mortgages at loan-to-value ratios comparable with those in the FHA program.

The story should end here. You would think FHA would be out of business today. The initial legislative intent of FHA has long been accomplished; the housing market is not in total collapse, so FHA should have disappeared.

However, new problems always seem to arise in housing markets. So FHA was asked to address new issues. The main new issue basically has to do with the desire to provide housing credit to specific groups in the population.

Since the mid-1960s, FHA has changed its lending criteria and its insurance criteria, and moved more and more into insuring mortgages in declining inner-city areas. We view this primarily as an experiment, in which FHA goes into declining areas and makes loans and insures loans that private lenders ordinarily wouldn't make, and we observe a default experience. This is how you get information.

The earlier trick of FHA, of just raising loan-to-value ratios, had already had its effect. Private lenders were successfully competing with FHA in that market. So the FHA went into the declining inner-city areas. In this experiment there has been an increase in defaults. And the conventional lender has not followed FHA. The conventional lender followed FHA in raising loan-to-value ratios, but not in rushing into declining inner-city areas.

Indeed, the conventional lender, in the view of some, has been so tardy that we have had to pass a variety of regulations, such as the Community Reinvestment Act, to prompt or coerce an increase in conventional lending in declining inner-city areas.

We can ask ourselves, are the lenders going to follow FHA? Should they follow FHA? Should they increase their lending in the declining inner-city areas? I think the key to that is to view FHA as an experiment and to look at the experience in the FHA portfolio and ask yourself what happens when you change your location of lending and make mortgages in the inner-city areas at the same rates that you would in the suburbs.

Tables V-8 and V-9 contain a summary of the results of an empirical study of default experience in the FHA portfolio. The tables indicate the effect of loan-to-value ratio and selected location characteristics on the default rate.

In the tables, a value of 1.0 represents the average default rate in the FHA portfolio. This is the unsubsidized Section 203(b) portfolio, so that represents the average. Obviously, it fluctuates up and down with economic conditions. Here we are concerned with the differential effect of location.

For given loan-to-value ratios and different locations, the tables provide a measure of expected default on an FHA-insured loan. Clearly, loan-to-value ratio makes a big difference; that is, if you raise the loan-to-value ratio, your expectation for foreclosure goes up.

TABLE V-8. RELATIVE DEFAULT RISK a/ OF FHA 203(b) MORTGAGES BY LOAN-TO-VALUE RATIO AND SELECTED NEIGHBORHOOD AND PROPERTY CHARACTERISTICS

Loan-to-Value Ratio	Neighborhood				Non-Blighted	Structure	
	Central City	Suburb	Rural	Blighted		Fair or Poor	Other
0.75	0.25	0.16	0.25	0.46	0.20	0.44	0.20
0.85	0.66	0.56	0.65	0.86	0.59	0.86	0.59
0.90	0.86	0.76	0.86	1.06	0.80	1.04	0.80
0.95	1.05	0.96	1.05	1.26	0.99	1.24	0.99
1.00	1.25	1.15	1.25	1.45	1.19	1.44	1.19

a/ The mean default rate of the sample is assigned a value of 1.00.

TABLE V-9. RELATIVE DEFAULT RISK a/ OF FHA 203(b) MORTGAGES BY LOAN-TO-VALUE RATIO AND SELECTED CITY CHARACTERISTICS

Loan-to-Value Ratio	SMSA Size (Millions)			City Population Growth (Percent)			SMSA Size Per Capita Income (Dollars)		
	9.53	1.86	.272	+8	-1 <u>b/</u>	-10	6571	4739 <u>b/</u>	3075
0.75	0.47	0.21	0.16	0	0.21	0.56	0.213	0.214	0.215
0.85	0.87	0.62	0.56	.27	0.62	0.96	0.616	0.617	0.618
0.90	1.08	0.82	0.74	.48	0.82	1.02	0.819	0.82	0.821
0.95	1.27	1.01	0.96	.67	1.01	1.36	1.015	1.016	1.017
1.00	1.47	1.21	1.16	.87	1.21	1.56	1.210	1.211	1.212

a/ The mean default rate of the sample is assigned a value of 1.00.

b/ Values are the mean values for the sample.

Some of the location factors definitely make a difference-- for example, whether the neighborhood is judged blighted or unblighted, that is, whether the structures are in sound or unsound condition. Also, the rate of population growth, whether the housing market is generally expanding or contracting in the area, makes a substantial difference. Other factors don't make a difference. For example, age of structure makes no difference.

Now, what can we conclude from this experiment? First, we conclude that FHA mortgage guarantees can be valuable as a source of experimental data on risk-taking in mortgage markets. This is probably also true of SBA loan programs and others.

Also, in the new move to have conventional lenders deemphasize location, some factors can be dropped with little impact on losses. These factors potentially represent unexploited gains.

However, there are certain location factors that are associated with higher rates of foreclosure. And if you are going to insist that lenders follow the experimental evidence and increase lending on properties that have characteristics not associated with higher losses, you also have to accept the other consequence, that they are going to decrease lending or fail to lend on properties that have location characteristics that increase foreclosure loss.

The net result of our analysis is that we believe the guarantee programs do have a potential role for providing information on lending.

After they provide information on risk, however, we would expect the private sector to take advantage of this information, as it did with FHA in the past, and begin to compete away business from the insurance program. The insurance program would then tend to shrink in volume over time insofar as it is successful.

Despite this potential of government insurance programs to provide information, there has been little exploitation of that potential. Only a handful of studies of default loss in the FHA mortgage portfolio have been made.

The data are getting better, but they are still difficult to work with, and of course we are just talking about mortgages here. A variety of other loan programs could be subjected to the same analysis, that could generate the same benefits of reducing

uncertainty. But in many of these other programs data are unavailable, or have not been put in a usable form.

COMMENTS BY DISCUSSANT

John Tuccillo. Essentially, the Barth-Cordes-Yezer paper, which I will abbreviate as BCY, is an attempt to examine the efforts of the federal government through FHA and related programs, such as the Community Reinvestment Act, to enhance the equity and efficiency of the mortgage market.

The paper consists of three parts, each of which is somewhat independent. The first is a theoretical model of the impact of FHA on mortgage markets. Tony Yezer did not address himself to that part, quite wisely I think, because while this is an interesting story it adds very little to the conclusions that you can draw from applying a little common sense to some knowledge of mortgage markets.

The second part is a long discourse on the development and progress of FHA and the inroads that have been made into the program by the private mortgage industry.

Finally, in the third section, which is probably the most interesting and most valuable section of the paper, the authors analyze recent mortgage market regulations and how they relate to the FHA experiment.

The model set out in Part 1 relies on a variable cost of equity to the homeowner to achieve its results. In fact, there is no reason to believe that the cost of equity is variable. If the cost of equity is assumed constant, the result in most cases is that one chooses a loan-to-value ratio of either one or zero, neither of which we observe very often. For this and other reasons, I find the model unsatisfactory.

The history of FHA in Section 2 breaks into two parts. The first, dealing with the 1930s and 1940s, concerns a period during which the program was actuarially sound in the Downs-Villani sense.

On an operating basis, the program was set so that, for the program as a whole, premiums and losses were designed to even out. Ex ante, there was no subsidy. This abstracts from the fact that there were two kinds of subsidy involved.

First of all, FHA received a large capital subsidy because without FHA there wouldn't have been a mortgage market in the 1930s. When the mortgage market collapsed, FHA bailed it out. The notion that Bill Silber referred to of homogenizing the market was a tremendous contribution. For that the federal government has received no payback. So, in a sense, there was an enormous capital subsidy.

Within the program itself there was and still is a cross-subsidy element. The single-premium policy that FHA employs invariably causes some people to pay more than they should and some people to pay less. Within the program, some of the FHA recipients are subsidizing others. These are the two kinds of subsidy involved here.

That was the first part of FHA's history, and I think an evaluation yields quite high marks for FHA. It did save the mortgage market. It homogenized the single instrument, and together with the federal secondary market facility restored order to the mortgage market.

The second period begins in the mid-1950s. Here we have FHA branching into two types of programs. One is the nonsubsidized program that I just mentioned. The other is the special assistance programs, which employed explicit operating subsidies.

The subsidized program is one in which the federal government steps into an already existing market, takes some borrowers from the back of the line, and puts them in the front of the line. Starting in the mid-1950s and accelerating through the 1960s and 1970s, FHA got more and more into this business.

Now what happened? Two things happened. First, the private mortgage insurance industry began to skim off FHA's better risks. The private sector, learning from FHA's example, decided that there was business out there they could do.

They had an experience base to build on that was provided free of charge by the federal government. Moreover, they did not have to insure the whole loan. They could insure the top part of the loan and make out very nicely. That is precisely what happened.

The private mortgage insurance industry came in and said to those FHA borrowers who were paying more than they should, "We have

a better deal." There is an excellent article by David Kasserman in the Journal of Money, Credit and Banking in 1978, entitled "Evidence on the Decline of FHA," which describes this phenomenon clearly.

The second thing that happened is that FHA started getting into the business of looking at other types of experiments--that is, getting involved in riskier and riskier types of lending. What happened though, as BCY point out, was that the private sector did not follow FHA in. There was no reason to expect that they would. The only reason they got into the business that was normally handled in the 203(b) program was because they could exploit a profitable opportunity. To get into the high-risk area would be to exploit a loss. While the BCY paper suggests that private lenders haven't sufficiently analyzed the FHA data, I would argue that they have analyzed it marvelously well. They have analyzed it and run the other way. They have made their decision.

That leads to the third part of the paper, the offspring of FHA, which was an attempt by the federal government to cure the inertia of private lenders. Thus, we have the Community Reinvestment Act and other types of regulation that attempt to get private lenders to focus on different areas by proscribing certain traits such as sex and location in the lending decision.

In this part of the paper, BCY do an analysis of the causes of default. They attempt to single out those particular characteristics that are significantly related to default. They then argue that if lenders are prohibited from using these characteristics in lending decisions, one is forcing the onus of a public experiment onto the private sector. This is what BCY are arguing, and I think they are right.

I disagree slightly with one conclusion. They conclude that this is necessarily inefficient. I would weaken that a bit and say it is potentially inefficient. There are cases, for instance the South Shore National Bank of Chicago, in which lenders have profited from living with CRA and anti-redlining legislation by specializing in a high-risk sector of the market. Specialization, especially in financial markets, is efficient. So it is possible that shifting the onus may not necessarily result in inefficiencies, but I think the point is well taken.

The new types of regulation are attempting to make up for an essentially correct impression by the private sector that, if they

follow the lead of FHA, they are essentially taking on a role that government ought to assume.

RESPONSE BY AUTHOR

Joseph Cordes. I would like to refer to one result of our paper that has not yet been given appropriate emphasis. It involves the fact that in the 1960s FHA began to move in the direction of more explicit kinds of subsidies such as below-market interest rates.

While this was happening, FHA was also relaxing some of its property and location criteria while maintaining its uniform pricing policy.

Relaxing some of the criteria, while continuing to maintain a uniform insurance price, may have generated a pattern of implicit subsidy within the program that had some of the same distributional effects as some of the explicit subsidies that were being enacted at the same time.

The point is that rule changes of this type may reallocate funds within a particular credit program in a way that is quite similar to explicit subsidy programs.

DISCUSSION

James Barth. John Tuccillo argued that our model is flawed because we assume the cost of equity is variable.

But, in the spirit of the earlier discussions, we see no reason to assume that price elasticities are either zero or infinite. That doesn't strike us as a useful assumption on which to conduct our analysis.

I also thought I detected an inconsistency in his remarks when he said private mortgage lenders won't make conventional loans in some areas because those loans are very risky. Why won't interest rates adjust to reflect risk? That is the question that wasn't answered. He later referred to an institution in Chicago that was willing to make high-risk loans. Why? Presumably because it could charge interest rates that reflected risk based upon the expected default loss associated with those types of loans.

There are usury ceilings and other restrictions that prevent lenders from raising interest rates to reflect the expected default losses associated with certain types of high-risk loans.

John Tuccillo. You are right, usury laws are involved here, along with some balance sheet constraints that prevent the risk-return tradeoff from occurring.

In the case of the South Shore Bank, they have made investments in information that have allowed them to gauge more accurately risk in their particular area.

It is very hard to make those kinds of investments on any kind of large-scale basis. The Philadelphia mortgage plan, for example, does it on a pooling basis, but even there the rejection rate is very high. These things can be done on a local, specialized level. This is the essence of specialization in financial markets. So I am not sure that there is an inconsistency there.

What I am saying is that you can't really force any kind of broad, wide-scale commitment by the private sector to the type of lending that FHA is doing on an explicit subsidy basis, simply because the information costs are too high.

Kevin Villani, Department of Housing and Urban Development. This is addressed to both the authors and the discussant. There has been a lot of discussion about why private institutions don't lend in high-risk, inner-city neighborhoods. Jim Barth just pointed out that the rates don't adjust in those neighborhoods, they don't go high enough for conventional lenders to want to make the loan. John Tuccillo seemed to indicate that it was a rational decision on the part of private mortgage insurers not to want to insure in inner-city neighborhoods because they were risky. But, in fact, life insurance companies insure the life of tightrope walkers. Why don't private mortgage insurers actuarially determine what it will cost them to insure high-risk, inner-city loans, and then do it?

Mr. Barth. It probably has something to do with credit scoring, which is to say, why is it that there aren't an infinite number of interest rates, one for each and every individual in the country? Credit institutions identify certain factors that they deem important, and they tend to assess risks based upon those factors. They group people discretely. There is cross-subsidization in conventional loan programs too, to the extent that the risk

premium is basically the same for large classes of individuals of differing riskiness.

Mr. Tuccillo. I think my answer to Villani's question is, if you show me a private insurer willing to insure 100 percent of a loan, at a premium that would not completely bar the potential borrower from that mortgage, I do not see any reason why a private lender would not make that loan. You have to have a loan first to insure. Private mortgage insurers only take the top part of the loan, only 20 percent. That means I still have to adjust my interest rate to cover the risk exposure of 80 percent of the loan.

Mr. Villani. The suggestion is that there is a tremendously profitable opportunity for the private mortgage industry to go in and make loans in inner-city areas. Why don't they go in there?

Mr. Tuccillo. I think part of the reason for that is that they do not have to. It is much easier to make a suburban tract loan than to make an individual inner-city loan. It is much easier to lend on the whole tract, drive home from the country club, and say "Hey, the roofs are on, release the next \$100,000 to these guys."

Anthony Yezer. Jim Barth offered you one answer which I think is part of an answer to the basic question of why conventional lenders or private insurers are not active in all mortgage markets. It is that lenders tend to specialize. We find that in personal loan markets too. Commercial banks do not make the same kind of loans that finance companies make. There are various reasons, adverse selection and imperfect information. These suggest that insurers will specialize.

On the other hand, you can come back to Jim Barth and ask, "Why isn't there a specialized PMI that goes into the inner city?" John Tuccillo has indicated that there is one case of that. In Washington, D.C. also, there is one bank very active in high-risk mortgages.

There are some specialized lenders. But they are limited in entry to the market because they must compete with FHA. Our results suggest that there is a cross-subsidy in FHA, which may mean that the higher-risk neighborhood is getting a cross-subsidy even at current premium levels in the unsubsidized program. That cross-subsidy element in FHA may preclude a specialized PMI from going into an inner-city area.

All results about the level of subsidy in mortgage guarantee programs are based on what happens in the housing market over time. But our data are drawn from a period in which housing prices have been going up at a fairly rapid rate for at least the last decade.

What would be the actuarial soundness of the FHA unsubsidized portfolio if the rate of housing price appreciation were only 4 percent a year? It might not be sound at all.

In that case you cannot expect a PMI to compete with any of the things being done by the FHA program. PMI's have not replaced FHA in the inner-city neighborhood for two reasons: number one, because of a cross-subsidy in the program, and number two, because the rational private insurer has to feel that housing prices cannot keep going up in the future at the rate they have been rising in the past.

John Clapp, University of California. There is a certain redundancy in mortgage lending that has been ignored: a redundancy in the tools available for controlling risk. There are several control variables for one object. Those control variables include the interest rate, which is not typically used. Interest rates do not vary from neighborhood to neighborhood, or from borrower to borrower. Another control variable is the term to maturity, which is used quite extensively. For example, George Benston's evidence from Rochester shows that the term to maturity is significantly less in the inner city of Rochester than in the suburbs. 1/

Finally, there is the loan-to-value ratio. The higher the loan-to-value ratio, the higher the default rate. These additional control tools go a long way toward explaining why interest rates do not vary in submarkets.

A related point may be phrased as a question: Have private lenders learned from the experiment conducted by the FHA? Has

1/ George J. Benston, "Urban Decline and Redlining," Innovations and New Directions in the U.S. Financial System: Implications for Real Estate Markets and Investments, Real Estate Chair Lecture Series, John M. Clapp, editor, Housing, Real Estate and Urban Studies Program, Urban Resources Center, Graduate School of Management, University of California, Los Angeles (1977), pp. 62-84.

their lesson been to run away? I do not think the evidence is in on this and I am surprised to hear other discussants state so categorically that they have turned and run. The dominant position of the FHA in inner-city areas could be related to the easy terms offered by the FHA. Private lenders generally cannot match those terms.

Mr. Yezer. There is some evidence that the ratio of FHA to conventional lending is higher in declining inner-city areas than elsewhere. That is what I was relying on in discussing the behavior of the private lenders.

SESSION VI. MORAL HAZARD, ADVERSE SELECTION, AND SBA BUSINESS LOAN
GUARANTEES

William C. Hunter, University of Georgia,
prepared the paper for this session. (The full
paper is printed in Part II.)

Ira Kaminow, Government Research Corpora-
tion, offered formal comments on the paper.

SUMMARY OF PAPER

The lending activities of the Small Business Administration
(SBA) are carried out under four basic programs:

- o Section 7(a), Regular Business Loan Program;
- o Economic Opportunity Loan Program;
- o Development Company Loan Program; and
- o Displaced Business Loan (DBL) Program.

Under each of these programs, the agency engages in three
types of lending activity:

- o Direct loans (SBA lends directly, no intermediary);
- o Immediate participations (both bank and SBA advance a
portion of the loan); and
- o Guaranteed loans (SBA acts as insurer, and guarantees up to
90 percent of the loan principal that a bank extends to a
borrower).

Loan guarantees constitute the most important type of SBA lending
activity, in terms both of dollar volume and of total number
of loans made.

In this paper, I examine the implications of moral hazard and adverse selection for the efficient functioning of SBA-guaranteed lending. More specifically, because of data limitations, I consider only 7(a) Regular Business Loan Program guarantees. I do not attempt to assess the relative costs and benefits of the program. Nor do I attempt to measure any explicit or implicit subsidies.

In simple terms, moral hazard arises in an SBA-guaranteed lending relationship when either the borrower, the bank, or both can affect the liabilities of the agency without the agency's knowledge. In other words, the probability of default depends in large part on actions taken by the borrower and the bank, and not only on the state of incentives for exercising care. In the paper, I consider where the responsibility for care should be placed, in terms of the relative efficiency of the parties to the agreement. Then I consider the structure of the SBA program in light of these theoretical considerations. I conclude that a problem exists in that the fee structure is not the correct structure.

If the program were correctly structured, the fee would vary depending on the level of care exercised by borrowers. Currently the fee is 1 percent of the guaranteed portion of the loan. It is fixed. It does not vary with the level of the guarantee, which can range as high as 90 percent.

The literature on the private provision of insurance or guarantees when moral hazard and adverse selection are present is highly relevant to the SBA's activities. This literature shows that a competitive equilibrium cannot be a first-best optimum under plausible conditions. The essential argument leading to this result runs as follows:

When the cost of providing a good or service depends on the behavior of the purchaser, as is obviously the case for insurance or loan guarantees, and the supplier cannot observe this behavior, the price charged for the good or service cannot be related to costs. For example, the insurance premium or guarantee fee is not a function of the level of care exercised by the purchaser. The implication of this argument is that social cost is greater than private costs, so that equilibrium under private provision cannot be a first-best optimum.

Essentially, in a competitive market, the supplier of insurance or guarantees does not have enough information on the amount

of insurance or guarantees purchased and does not receive a signal that the expected losses of the purchaser are increasing. In such markets, fees or premiums are uniform over the quantity of insurance or guarantees purchased; thus they do not vary with expected losses, and result in externalities.

This literature argues convincingly that public provision can solve these shortcomings of private provision. Specific proposals include mandatory minimum public insurance plus private insurance or guarantees, and the taxing of insurance or guarantee purchases, among others.

The problem of adverse selection has also been studied extensively in the literature of private provision, and similar conclusions hold. That is:

- o Competitive equilibrium may not exist
- o When it does exist, it may have perverse properties.

Essentially, these results are based upon the fact that whenever there are two or more purchasers with different default probabilities, the insurer will have imperfect information.

The classic example here is the case where there are two purchasers, high-risk and low-risk, each knowing his type, but where suppliers are unable to distinguish between them during the contracting period. If two contracts are offered, high-risk types will demand the contract designed for low-risk types. And only one contract will survive the competition process. Low-risk individuals will not be able to allocate their wealth efficiently and will either have to subsidize high-risk individuals or go without insurance or guarantees.

Rothschild and Stiglitz (1976), in an elegant paper, study the adverse selection problem in detail and show that of two types of equilibrium, pooling and separating, only separating is possible and still may not be an optimum relative to the information set. As in the moral hazard case, public provision or intervention is suggested as a solution to the market failure.

Given these shortcomings of a purely competitive insurance industry, what is the problem with the current structure of the SBA guarantee program?

SBA is structured so that the problems of moral hazard and adverse selection could be eliminated. That is, the agency has the relevant information necessary to minimize these problems, but the guarantee fee does not vary in the required manner. This fixed fee is invariant with respect to the guarantee level and the level of care exercised by the bank.

It is highly doubtful that the fixed fee of 1 percent of the guaranteed portion of the loan is enough of an incentive to induce care above some self-protection level. One could even argue that any observed care is more likely due to the presence of coinsurance, that is, less than a 100 percent guarantee level.

This analysis leads to the natural expectation that the higher the guarantee level, the lower are the incentives for exercising care above simple self-protection levels.

To correct the current program requires that the guarantee fee be directly related to bank behavior that affects the probability of default.

The SBA would have to experience-rate each participating bank so that an experience-related guarantee fee could be assessed. There are numerous difficulties associated with carrying out such a program, but it is not impossible.

In fact, the new Bank Certification Program represents a step in this direction. It gives selected banks the power to commit the agency to lend. Banks are selected on the basis of past performance and care in handling SBA loans.

In Section IV of the paper, I define and characterize for the guarantee program what Arrow refers to as ideal insurance. Here we specifically look at the relationship of SBA and the bank. An ideal guarantee is characterized by

- (1) Being actuarially sound--that is, the agency should break even on operations.

- (2) Equating the bank's marginal utility of dollar return from lending in the default and no-default states of nature.

This is possible only when guarantee fees vary correctly with behavior that affects the costs of the agency. As mentioned earlier, guarantees of less than 100 percent are helpful but do not eliminate the problem.

In Section V, I show that in an expected utility-maximizing framework, the cost-minimizing guarantee arrangement for the SBA under moral hazard is an arrangement whereby the marginal utility of the lending bank is equal in the default and no-default states of nature. But this is nothing more than the provision of an ideal guarantee whereby fees vary correctly with the level of care exercised.

As an example of the adverse selection problem, I also show in this section that when the SBA uses inaccurate probabilities of default relative to the bank's, its costs rise faster than in the case of correct perceptions so that, if the agency selects the cost-minimizing guarantee, the guarantee level will be too high. Thus the social costs of providing the loan guarantee are higher than the private costs. In this case, one can have too many loans being guaranteed that are too risky, and too many defaults.

In Section VI, I consider the level of care exercised by the parties to the loan agreement. With respect to bank care, I utilize a model in which the probability of default on the loan is directly related to the level of care exercised by the bank.

An interesting result of this model is that the level of care can be zero even when the benefit guarantee is less than 100 percent. That is, even with a deduction the bank still exercises zero care and maximizes its utility. This implies that a variable rate premium is much more important than a coinsurance provision.

I also consider borrower care and the impact of the guarantee level on the borrower's care. To do this, I assume the borrower pays the cost of the guarantee, with benefits payable to the bank in case of default. If we assume that the SBA is fully aware of the characteristics that determine default, and charges a fee

varying with borrower behavior, and that the borrower is responsible for any unguaranteed losses to the bank, then the borrower has full incentive for proper care and will seek out banks that exercise good care.

In contrast to this situation, I consider the case in which the bank pays the guarantee fee and is responsible for any unguaranteed losses. If the borrower knows his capabilities but the bank does not, then we have the moral hazard and adverse selection problem all over again. In this case it is natural for banks to seek the largest guarantees possible and to substitute guarantees for their own care. Borrowers have little incentive to search out banks that exercise good care or have a relative advantage in servicing their type of loan. In fact, borrowers are likely to search randomly for banks, and misallocations are likely to occur.

These two cases represent extremes. Actual practice is somewhere between the two cases so that perhaps the bank and borrower have incentives for care, at least at self-protection levels.

The last part of this section considers incentives for taking care and efficient care. Here I show with an extreme set of assumptions that when the borrower is assigned unguaranteed costs of default he has incentives for optimal care, and bank care is at the self-protection level. When the bank is assigned these costs, the borrower's care is at the self-protection level while the bank has incentives for proper care.

In this analysis the most efficient equilibrium occurs when costs are assigned to the party that is more efficient in making additional default cost-avoidance expenditures. Thus, if the bank is better at taking care, the bank should be responsible for care activities. Again, these are two extreme cases. All of this merely identifies the possibility of moral hazard and adverse selection. It does not answer the empirical question of the extent to which it exists.

To attempt to answer this empirical question, I went through 400 SBA cases. I collected data on the terms of the loan, the bank and borrower characteristics, and a host of demographic variables. In Table VI-2, the variables are defined and in Table VI-3 some linear regression equation estimates are given.

TABLE VI-2. DEFINITIONS OF VARIABLES

Definition	
DEFAULT	Status of loan default: Yes = 1, No = 0
RACE	Minority = 1, Nonminority = 0
BKCARE	Management assistance provided by bank: Yes = 1, No = 0
USE	Use of loan proceeds: Regular = 0 Regular and/or Repayment of debt = 1
TOTASS	Total assets of borrowing firm (000's)
YRSBUS	Number of years business has been operating
GUARANTEE	Percent of loan principal guaranteed by SBA (nondecimal)
CRRATE	Credit rating of business: Good = 1, Bad = 0
PRESBA	Previous SBA borrower: Yes = 1, No = 0
ACARE	Borrower care: Yes = 1, No = 0
SBACARE	SBA Management assistance provided: Yes = 1, No = 0
ROI	Borrower's return on investment (decimal percent)
EMULT	Borrower's equity multiplier (ratio of assets to owner's equity)
SALNW	Turnover of owner's equity
REGBK	Borrower had previous bank relationship with participating bank: Yes = 1, No = 0
BROI	Bank's return on investment (decimal percent)
CAPAS	Ratio of bank's capital accounts to total assets (decimal percent)
CILOAN	Ratio of bank's commercial and industrial loans to total loans (decimal percent)
USFASS	Ratio of U.S. Government securities and federal funds sold to total bank assets (decimal percent)
LONDEP	Ratio of loans to total deposits (decimal point)
NLLLOANS	Ratio net loan losses to total loans (decimal point)
SPREAD	Bank's return on loans minus yield on U.S. Government Securities portfolio (decimal percent)
EFFTAX	Bank's effective tax rate before extraordinary items (decimal percent)
BASS	Total bank assets (millions)
NOEMP	Borrower's total number of employees
NW	Net worth of borrowing business (000's)

TABLE VI-3. ESTIMATED REGRESSION EQUATIONS (Standard Error In
Parentheses)

Model 1

$$\begin{aligned}
 \text{DEFAULT} &= .833 - .073 \text{ REGBK} + .159 \text{ RACE} - .150 \text{ BKCARE} + .115 \text{ USE} \\
 &\quad (.179) \quad (.203) \quad (.07)* \quad (.084) \\
 &- .005 \text{ TOTASS} - .014 \text{ YRSBUS} + .025 \text{ GUARANTE} \\
 &\quad (.001)* \quad (.01) \quad (.018) \\
 &+ .195 \text{ CRRATE} - .223 \text{ PRESBA} - .019 \text{ ACARE} - .101 \text{ SBACARE} \\
 &\quad (.042)*+ \quad (.101) \quad (.181) \quad (.085) \\
 &+ .025 \text{ ROI} + .176 \text{ EMULT} - .0002 \text{ SALENW} \\
 &\quad (.018) \quad (.151) \quad (.00001)*
 \end{aligned}$$

R² = .54
N = 198

Model 2

$$\begin{aligned}
 \text{BKCARE} &= -.288 - .021 \text{ RACE} + .283 \text{ REGBK} + .013 \text{ YRSBUS} \\
 &\quad (.138) \quad (.107)* \quad (.009)+ \\
 &- .067 \text{ GUARANTE} + .076 \text{ PRESBA} - .036 \text{ ROI} + 13.8 \text{ BROI} \\
 &\quad (.005)* \quad (.147)+ \quad (.027) \quad (9.89) \\
 &- 1.25 \text{ CAPAS} - .665 \text{ CILOAN} + 2.48 \text{ USFASS} + 1.17 \text{ LONDEP} \\
 &\quad (2.98) \quad (.541) \quad (2.43) \quad (.833) \\
 &+ 16.6 \text{ NLLLOAN} - .83 \text{ SPREAD} + .067 \text{ EFFTAX} - .07 \text{ BASS} \\
 &\quad (9.31)* \quad (.241) \quad (.208) \quad (.001)*
 \end{aligned}$$

R² = .49
N = 198

(Continued)

TABLE VI-3. (Continued)

Model 3

$$\begin{aligned}
 \text{ACARE} = & - .029 - .056 \text{ RACE} - .018 \text{ USE} + .03 \text{ TOTASS} - .007 \text{ YRSBUS} \\
 & \quad (.080) \quad (.059) \quad (.011)^* \quad (.005) \\
 & - .013 \text{ GUARANTE} + .073 \text{ CRRATE} + .0059 \text{ NOEMP} + .048 \text{ PRESBA} \\
 & \quad (.028) \quad (.065) \quad (.001)^* \quad (.021)^* \\
 & - .092 \text{ REGBK} + .60 \text{ SBACARE} - .162 \text{ NW} - .048 \text{ ROI} \\
 & \quad (.151) \quad (.062)^* \quad (.001)^* \quad (.052) \\
 & - .033 \text{ SALENW} \\
 & \quad (.001)^*
 \end{aligned}$$

$R^2 = .72$
 $N = 198$

Model 4

$$\begin{aligned}
 \text{SBACARE} = & - .415 + .03 \text{ RACE} + .014 \text{ USE} - .006 \text{ TOTASS} - .034 \text{ YRSBUS} \\
 & \quad (.152) \quad (.112) \quad (.0001)^* \quad (.042) \\
 & + .08 \text{ GUARANTE} + .15 \text{ CRRATE} + .09 \text{ NOOWN} + .235 \text{ PRESBA} \\
 & \quad (.02) \quad (.384)^+ \quad (.060)^+ \quad (.101)^* \\
 & - .02 \text{ ROI} - .013 \text{ EMULT} \\
 & \quad (.03) \quad (.095)
 \end{aligned}$$

$R^2 = .19$
 $N = 198$

(Continued)

TABLE VI-3. (Continued)

Model 5

$$\begin{aligned}
 \text{GUARANTE} = & 77.9 + 2.44 \text{ RACE} - .351 \text{ YRSBUS} - 7.33 \text{ REGBK} \\
 & \quad (2.66) \quad (.452) \quad (2.78)* \\
 & - 1.75 \text{ PRESBA} - 114.40 \text{ BROI} + 20.6 \text{ CAPAS} + 5.95 \text{ CILOAN} \\
 & \quad (2.42) \quad (286.3) \quad (48.2)* \quad (8.67) \\
 & + .429 \text{ LONDEP} - 66.5 \text{ NLLLOAN} + 10.4 \text{ SPREAD} \\
 & \quad (13.26) \quad (268.4) \quad (5.3)* \\
 & - .892 \text{ EFFTAX} + .02 \text{ BASS} \\
 & \quad (3.41)+ \quad (.042)+
 \end{aligned}$$

$$\begin{aligned}
 R^2 &= .17 \\
 N &= 198
 \end{aligned}$$

* Coefficient significant at .10 level or higher.

+ Sign disagrees with expected sign.

A simple linear probability model has many problems. For example, it predicts outside the 0-1 interval for binary dependent variables. However, it does give you some idea of the relationship between these characteristics and the dependent variables. Later, I intend to use probit and logit analysis.

In the equation estimates, the question of moral hazard and adverse selection hinges on the sign of the guarantee variable.

In the first model, we are predicting default. Default is represented by 1 and no-default by 0. Notice that the guarantee variable has a positive sign. That is, the higher the guarantee the higher the default, although the variable is not significant.

The other significant variable is bank care. Bank care is defined as any documentation in the loan file showing that the bank assisted the borrower with recommendations, or some other documentation indicative of bank care. Notice that bank care has a negative sign. It is significant and implies that when the bank took care the probability of default was lowered.

So the first equation suggests, at least, moral hazard.

The second model predicts bank care. What is the probability the bank will take care? If the borrower uses his regular bank, the probability of bank care goes up by 28 percent. An increase in the guarantee level lowers the probability of bank care by 6.6 percent. Adverse selection is evident in this particular case.

The other variable that is significant is the ratio of net loan loss to loans. It has a negative sign, which implies that an increase in this ratio lowers the probability of bank care. If a bank has a higher ratio of losses to loans, it is probably taking less care.

In the third model, the dependent variable is the borrower's care. The R^2 for this equation is fairly high. The reason is that SBA care and applicant care are almost perfectly correlated. This is due to the fact that most SBA borrowers in Georgia tend to use SBA programs whenever they get SBA loans. They attend seminars and use the agency's facilities. Notice also that the guarantee is not significant in this equation.

The fourth equation, SBA care, did not perform very well. The R^2 square is only .19, but you will notice that most of the significant signs make sense.

Equation 5 tries to explain the level of the guarantee.

All in all, the signs and significance of the coefficients tend to support the existence of moral hazard. They also suggest a relationship between default and guarantees. A guarantee lowers bank care, and bank care is the most important determinant of default.

COMMENTS BY DISCUSSANT

Ira Kaminow. Bill Hunter's paper may be divided into two sections, theoretical and empirical. I reach two conclusions about this paper: The first is that the empirical section is a good deal more of a contribution than the theoretical section. That is, the theoretical section is to a large extent putting a new problem, the SBA loan guarantee program, into the old package of adverse selection and moral hazard. The second conclusion is that this old package is not suitable for the new problem.

In terms of the empirics, I think there are useful results here and I hope some of them will be brought to the attention of policymakers.

But to come to the central question: Is the problem the Small Business Administration seeks to solve one of a market failure in the insurance industry? I do not believe so. It is, in fact, a problem of what society considers to be an inadequate flow of loans to small businesses. The Small Business Administration loan function is unambiguously a subsidy program designed to encourage loans to small businesses. In 1979, the SBA had about \$300 million in income from loan guarantees and direct loans, and \$900 million in expenses. That is to say, its expenses were some three times as high as income. The appropriate way to view the SBA loan guarantee program is as a subsidy program, not as some effort to restore efficiency in an otherwise inefficient insurance market. I should point out, incidentally, that since 1966 the SBA has lost for taxpayers something like \$4 billion.

Much of the theoretical section in the Hunter paper is based on the premise that there exists a problem of insurance and that the insurance market functions inefficiently. Consider, for example, the conclusion of the first section:

On the basis of these findings we can conclude that the government can improve resource allocation in insurance and loan guarantee markets with judicious intervention. This could be through taxation or through subsidizing other activities that affect the probability of loss under the guarantee relationship or through some form of compulsory provision.

When we move on to his optimizing equation (6) we find a unique optimum intervention level by the SBA. I suspect that the unique optimum is based on the fact that it ignores the role of the SBA in providing subsidies to small businesses, and focuses on its role of eliminating problems resulting from a hypothetical insurance problem. Significantly, the whole series of equations leading up to (6) ignores the fact that the rate of return banks receive on loans made to small businesses should have a risk premium built into it that varies with the probability of default. With a risk premium, in an ideal free market situation, banks would be indifferent between insured and uninsured loans. The reason for this is that in a market equilibrium without insurance, the rate of return that banks would receive from their loans would incorporate the risk premium that would make it worth their while to make loans to risky small businesses. That is, the banks would self-insure.

The alternative to having the risk premium built into the rate of return is for the banks to buy insurance and pay an insurance premium. In a competitive market, they would pass the insurance premium along to borrowers. The banks would be indifferent as between charging risk premiums and passing along insurance premiums charged by an outside loan insurer. I would suggest, therefore, that the optimum amount of SBA intervention would be zero if banks could include full risk premium in interest rates. The SBA incurs expenses in overseeing lending operations, and we may just as well allow the banks to do their own direct insuring.

Well, why is the rate of return more or less fixed? That is, why do they not include full risk premiums that vary with default risk? The reason is, we have usury restrictions and other restrictions as to how much banks can charge small businesses. Society has made the decision to provide a subsidy to small businesses by imposing usury ceilings combined with SBA loan guarantees. It is not that there exist some inherent market inefficiency that the SBA needs to save us from.

If I had to write the Hunter paper, I would consider the optimality condition as follows: that society has made the decision that we should encourage small businesses. Given that society has decided to provide \$600 million a year in subsidies to small business, what is the most efficient way to do this? One way is to provide a direct interest-rate subsidy. If the bank charges 12 percent, the SBA picks up, say 3 percent, the net cost would be 9 percent. That would encourage small-business loans and small-business activity. The alternative to that is the loan guarantee

program. I suspect you will find the loan guarantee program is inferior because not only do you shell out the \$600 million, you introduce the problem of moral hazard and adverse selection because the banks now have an ideal opportunity to take advantage of the government. When government writes guarantees for the banks, the banks do not have to exercise as much care, and all the problems Bill Hunter talked about arise. So the SBA introduces a wider wedge in the efficient market operation using loan guarantees.

Well, having said this, and having explained the way I would have set up the theoretical section as a choice between ways of shelling out \$600 million a year to small business, I would then have gone on and done something very similar to what Bill did in the empirical section. That is, I would point out what the costs are for a guarantee program as opposed to the costs for an alternative subsidy program. The way you do that is, as Bill Hunter did, to find out to what extent these loan guarantees encourage banks to behave in ways that are privately efficient and socially inefficient--that is, not caring very much whether a loan is defaulted because Uncle Sugar will pick up the tab.

I would now like to say a few words about the empirical section. First, I found the first two equations, model 1 and 2, to be by far the most interesting. I suppose that reflects the way I would have gone about the theoretical section. These equations are concerned with the amount of bank care and the extent to which banks are assured that the loans will be paid.

I would suggest, however, that had I done equations 1 and 2 I would have considered them as a simultaneous equation system. The degree of bank care clearly influences the extent of default. And one would expect that if a bank tries to assist business, the probability of default will be less. But under what circumstances would we expect banks to try to help out? When a business is in danger of failing, of course. So the probability of default clearly influences the likelihood that the bank will send its representative in to provide management assistance. While the degree of bank care clearly influences the likelihood of default, an a priori probability of default also should influence the degree of bank care.

To quibble on a few details, I thought the bank-care variable left out one of the most significant parts of bank care. That is the banks' own selection process, that is, whether the loan is made in the first place.

I was uncertain as to why the dependent variable in Model 1 was considered to be a 0-1 variable. One could have made that a continuous variable by looking at the percentage of loans paid. Also, more appropriate kinds of analytical techniques could have been used.

Moreover, the size of the loan was not included in equation 1. A bank that has a \$500,000 loan outstanding will exercise a lot more care than one with a \$5,000 loan outstanding.

I would also suggest that Hunter not stick only with linear equations, because some of his coefficients are rather peculiar. For example, if the guarantee level went up by 1 percent, according to his estimates, the default probability went up by 2.5 percent. It may be useful to find out precisely which way this curve bends and how, and what its properties are in terms of non-linearities.

RESPONSE BY AUTHOR

William Hunter. I thank the discussant for a comprehensive comment on the paper. I do not disagree with his analysis, but my approach was to assume that we are stuck with the SBA program and then to ask, "how can we improve it?"

I would like to follow up on your suggestion of broadening the perspective to include alternative means of achieving the program's objectives.

The empirical work needs improvement, though what I did was low-cost in terms of time and getting the analysis done. I intend to follow up on your suggestions to the extent that data availability permits.

DISCUSSION

Ron Hoffman, U.S. Treasury. First, the Hunter paper considers a case of efficient intervention by government into the economy. The discussant cast this in terms of a subsidy. It seems to me that if you are going to engage in an intervention, then you may be moving from a point at which the economy is operating inefficiently to a point of efficiency. If you can do that, then you have a free lunch.

Second, in this intervention, you may move from a position of efficient operation of the economy to a different point of efficient operation of the economy. In that case you have a redistributive move. There will be people who scream about it and people who are happy about it, but at least your intervention will not have been inefficient.

Also, the move may be from either an efficient point or an inefficient point to a more inefficient point. That has economic costs. I think the discussant's position is that what is being done is an intervention with inefficiency. At least, however, we can be specific about the value judgment that underlies this intervention. A transfer is being made that results in advantage to some and maybe a disadvantage to the economy.

The discussant made the point that he would like to compare this particular subsidy with alternative ways of getting the same sort of benefit to the recipients. I think that is a good point.

In general, what one would like to do is be able to translate all kinds of interventions into cash outlays that are similar to the outlay programs that you see in the budget. That would be ideal for tax expenditures. I think it would be ideal for direct loan programs and loan guarantees. We would like to know what the translation is in terms of a numeraire that can be compared with the outlay section of the budget. Moreover, there is a deductible provision in most of these guarantee programs. What about a copayment provision?

In addition to covering some proportion of the loan guarantee, what about having the bank share in the losses? That is a method used in other kinds of insurance programs; it may be a way of closing the gap between bank care, on the one hand, and the proportion of the loan that is guaranteed, on the other.

In fact, as I look at those regression equations, one of the things that occurs to me is, does the profit-maximizing bank say, "I have alternative ways of reaching my objective?"

One way would be to spend money monitoring the loan, and another would be simply to purchase a larger or smaller guarantee on that loan. There may be other methods that would make the lender more price sensitive.

On the empirical analysis, I think it would be useful to show a little supply/demand model from which those regression equations might be deduced, say, from the point of view of the profit-maximizing bank.

Mr. Hunter. I just have one response and that is to the question of the assignment of cost. I consider the case in which the losses are assigned to one party. In that case, you get the optimum amount of care from one party and not the other. Ideally, you want to have some kind of sharing in the losses so that all parties take the right amount of care.

Mr. Kaminow. My only comment is something of a repetition of what I said earlier. I think what the SBA has managed to do is, using your terms, to take an efficient situation and turn it into an inefficient one. Anything we might do to reduce moral hazard and adverse selection in the SBA program, such as requiring a high coinsurance on the part of banks, would, I think, make the problem smaller.

I think we could reduce the problem to zero, simply by not using a loan guarantee program to subsidize small businesses. My suspicion is that we use a loan guarantee program to subsidize small businesses for political reasons. Somehow, guaranteeing loans appears to be less costly than actually making the loans at below-market interest rates. If you guarantee a loan you only have to pay off if the loan goes into default. If you forget the probability that the loan can go into default, then the cost appears to be zero.

The only way I can explain loan guarantees is that they are somehow politically more palatable. I think it is easier to guarantee a Chrysler loan and to absorb whatever risk premium is in that than to give Chrysler \$200 million outright.

Christopher Baum, Commonwealth Research Group. I have a couple of comments on the empirical part of the analysis. It seems to me, given that you have a great number of parameters here that fall short of any significance level, that use of a linear probability model is not really justified. At a couple of points in your talk you seemed to suggest that you needed to have more degrees of freedom to do, say, logit or probit. That is not true. You can do logit or probit on anything you can run a linear regression upon. As Mr. Kaminow suggested, use of a nonlinear function as opposed to the linear probability function would be justified.

The next problem that comes up, though, is that of simultaneity. Indeed, equation one contains all four left-hand variables of the other four models. Thus the argument that you do not have bias and inconsistency seems questionable. It does seem that the simultaneous problem could be quite serious and that some sort of instrumental approach would need to be taken to insure that these estimates were consistent, let alone efficient.

Mr. Hunter. I yield on all the econometric problems.

Marvin Phaup, Congressional Budget Office. From Bill Hunter's survey of the insurance literature, Ira's discussion of it, and Kevin Villani's earlier remarks on the potential for guarantees to perfect capital markets, are we to understand that there is no type of risk that government should not stand prepared to insure? And further that the only real issue we have left to settle is the fee structure or price? Is that a correct interpretation of this literature?

Mr. Hunter. I would say from my reading of the literature that there may be other ways for government to intervene. Government does have a role to play whenever you have market failure existing in the presence of moral hazard and adverse selection.

The role for government is to come up with a scheme either to tax away the externality or to supply the information that the market lacks. Private firms don't get the proper signals in the market. The role of government is to supply that information.

Mr. Kaminow. To demonstrate market failure does not in any way demonstrate that the government is best situated to resolve the problem of market failure.

It is well documented that it is almost impossible to get around the problems of adverse selection and moral hazard using competitive markets. That doesn't lead us to the conclusion that it is possible to get around those problems with government intervention. Government, in many cases, has the same problems as the market and additional problems that the market doesn't have.

I would like to point out an interesting reverse moral hazard problem, in which the government participates. That is in the bank insurance program. The FDIC insures bank deposits, while government policies clearly influence the probability of bank failures.

The fact that the government plays a role in insurance alters government policies or may alter government policies in ways that are more inefficient than alternative solutions to the problem.

I don't think that we can easily jump to the conclusion that because of these market inefficiencies we ought to get the government involved in the insurance process.

Mr. Hunter. I didn't mean to imply that government should come in with a program like the SBA loan guarantee program. This literature says that the role of government should be to provide ideal insurance where you have actuarially fair programs that break even, in which all costs are covered. This way you have a more efficient equilibrium.

If government can do that, it ought to provide ideal insurance. With this particular program, fees don't vary with care and the program is operated at a loss.

It might be unreasonable to assume that we could ever have ideal insurance provided by the government.

SESSION VII. THE EFFECT OF FEDERAL LOAN GUARANTEES ON SMALL
ENTREPRENEURS

Christopher F. Baum, Commonwealth Research Group, prepared the paper for this session. (The full paper is printed in Part II.)

Daniel Reingold, Economic Studies Group, Washington, D.C. Office, Coopers and Lybrand, offered formal comments on the paper.

SUMMARY OF PAPER

The loan guarantee, as an instrument, has gained notoriety for its high exposure usage in a few instances, such as Lockheed and Chrysler. Unseen by most of us, though, have been numerous small loan guarantee programs creeping into the off-budget activities of federal agencies.

Many of these programs have been established over the last several years in the alternative energy field. They were first utilized by the Energy Research and Development Administration for solar energy, geothermal energy, and alternative fuels, long before we heard talk of synfuels and electric and hybrid vehicle development.

All of these programs have had the avowed goal of stimulating the private sector to carry the ball. Why do we need government intervention at all in these cases? Largely because progress in these alternative energy areas is perceived to require some financial support if that progress is to continue at a socially desirable level.

That is not to say that we have ruled out, in a policy sense, direct government activity. There has been a great deal of direct government involvement in the form of sponsored research, purchase agreements, and the like. There is, however, what I might term an almost messianic concern at the Department of Energy, perhaps created by members of Congress, that commercialization in these various alternative energy fields be very visibly a private-sector, free-enterprise activity.

Why, then, loan guarantees?

The last discussant suggested that it is politically more feasible to operate through loan guarantees than to shell out the taxpayers' money directly. The problem, however, is that many of these alternative energy fields are characterized by emerging technologies that are inherently risky. The technology is largely unproven, in the process of technological development there may be a number of false starts, or capital sunk into a hole that is abandoned or superseded in some way as we move toward commercialization. If we want to stimulate private-sector activity with supposedly minimal government involvement, loan guarantees may be an appropriate instrument.

We are not talking about the theoretics of public finance. We are not talking about an ideal guarantee program. The tack I have taken is to consider a flesh-and-blood program administered by an executive department's employees, circumscribed by a long list of regulations, involving large quantities of red tape and the other necessary requisites to get something moving.

What I undertake to evaluate here is the Department of Energy's electric and hybrid vehicle loan guarantee program, and I try to form an estimate of its likelihood of success.

First of all, we have to define success. Success to the Department of Energy (DOE) sponsors of the program may be something different than success to, say, the Office of Management and Budget.

For DOE success is defined as getting over the hump into commercialization. The target of the electric and hybrid vehicle commercialization program is to get a production level of 100,000 vehicles per year by 1983. Now, that target has been moved back numerous times, but it seems clear that, if we are talking about something other than just a very small demonstration effort, the omelet of large-scale commercialization can't be made without breaking eggs. One presumes the people who are setting up the loan guarantee program at DOE realize that there are going to have to be some eggs broken. Some dollars will have to go down the drain.

On the other hand, to the General Counsel and the Comptroller's Office in DOE, and to the Office of Management and Budget

and the Treasury, a successful loan guarantee program may mean rather a program that doesn't cost the taxpayer very much money. Better yet, no money at all. That program, however, is not likely to be very successful from DOE's viewpoint.

Let me give a little background on this program. The original act mandating some direction in electric and hybrid vehicle development dates from 1976, when Congress passed it over President Ford's veto.

Loan guarantees were authorized at that time primarily as a small-business endeavor to encourage small businesses to conduct R&D and capital construction, and handle the initial start-up costs of production. It was limited to 90 percent of the cost of any activity with a 15-year maximum repayment, and required that interest rates be reasonable. I don't know what lawyers would consider reasonable these days, but they have to be reasonable.

Additional legal language suggests that the amount of loan added to any available capital for the firm must be sufficient, and there must be, again, a reasonable assurance of repayment. Of course, at the same time no borrower will be considered for this program who has other reasonable means of financing. So it amounts to a lender-of-last-resort program, where presumably the only ones you see coming to your door to get a loan guarantee are the admitted losers who have not been able to attract capital from any other source.

Thus, there is adverse selection, not by those coming for loans, but by those standing ready to make the loans. The program, by definition, must select the poorest of credit risks.

The government was also authorized to pay the principal and, in a later amendment, the interest if necessary to prevent default, provided that the probable net cost to the government would be smaller in bailing out the firm than in letting it go under.

As long as you attach a zero probability to the possibility of default, there is no budgetary expenditure. There are no dollars involved. However, it is clear that you could be talking about a fairly large sum here.

A single borrower is permitted to apply for up to \$6 million in total loans, although the origin of that figure is far from

clear. The total program was given an authorization of \$60 million. It is a short-term program expiring in 1983. It may very well expire before actually doing anything except consuming a good deal of red tape.

No loan guarantee has been granted under this program to date. There has been a tremendous amount of red tape involved in getting the program rolling. This arose from the Congressional blockage of appropriations to start the program and to grant guarantee authority. The blockage was not removed until last year. At that time a lending ceiling of \$17.5 million was established, so that rather than a \$60 million program, the size of the current program is \$17.5 million.

Numerous loan applications have been received, and some of them have languished in the DOE corridors for up to a year. Some firms have reportedly gone into bankruptcy by the time their loan applications were considered.

In practice, DOE is aided in performing the evaluations by outside contractors, who have been told that no firm is going to be able to get more than \$3 million per borrower. The \$6 million limit has been reduced to \$3 million because of the small size of the total program.

How do I go about deciding whether this procedure is a viable one and whether if we start making guarantees we will indeed succeed in anybody's sense of the word? To do that analysis I put together a small model of an entrepreneurial firm of the type that would be coming to DOE's doorstep and saying, "I would like a loan guarantee. I am ready to start research and development, moving toward production of electric and hybrid vehicles."

This model did not involve estimation. It did not involve any optimizing other than the assumption that the firm is one of those profit-maximizing creatures found in the textbooks. All that the model entails is pro forma balance sheets, income statements, and cash flow statements for the firm over a horizon of 10 to 15 years.

We have to make a number of assumptions about this firm. First of all, we assume that the firm faces a constant price for its product. That product, the electric vehicle, is going to be competing in the second-automobile market, if we can still afford second automobiles.

It is a short-range vehicle, and within the near future is likely to be used for shopping and perhaps commuting. It is not for driving from Washington to Los Angeles. It will be competing with the Rabbit, the Chevette, the LeCar.

Secondly, we assume that the quantity sold by a firm is going to be largely determined by supply. The firm will be able to sell whatever it can produce, but what it can produce will be limited very strongly by its financial resources and by its ability to go from a production level of 350 units a year up to, let's say, 5,000 over a period of six or seven years.

The firm is not so much a manufacturer as an assembler. It takes something like a Chevette or a Pacer or a Rabbit, removes the engine, and installs the appropriate batteries, electric motors, controllers, and so forth. The firm is at the mercy of the costs of raw materials or intermediate materials. It will face a market price for components such as the chassis, the body, the electric motor, the batteries. It will not be able to produce those on its own, so that both its revenues and its costs will be fairly tightly constrained.

The simulation takes the demand schedule as given. Table VII-1 gives you these assumptions, while Tables VII-2 and VII-3 add other assumptions that put some flesh onto the cost categories of materials and labor. Tables VII-4 and VII-5 give some assumptions that enable us to work through income statements and balance sheets for the firm.

The baseline case is one in which the firm sells units at \$7,000 per vehicle. Its base materials cost \$6,500. With a \$500 margin, it has to cover all other costs and presumably turn a profit.

We assume first of all that the firm is able to get a \$6 million loan guarantee; that it is able to start off on day one of year one with a \$6 million line of long-term guaranteed debt arranged through DOE and a participating bank or banks. The question then is, just when will the firm turn the corner? When will it become financially viable? Will this be before it uses up the \$6 million of long-term debt? We assume that once the \$6 million is exhausted, the firm will then have to start issuing short-term debt. Since it couldn't get money in the first place, borrowing short-term may be a questionable proposition.

TABLE VII-1. QUANTITY SOLD AND PRICE ASSUMPTIONS

Year	Quantity Sold (Units)	Price (1977 Dollars)
1980	50	7,000
1981	150	7,000
1982	420	7,000
1983	780	7,000
1984	1,500	7,000
1985	2,170	7,000
1986	3,000	7,000
1987	5,000	7,000
1988	5,000	7,000
1989	5,000	7,000
1990	5,000	7,000
1991	5,000	7,000
1992	5,000	7,000

SOURCE: Derived by Commonwealth Research Group, Inc., Boston, Massachusetts.

NOTE: Baseline case figures. This schedule can be varied for each case if desired.

In any case, when there is a deficit, when the firm needs to go to the bank for bridge financing, it will have to meet standard accounting tests. It will have to have a favorable current ratio, a favorable profit potential. In the absence of those, we can pretty well assume that the firm will not make it.

What does the baseline case tell us? The firm will be able to borrow if it has a current ratio of 2.0--that is, if its ratio of current assets to current liabilities is 2.0. In the baseline case, it runs up to the \$6 million limit within three years starting in 1980. By 1982 it has exhausted its long-term credit line. It then requires short-term financing which reaches a high of \$1,892 million in 1983.

TABLE VII-2. MATERIALS COST ASSUMPTIONS

Component	Unit Price (1977 dollars)
Chassis and Shipping Costs	2,280
Motor	1,200
Controller	1,300
Battery Pack	720
Charger	<u>1,000</u>
Total	6,500

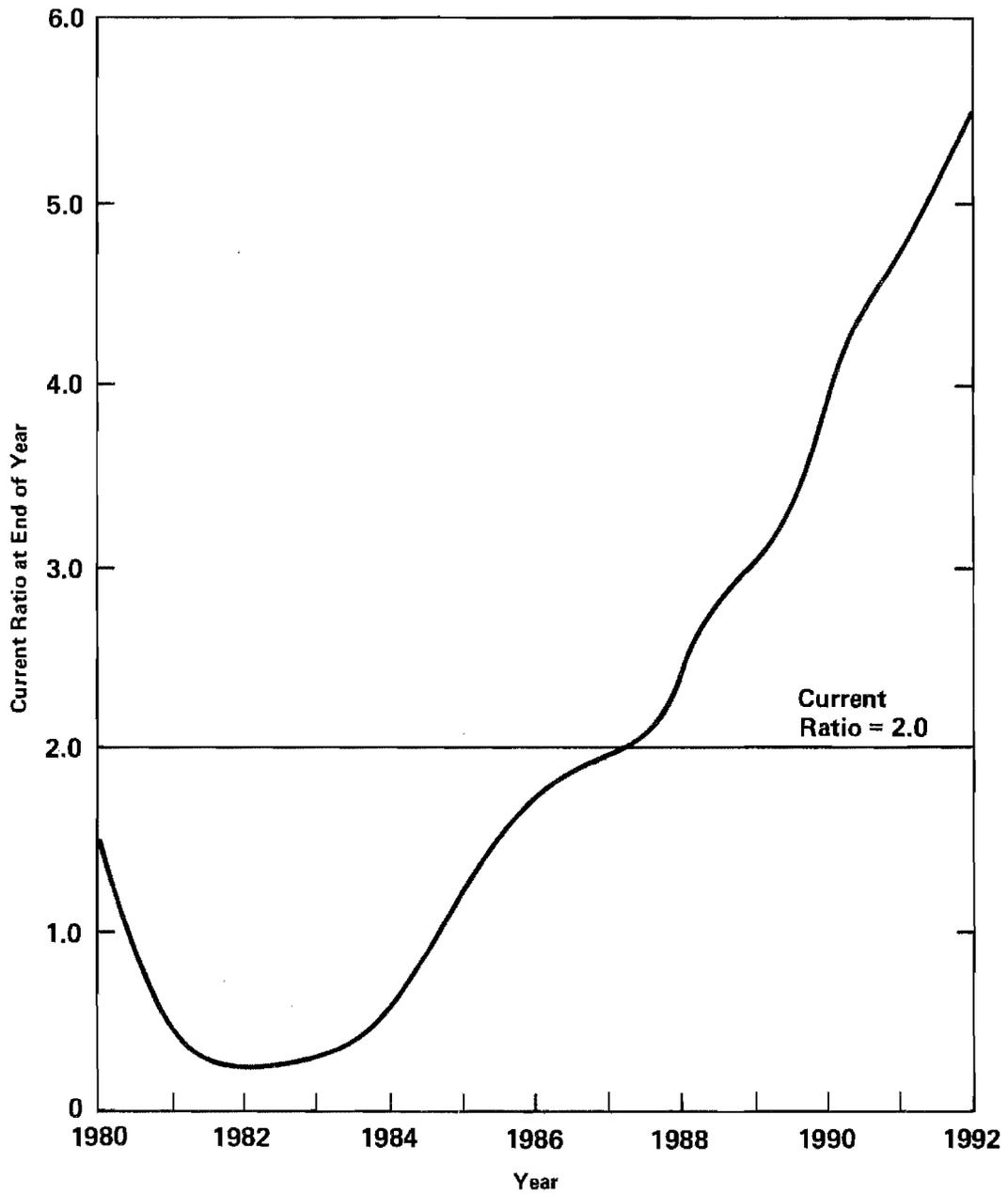
 Materials cost per vehicle (MCV) decreases with quantity
 sold (QS) in the following manner:

If $QS \leq 250$	$MCV = 0.9 \times \text{original MCV}$
If $250 < QS \leq 500$	$MCV = 0.8 \times \text{original MCV}$
If $500 < QS \leq 750$	$MCV = 0.7 \times \text{original MCV}$
IF $QS > 750$	$MCV = 0.6 \times \text{original MCV}$

SOURCE: Derived by Commonwealth Research Group, Inc., Boston,
 Massachusetts.

By 1985 the firm can make it. By 1985 it doesn't need short-term debt, and, as you can see from Figure VII-3, by mid-1987 or so its current ratio is sufficient under this deterministic projection to allow it to carry on, to operate as a private-sector firm.

Figure VII-3.
Current Ratio of the Entrepreneurial Firm, Baseline Simulation



SOURCE: Table 7.

TABLE VII-3. DIRECT LABOR ASSUMPTIONS

Quantity Sold (Vehicles)	Direct Labor (1977 Dollars)	Assumptions
0 - 50	12,000	1 factory worker (\$12,000/year)
51 - 150	24,000	2 factory workers (\$12,000/year)
151 - 300	44,000	3 factory workers (\$12,000/year) + 1 stockperson (\$8,000/year)
301 - 500	62,000	3 factory workers (\$12,000/year) + 1 stockperson (\$8,000/year) + 1 supervisor (\$18,000/year)
501 - 1,000	106,000	6 factory workers (\$12,000/year) + 2 stockperson (\$8,000/year) + 1 supervisor (\$18,000/year)
1,001 - 5,000	106 per unit	Same as above

SOURCE: Derived by Commonwealth Research Group, Inc., Boston, Massachusetts.

The whole story here is one of questionable assumptions about technology. This baseline simulation assumes that things will work; that the batteries will come through at the stated cost and that they will last as long as they should; and that consumers will be willing to pay the market price for the vehicle. The whole difficulty, of course, as in all these alternative energy fields, is that those are extremely tenuous assumptions.

So it becomes necessary to add a treatment of the uncertainty inherent in this firm's outlook. The uncertainty may be taken into account in a rather crude way by merely varying some of the exogenous parameters in the simulations. A couple of the simulations suggest that if the vehicle price was raised to \$8,000 or perhaps \$9,000, in line with trends in current internal combustion vehicle

TABLE VII-4. INCOME STATEMENT FORECASTING ASSUMPTIONS

Entry	Method of Calculation	Assumptions
Total Revenue	Vehicle selling x quantity sold	See Table VII-1
Materials Expense	Materials cost per vehicle x quantity sold	See Table VII-1 for quantity sold; Table VII-2 for materials cost
Direct Labor Expense	Varying amount	See Table VII-3
Warranty Expense	Warranty per vehicle x quantity sold	\$200 warranty; see Table VII-1 for quantity sold
Freight Expense	Freight per vehicle x quantity sold	\$200 freight; see Table VII-1 for quantity sold
General, Administrative, and Sales	Percentage of total revenue that would be derived from particular sales volumes	5 percent; 500 vehicles for the first 4 years; 2,000 for the next 3 years; 4,000 for the last 6 years
Depreciation and Amortization	Percentage of previous year's property, plant, and equipment	5 percent; plant is rented, equipment depreciates over 20 years
Research and Development	Varying amount	\$100,000 for the first 5 years; 5 percent of total revenue thereafter
Indirect Labor Expense	Percentage of direct labor	50 percent
Rent and Miscellaneous Overhead	Constant amount	\$350,000 (\$2 per square foot for a 100,000 square foot plant, \$150,000 miscellaneous overhead)
Interest Income	Percentage of previous year's ending cash surplus	6 percent
Interest Expense	Percentage of previous year's long- and short-term debts	12 percent
Income Taxes	Percentage of pretax profits, less carry-forward and investment tax credit	17 percent of first \$25,000; 20 percent of next \$25,000; 30 percent of next \$25,000; 40 percent of next \$25,000; 46 percent of adjusted pretax profit over \$100,000
Common Dividends	Percentage of net income	0 percent
Retained Earnings	Retained earnings for the previous year plus net income less common dividends	No assumption

SOURCE: Derived by Commonwealth Research Group, Inc., Boston, Massachusetts.

TABLE VII-5. BALANCE SHEET FORECASTING ASSUMPTIONS

Entry	Method of Calculation	Assumptions
Cash	Fraction of total revenue	Total revenue/48 (two weeks of revenue)
Investments	Fraction of total revenue	Total revenue/48 (two weeks of revenue)
Accounts Receivable	Fraction of total revenue	Total revenue/12 (one month's revenue)
Inventory	Percentage of materials cost	8.33 percent (one month's supply)
Prepaid Expense	Percentage of total revenue	2.9 percent <u>a/</u>
Land, Plant, and Equipment	Capital invested in assets	\$2.0 million worth of capital equipment in the first year; \$100,000 each year following; an additional \$3.0 million invested the first year that quantity sold equals or exceeds 300 units; \$250,000 each year following.
Accumulated Depreciation (AD)	Previous year's AD plus this year's depreciation	Not applicable
Accounts Payable	Percentage of total revenue	8.33 percent (one month's revenue)
Short-Term Debt	Difference between total assets and total known liabilities	See Long-Term Debt
Current Maturity Long-Term Debt	Principal due on loans	8-year repayment period on loan
Taxes Payable	Percentage of income tax	50 percent <u>a/</u>
Accruals	Percentage of total revenue	6.8 percent <u>a/</u>
Long-Term Debt (LTD)	Previous year's LTD less current maturity LTD plus new LTD	Once the loan guarantee is used up, further debt accrues in STD
Paid in Capital	Fixed amount	\$10,000,000
Net Working Capital	Total current assets less total current liabilities	Not applicable
Current Ratio	Total current assets as a fraction of total current liabilities	Not applicable

SOURCE: Derived by Commonwealth Research Group, Inc., Boston, Massachusetts.

a/ Reflecting typical internal combustion engine (ICV) vehicle manufacturers' experience.

prices, this would provide a much greater profit potential if materials costs were held fixed. Would that eliminate the short-fall in cash flow? There would still be a cash flow deficit, although it would be much shorter and smaller.

The other side of the coin, though, is that consumers may not be willing to pay more for the vehicle but suppliers may charge more than the projected prices. In particular, since the manufacturers or assemblers will be buying the chassis from American Motors or Chevrolet, the price of the chassis may increase at the same rate as car prices. So materials prices, especially those for batteries or electric motors of an advanced design, may be a good deal higher than those we have projected in the baseline case. If so, that would spell financial disaster for the firm and for the guaranteed loan.

We have, then, a quite plausible scenario of a firm squeezed between rising costs and the reluctance of consumers to pay a premium for technology that in many ways is inferior. The whole electric and hybrid vehicle program is in the very peculiar situation of trying to commercialize an inferior product. The only good things one can say about the vehicles are that they are quiet and they don't pollute. On the other hand, they don't go very long before you have to plug them in; they don't go very fast; and they have other disadvantages that limit their commercial potential.

That suggests what would happen if we change some of the exogenous parameters facing the firm. The policy issues here, however, involve just how much we should give the firm; how much loan we should be guaranteeing. Is the rather arbitrary limit of \$6 million or \$3 million going to be, in any sense, reasonable?

If a successful program is one that has some possibility of getting the firm over the hump into commercialization, then we can say yes, \$6 million will do it. On the other hand, a guarantee of \$3 million would not do anything but throw \$3 million down the drain. It would be merely enough to get the firm started and into collapse very quickly.

Another possibility is to increase the guarantee limits. What if we give the firm more than \$6 million? Will that help the firm get over the hump and out of need of assistance? It seems that it will. If you increase the limit to \$8 million, the firm

will be able to avoid cash deficits. It will have adequate financial resources to make the relatively large-scale capital commitments that will be necessary to move along the suggested expansion path.

But \$8 million seems to be a rather borderline figure. The actual amount drawn is \$6.892 million. Thus a \$6 million limit, or even \$7 million, seems to be doomed from the start.

Loan guarantees, however, are not the only game in town. What would happen, for example, if we had a direct purchase arrangement or a price support? Suppose the firm produces the cars, calculating the full cost including overhead and profit, and then sells to the public at the same price, that is, at \$7,000, with the government subsidizing the difference between the selling price to the consumer and the all-inclusive cost of production.

When you look at the budget cost of the equivalent subsidy, you arrive at a frightening figure. As shown in Table VII-22, the firm, to meet its costs and to avoid cash flow deficits, would require a subsidy of \$2,631 million this year. That subsidy would get 50 units out the door, which would mean that the government would be subsidizing those 50 units to the tune of \$53,000 each, or something like eight times their cost to the consumer. The average subsidy per vehicle over the entire period while subsidies are needed under this option would be \$5,933. That involves a total budgetary outlay of \$30 million.

Of course, we could reduce the subsidy. Why not crank up the price to the consumer? Assume that we can find a few people who are willing to buy these initially produced units at, say, \$10,000. In Table VII-23, you can see that under this lower subsidy scenario only four years and \$14 million are needed. That turns out to be an initial subsidy of over \$50,000 per vehicle; the average subsidy over the life of the subsidy program is \$10,296 or more than 100 percent of the vehicle price.

Several conclusions are in order. One is that the most likely effect of a \$6 million limit or a \$3 million limit will be \$6 or \$3 million down the drain, or bailouts. That sort of limitation will so greatly increase the probability of collapse of the firm that no such program is justified. On the other hand, if we increase the guarantee limit, we can prevent that kind of potential collapse in probabilistic terms.

TABLE VII-22. CASE H SUMMARY

Year <u>a/</u>	Quantity Sold (Units)	Total Subsidy (Millions of of 1972 Dollars)	Subsidy Per Vehicle (1972 Dollars)
1980	50	2.631	\$52,620
1981	150	3.645	24,300
1982	420	7.325	17,440
1983	780	7.207	9,240
1984	1,500	5.901	3,934
1985	2,170	3.372	1,554
1986	<u>3,000</u>	<u>- 0 -</u>	- 0 -
Total	5,070	30.081	- - -

Average Subsidy Per Vehicle			5,933

a/ No subsidies are required after 1985.

My policy recommendation would be that either the program be adjusted so that a guarantee provides some likelihood, some non-zero probability of preventing collapse by the firm, or the program be terminated.

COMMENTS BY DISCUSSANT

Daniel Reingold. I have a list of five comments. Before reciting them, however, I want to commend the author for accomplishing a very difficult task--that of integrating the perspectives of an economist, a financial analyst, and a public policy analyst. The five points are as follows:

TABLE VII-23. CASE I SUMMARY

Year <u>a/</u>	Quantity Sold (Units)	Total Subsidy (Millions of Dollars)	Subsidy Per Vehicle (Dollars)
1980	50	2.556	51,120
1981	150	3.187	21,247
1982	420	5.629	13,402
1983	780	3.043	3,901
1984	<u>1,500</u>	<u>- 0 -</u>	- 0 -
Total	1,400	14.415	- - -

Average Subsidy per Vehicle			10,296

a/ No subsidies are required after 1983.

First, and perhaps most important, the paper does not really assess the effects of loan guarantees. Rather, it assesses the effects of the availability of medium-term debt. Of course, what really should interest us is how the federal guarantee will affect a lender's loan-making decision; that is, whether lenders will be more likely to extend \$6 million or \$8 million in medium-term debt to electric motor vehicle companies if a 90 percent guarantee is provided. If so, how much more likely will they be, and how, if at all, will the terms of the loan to a borrower be changed, as a consequence of a guarantee?

These are questions that the author does not address because he has assumed them away. He has assumed (a) that the loan would not have been available without the guarantee; and (b) that, with a guarantee, the required medium-term debt of \$6 million to \$8 million will indeed be available.

In our current pilot assessment of the Farmers Home Administration business and industry (B&I) loan programs, my colleagues and I have examined these issues in interviews with borrowers, lenders, packagers, and broker-dealers involved with the B&I loan process. In that study we are attempting to develop a conceptual framework and methodology for determining, on a loan-by-loan basis, the impacts of the B&I guarantees on capital supplies and economic development in rural areas.

My second point is that it would be interesting to consider the small electric and hybrid motor vehicle company in the context of the whole auto industry. Is it likely that major auto companies themselves, or perhaps their spinoffs, will develop directly competitive products? If so, one should consider what effects such competition and, incidentally, larger-scale commercialization, will have on the small producers' costs, prices, markets, and, importantly, their riskiness as perceived by lenders.

The third point: For most of the scenarios presented, the author argues that in the company's early years requirements for large amounts of short-term debt, over and above the \$6 million long-term credit line available, are likely to be unsatisfied. Consequently, he argues, the company's projected condition falls short of accepted lending criteria.

One might, however, view these scenarios from a slightly different perspective. Take, for example, the base case where, after three years of losses, substantial profits are generated in the fourth year and beyond. Indeed, by 1983--or the fourth year--\$1 million of gross profit is generated. By 1985, short-term debt is a negative \$658,000; that is, by the sixth year a positive cash flow results. Though it may take six years to bridge the cash-flow gap, we should recognize the possibility that some lenders will view the long-term solvency of the company positively.

One reason the author sees things differently may be his reliance upon the current ratio as an indicator of the company's access to short-term funds. Current ratios, my textbooks and colleagues tell me, are poor indicators of liquidity and of financial performance for two reasons: First, liquidity depends, to a large extent, on prospective cash flows, something not measured by current ratios. Second, quoting from a financial analyst's text, "There is no direct or established relationship between balances of working capital items and the pattern which future cash flows are likely to assume."

The fourth point: One misleading statement that I think should be pointed out occurs when the author writes: "In case of default, the Department of Energy would be obligated to repay the lender in full and would then attempt to recover the guaranteed amount through bankruptcy proceedings."

It is incorrect to say that the Department of Energy would repay the loan in full. Rather, in case of a default, DOE would be obligated to pay the lender only 90 percent of the outstanding debt.

A related point, and one which I think needs emphasizing at this conference, is that the government's obligation is not only limited to 90 percent of the loan value, but also that that obligation is a contingent liability. Only to the extent that borrowers default will the government incur direct costs other than administrative costs. When considering other federal financing incentives, such as direct purchase agreements, or price supports, or other subsidies, one must bear in mind that the costs of alternatives are uncertain. Barring a 100 percent default rate, and assuming equal dollar amounts for guarantees and these other incentives, the expected cost of a guaranteed loan program will be lower.

My fifth point is my final one. It is intended more as a "guide to the perplexed" than as a criticism of the paper. For those noneconomists who choose to read the paper, I offer these hints: First, don't worry about the exogenous, endogenous, and predetermined variables, nor what the author refers to as decision rules. Just read "parameter," or even "assumption" whenever you come across those words.

Second, don't be concerned with the Gauss-Seidel convergence technique employed in the simulations. I have consulted with some financial modelers in my office, and it is their opinion that the use of such convergence techniques may not be necessary. A straightforward simulation, based upon a series of equations and using conditional branching programming to handle discontinuities in the equations would, in their view, be more than adequate to deal with this problem.

Christopher Baum. I have assumed away the possibility that the loan is available without a guarantee. That is perhaps unrealistic. It is, however, the condition that DOE is supposed to be using. They are supposed to look only at people who can't get funds elsewhere. In particular, the decision rule they are supposed to follow is that the potential recipient of the guarantee is to present proof that he has been turned down by at least two lenders. Now, perhaps that is not the way it really works. Perhaps Mr. Reingold's familiarity with the actual administration of programs would suggest that that is not what is going to happen, but it is, naively, the conditions firms are alleged to face.

Point two, there has been a good deal of discussion of the major auto firms coming into electric vehicle production. It is pretty well understood from analysis of the auto industry that no major firm will enter until it can achieve a 100,000 vehicle per year production level. That may happen. GM has been making noises about it. I assume that it is not going to happen right away, and I think reasonable analysis suggests that it will not.

I yield to people who know more about accounting than I do on point three. I admit that the current ratio may not do what it is supposed to do, but I suggest that it gives a guideline. I agree in general that a discounted cash flow would be more appropriate; indeed, it could readily be computed.

On point four, I must correct what Mr. Reingold feels is incorrect. The 90 percent mentioned in the paper is not the ratio of the guarantee to the loan amount. The 90 percent is the ratio of the loan amount to the activity. In other words, if a firm is going to make a \$10 million capital investment, it can get a guarantee for \$9 million of that investment. However, of that \$9 million, every penny is potentially a liability of the government. If a guarantee for \$9 million is extended, it is a 100 percent guarantee.

Lastly, a minor point is that this model comprises a set of simultaneous equations. If there is a way to solve it without using some iterative convergence technique I would like to see it. Indeed, the conditional logic with branching is inherent in the implementation of the model because things like the cost functions are step functions of the level of output. You have a system of simultaneous variables, and there is no way to solve it other than iteration.

SESSION VIII. VALUATION OF LOAN GUARANTEES

E. Philip Jones, University of Pennsylvania, and Scott P. Mason, Harvard University, prepared the paper for this session. Both authors presented the summary of their findings. (The full paper is printed in Part II.)

Howard Sosin, Columbia University, offered formal comments on the paper.

SUMMARY OF PAPER

Mr. Jones. In any loan guarantee, it is necessary to evaluate the cost to the government so as to compare it with whatever benefits may be attributed to the activity. Our paper focuses on techniques to assess the cost to the government and the benefit to private participants. The criterion adopted is that of market value because any loan guarantee involves future flows. It involves uncertain flows. To come up with the measure of that, we have to consider the initial cash equivalent. Our notion is to suppose that guarantees of securities are offered and to ask: What price would be placed on the guarantee in the market?

The critical characteristic of a loan guarantee is the contingent claim. By that, we mean that the payoff from the loan guarantee is contingent on the underlying asset value of the firm. For example, on a guaranteed, noncallable, nonconvertible issue of debt, if the assets of the firm are sufficient, the payoff on the loan guarantee is zero. Alternatively, if the asset value of the firm is insufficient to pay off the coupons, then the firm will default and the government will be liable. (There is a close parallel here with the European "put option," which is a security with a payoff only if the value of an underlying asset is below a certain critical level.)

The model that we use for finding the fair market price of a contingent claim on an underlying asset is the contingent claims

valuation model. This model is essentially analogous to a decision tree. The decision tree uses two pieces of logic at each decision point. The first piece is that as we move from one point to another something happens--for example, if the value of the firm goes up, then the value of the debt of the firm also goes up, or, alternatively, the liability that the government has goes down because it is more likely that the firm will be able to pay off. So the guarantee and the underlying asset value are highly correlated over a short interval of time. One principle for highly correlated assets is that they will have similar return-to-risk ratios.

The second principle we use is that each decision will be made in the best interests of the person making it. So we will talk about callable bonds, and obviously the firms will call the bonds according on their business interest.

Now, in some very special cases we can solve these decision trees analytically. In other words, we can come up with a functional form. We don't have to go through the decision tree. But the decision tree is an analytical solution. We have to resort to a computer routine to go through this sort of analysis to make sure the claim we are looking at is earning a fair rate of return at each point in time.

Fortunately, if you write up the initial software that embodies the decision through logic, the incremental cost is very cheap and it is easy to produce alternative stories as to what happens at the end. In other words, it is easy to look at different sorts of securities and different sorts of loan guarantee provisions once you have set up the software routine to use the logic.

Now, it is a very important characteristic of the solution of this decision tree that the expected rate of return on the underlying assets turns out not to matter. You do not have to know the expected rate of return on the underlying asset in order to come up with the value of the contingent claim. This is important because it is typically the most difficult thing to measure in valuing securities.

However, the volatility of the underlying asset matters very much. The volatility is much easier to measure than the average rate of return. A principal virtue of this model is that it

eliminates the need to estimate an expected rate of return on the underlying asset, or a fair expected rate of return on the guarantee, and thus eliminates one source of possible confusion and discussion.

We want to point out a couple of caveats, however. For the purposes of this paper, we have assumed that the interest rate is a constant. Secondly, there is at least a technical issue involved in that the value of the firm's outstanding liabilities may include the value of a potential guarantee. So when we talk about the value of the underlying asset, we emphasize that we are talking about the value of the underlying asset as if the guarantee were not there.

Now with this logic and software routine, we want to look at three types of loan guarantee programs to illustrate the application of the computer routine. The first is a coupon issue of debt, with a full or partial guarantee, that is nonconvertible and noncallable. The second is a case of junior and senior debt; we want to see whether guaranteeing senior debt versus guaranteeing junior debt produces different incentives for the firm. The third case is coupon debt.

Mr. Mason. Loan guarantees can be thought of as insurance through which the government insures something risky. Think of an insurance company, with an insurance policy on an oil tanker worth \$50 million. Question: Is that insurance policy a liability to the insurance company? Clearly it is. Is it a liability worth \$50 million? Well, no, it is only going to be worth \$50 million if the tanker sinks. Is it a liability worth zero? Clearly not; there is some probability that the tanker will sink. There has to be an intermediate value between zero and \$50 million that would represent an approximation of the contingent risk borne by the insurance company. That is a reasonable analogy of the government's position in insuring debt.

Consider a very simple firm worth \$100 million. Think of it as a demonstration plant for uranium enrichment or a shale oil plant--a private company that came to the government and said, we will build a shale oil demonstration plant for \$100 million if you will guarantee an issue of \$50 million of bonds. We need \$100 million total in assets, but we need the government to step in and guarantee an issue of bonds with the promised principal amount of \$50 million.

The coupon rate on the bonds is 12 percent of the face, which would be \$6 million a year in interest payments. We choose to pay no dividends on our equity. Let's summarize this example and add a little more information as follows:

Value of firm's assets = V = \$100 M

Face value of bonds = B = \$50 M

Coupon payments = C = \$6 M/yr.

Interest rate = r = .10 yr.

Variance of return on asset value = σ^2 = .20/yr.

Dividends = 0

Term to maturity of bonds = t = 15 yrs.

Total payment of firm (interest and dividends) = P
= \$6 M/yr.

You will note that the riskless rate of interest is 10 percent. Sigma squared is the measure of uncertainty attending the future value of the assets which will be deployed in this shale oil plant. From market data, we estimate sigma squared to be 20 percent a year. We want the bonds to have a maturity of 15 years. The large P is the total pay-outs this firm will make per year, which happens to coincide with the \$6 million that it will pay out to the bondholders.

Question: What will be the magnitude of the liability that the government will be taking on if it should agree to guarantee this issue of \$50 million? In order to use the particular tables prepared in the study, we have to form some ratios. The tables are indexed on three key ratios. The first is the quotient of the riskless rate of interest to the uncertainty of the project, or r/σ^2 . In this case, given the data, it happens to be 0.5

The next key ratio is that of the pay-outs to the bondholders divided by the principal of the bonds, which looks something like current yield on the debt, but again standardized by the risk on the project or $c/\sigma^2 B$. That ratio has a value of 0.6 as does the ratio of the total payout to bonds, standardized for risk.

Now consider Table VIII-2. You will note that the table is indexed on three different ratios, 0.5, 0.6, and 0.6, and those are precisely the ratios computed in this example. However, we have to calculate two more ratios ($\sigma^2t = 3$) and ($V/B = 2$) to use this table.

The entry in Table VIII-2 that corresponds to these data contains two numbers. That is, in Table VIII-2 under the column headed 3.0, in the row labeled 2.00, we see two numbers, 0.902 and 0.232. Those are the two answers given to us by the dynamic decision analysis when we evaluate the bond by itself without the guarantee and then just the guarantee.

For every \$1,000 bond this suggests that the bond, without the guarantee, would sell for \$902. But if you were to sell this bond in the capital markets, with the guarantee attached, it would have a value of \$1,134 which is the combined value of the bond and the guarantee.

Tables VIII-1, VIII-2, and VIII-3 are all essentially an attack on the same problem. It is a simple firm. It has only debt and equity. It has only one class of debt, coupon debt, which is guaranteed. But what we are attempting to vary between the tables is sigma squared, the risk. In other words, does the value of the guarantee increase with risk? Your intuition says yes.

If you study Tables VIII-1, VIII-2, and VIII-3, you will note underscored entries. In the left-hand column of Table VIII-1, you will see two underscored entries. As you move from Table VIII-1 to Table VIII-2, you have reduced sigma squared. In other words, the underscored entries in Table VIII-2 are essentially the same firm as the underscored entries in Table VIII-1, only the risk has been reduced. Note what has happened to the value of the unguaranteed debt. It has gone from 0.769 to 0.918. That is common sense. And the value of the guarantee has gone from 0.324 to 0.182. That is intuitive. The value of the guarantee should go down because we are guaranteeing the debt of a less risky firm. That is what Tables VIII-1 to VIII-3 accomplish.

But there is a more intricate situation, and a more interesting one. What happens when I am given a capital structure with many issues of debt in it, and there is but one other layer of debt to be added--the one to be guaranteed? How do I account for these interactions?

TABLE VIII-1. UNGUARANTEED DEBT VALUES AND GUARANTEE VALUES

V/B	3.0	1.5	1.0	0.0
4.00	0.905 0.195	0.964 0.098	0.992 0.052	1.000 0.000
2.00	<u>0.769</u> <u>0.324</u>	0.835 0.226	0.880 0.163	1.000 0.000
1.00	0.595 0.484	0.642 0.416	0.681 0.362	1.000 0.000
0.50	0.406 0.652	0.425 0.624	0.442 0.598	0.500 0.500
0.25	0.238 0.796	0.242 0.791	0.245 0.787	0.250 0.750
0.00	0.000 1.000	0.000 1.000	0.000 1.000	0.000 1.000
R(T)	1.105	1.062	1.044	1.000

NOTE: $r/\sigma^2 = 0.25$ $P/\sigma^2B = 0.30$

$c/\sigma^2B = 0.30$ $T = \tau^2$

Well, one way to try to get a first approximation of that problem is to think of a firm with equity and debt. It comes to a public decisionmaking group and asks for a guarantee of another issue of debt. It will end up with equity and two classes of debt, junior and senior debt. One will have a priority claim over the other.

Tables VIII-7 to VIII-9 look at this situation. Again, how does Table VIII-7 differ from Table VIII-8 or VIII-9? We are only changing the variance, the risk of the firm. The firm wants a

TABLE VIII-2. UNGUARANTEED DEBT VALUES AND GUARANTEE VALUES

V/B	3.0	1.5	1.0	0.0
4.00	1.032 0.115	1.036 0.068	1.039 0.039	1.000 0.000
2.00	<u>0.902</u> <u>0.232</u>	<u>0.918</u> <u>0.182</u>	0.938 0.140	1.000 0.000
1.00	0.700 0.408	0.713 0.378	0.731 0.344	1.000 0.000
0.50	0.455 0.616	0.459 0.608	0.465 0.596	0.500 0.500
0.25	0.248 0.789	0.248 0.788	0.249 0.787	0.250 0.750
0.00	0.000 1.000	0.000 1.000	0.000 1.000	0.000 1.000
R(T)	1.155	1.105	1.078	1.000

NOTE: $r/\sigma^2 = 0.50$ $F/\sigma^2B = 0.60$
 $c/\sigma^2B = 0.60$ $T = \tau^2$

guarantee for another issue of debt and we must decide whether we will do it and whether the issue will be junior or senior to the existing issue.

Now, one of the things you will note is what happens to junior debt when you start changing risk. In the column headed 3.0 of Table VIII-7, you will see two sets of underscored entries. The first set is the value of unguaranteed junior debt and the value of the guarantee of that junior debt at very high-asset levels.

TABLE VIII-3. UNGUARANTEED DEBT VALUES AND GUARANTEE VALUES

V/B	3.0	1.5	1.0	0.0
4.00	1.101 0.070	1.086 0.047	1.076 0.028	1.000 0.000
2.00	0.982 0.173	0.979 0.149	<u>0.984</u> <u>0.120</u>	1.000 0.000
1.00	0.760 0.361	0.762 0.348	0.770 0.326	1.000 0.000
0.50	0.476 0.600	0.477 0.597	0.479 0.592	0.500 0.500
0.25	0.250 0.787	0.250 0.787	0.250 0.787	0.250 0.750
0.00	0.000 1.000	0.000 1.000	0.000 1.000	0.000 1.000
R(T)	1.178	1.135	1.105	1.000

NOTE: $r/\sigma^2 = 0.75$ $P/\sigma^2_B = 0.90$

$c/\sigma^2_B = 0.90$ $T = \tau^2$

Note that the V/B ratio is very large which says the firm is worth four times the promised payment. The second set of underscored numbers corresponds to the value of the debt and the value of the guarantee in a low-asset situation. Now let's proceed from Table VIII-7 to Table VIII-8, which again corresponds to reducing the risk. Notice what happens to the value of the junior debt when you reduce risk at very high-asset levels. Note again in Table VIII-7 the value of the junior debt is 0.896. If you reduce risk, the value of the junior debt unguaranteed goes to 1.055. That

TABLE VIII-7. UNGUARANTEED JUNIOR DEBT VALUES AND GUARANTEE VALUES

V/B	3.0	1.5	1.0	0.0
4.00	0.896 <u>0.381</u>	0.866 0.318	0.870 0.262	1.000 0.000
2.00	0.691 0.540	0.653 0.520	0.623 0.507	1.000 0.000
1.00	0.465 0.701	0.441 0.702	0.402 0.717	0.000 1.000
0.50	0.264 0.833	0.259 0.835	0.246 0.842	0.000 1.000
0.25	0.129 <u>0.918</u>	0.129 0.918	0.129 0.919	0.000 1.000
0.00	0.000 1.000	0.000 1.000	0.000 1.000	0.000 1.000
R(T)	1.316	1.187	1.132	1.000

NOTE: $\tau/\sigma^2 = 0.25$ $P/\sigma^2 B' = 0.70$
 $c'/\sigma^2 B' = 0.40$ $T = \tau^2$

says, reduce the risk of a project and the value of the debt goes higher. But look what happens at low-asset values. The debt goes from 0.129 to 0.127. It goes down. In other words, junior debt-holders can actually be hurt by a reduction of firm risk. This is counterintuitive.

Does that mean anything to us? It suggests a very interesting policy for positioning loan guarantees in complex capital structures. Returning to the example in which we had an existing layer of debt and equity, if we attempt to position our debt as senior

TABLE VIII-8. UNGUARANTEED JUNIOR DEBT VALUES AND GUARANTEE VALUES

V/B	3.0	1.5	1.0	0.0
4.00	1.116 0.275	<u>1.055</u> <u>0.248</u>	1.015 0.218	1.000 0.000
2.00	0.843 0.463	0.809 0.455	0.768 0.453	1.000 0.000
1.00	0.524 0.670	0.516 0.670	0.498 0.675	0.000 1.000
0.50	0.271 0.830	0.270 0.830	0.269 0.831	0.000 1.000
0.25	0.127 0.920	<u>0.127</u> <u>0.920</u>	0.127 0.920	0.000 1.000
0.00	0.000 1.000	0.000 1.000	0.000 1.000	0.000 1.000
R(T)	1.466	1.316	1.236	1.000

NOTE: $r/\sigma^2 = 0.50$ $P/\sigma^2 B' = 1.40$

$c'/\sigma^2 B' = 0.80$ $T = \tau^2$

to the existing debt, in other words if the debt that the government is guaranteeing is declared senior to the pre-existing debt, which will now be termed junior, note what happens. The junior debt, as I have demonstrated in these two tables, can benefit from allowing the firm to be more risky. If the firm falls upon bad times, it can be in the junior debt's best interest to go along with management's attempts to increase the risk of the firm.

Now what is happening to our guarantee? As we demonstrated earlier, our guarantee is becoming a much bigger liability. Do the

TABLE VIII-9. UNGUARANTEED JUNIOR DEBT VALUES AND GUARANTEE VALUES

V/B	3.0	1.5	1.0	0.0
4.00	1.237 0.213	1.180 0.200	1.127 0.184	1.000 0.000
2.00	0.918 0.421	0.896 0.418	0.862 0.417	1.000 0.000
1.00	0.541 0.661	0.538 0.660	0.531 0.662	0.000 1.000
0.50	0.268 0.832	0.268 0.832	0.268 0.832	0.000 1.000
0.25	0.123 0.922	0.123 0.922	<u>0.123</u> <u>0.922</u>	0.000 1.000
0.00	0.000 1.000	0.000 1.000	0.000 1.000	0.000 1.000
R(T)	1.536	1.405	1.316	1.000

NOTE: $r/\sigma^2 = 0.75$ $P/\sigma^2 B' = 2.10$
 $c'/\sigma^2 B' = 1.20$ $T = \tau^2$

senior debtholders care? No. They are fully guaranteed. They close their eyes to monitoring the actions of the firm. The junior debtholders are left in a situation where they implicitly go along with the firm ripping off the government or the guarantor.

If that seems like a tenuous situation, let's think about positioning our debt junior to the existing debt. It doesn't seem like a very wise choice, but let's consider it. We position this new debt junior to the existing debt. That leaves the old debtholders in a senior position. How will they be affected by games

that the firm plays by changing its risk? If you examine the tables, you will find that the senior debt is unambiguously hurt by increases in project risk. In other words, and this is the important implication, an unguaranteed senior claimant will always find it in his best interest to police the firm against actions that are inconsistent with the interests of the guarantor. That is, the government, or whoever is guaranteeing the debt, need not set up monitoring functions to determine whether or not the management is playing games with the risk because this pre-existing body of claimants, the senior debtholders, will perform that task for it.

Now let me call your attention to Table VIII-7 and try to convince you that the table will give you a read as to what Chrysler's situation was in November or December, when \$750 million in loan guarantees were being discussed. Why Table VIII-7? Well, I can argue that the riskless rate of short-term interest today is something like 12 percent. Assume, not unreasonably, that the ratio of r to σ square for Chrysler is 0.25. That also implies, in terms of the second ratio, that the coupon rate on this bond would amount to something like a 20 percent coupon on the Chrysler bond guarantee.

The third ratio says that Chrysler is making other payments that are not quite double that of the guaranteed debt. Assume that $t = 6$ years. So consider the column headed by number 3.

Now tell me, in November, Chrysler was worth how many times \$750 million? Was it worth twice that? Three times that? The rows are indexed in units of \$750 million. So you have to tell me how much more than \$750 million Chrysler was worth. Let's pick twice. Let's say it was worth \$1.5 billion. That would correspond with the V over B measurement of two. In other words V is twice the promised principal. So you read across row 2, column 1, and you find that for every dollar the government guaranteed, the contingent liability would be something like 54 cents. The Chrysler guarantee then was worth about $(.54 \times \$750 \text{ M})$ or, say, \$350 million to \$400 million.

These tables reflect existing software capabilities. In future months and years the software will become faster, cheaper, and easier to use, but nonetheless the capability exists today. We are not very far away from building analogous software capacity that can handle all sorts of additional complexities like variable interest rates. But the point is that, for all the shortcomings of this technique, it can answer some very general questions such as,

does the magnitude of the liability look more like \$5 million, \$50 million or \$500 million? We can certainly distinguish magnitudes of the factor of 10.

If you ask whether this gives answers of accuracy to the right of the decimal point, the answer is no. But at least it gives a cost benchmark against which people can measure the benefits they perceive from issuing a loan guarantee. In the Chrysler example, is bailing Chrysler out in the form of a \$750 million guarantee worth \$375 million in liability? Or could we take the \$375 million and redeploy it in another way to help the situation? At least it gives you a number against which to judge the benefits. That is essentially the contribution.

COMMENTS BY DISCUSSANT

Howard Sosin. My interest in loan guarantees began with the consideration of guarantees for the steel industry. This program was initiated on June 23, 1978, by the Economic Development Administration (EDA) of the Commerce Department to guarantee loans to firms in the basic steel industry. As of June 1979, the EDA had received applications for guarantees on loans with an aggregate face value of \$330 million and had given one guarantee of \$21.25 million. Restrictions on these guarantees require that the requested financial assistance not be available from other sources. In addition, the guarantee may not exceed 90 percent of the value. The guarantee is provided without cost.

On June 23, 1978, Korf Industries was the first recipient of a guarantee in this program. It was for 90 percent on a \$21.25 million loan made by a consortium of 16 banks. Korf is a privately held foreign-owned U.S. steel maker. I was interested in determining the value of this guarantee to Korf, and the value or cost of the entire steel program. I was also interested in ascertaining which class of security holder benefits by the guarantee.

I developed a model and telephoned representatives of Korf to ask for specific company information I needed in order to evaluate the worth of the guarantees. It turns out that they were unwilling

to provide the necessary information, and so I published my paper as a theoretical study instead of a case study. 1/

In discussing the Jones and Mason paper, I will also present some of my results. I should point out that my comments and criticisms apply to my paper as well as to theirs. I have two specific comments and five general comments. The specific comments are technical quibbles. We both assume that the variance of the rate of return on the assets of the firm is known and constant. In fact, one would expect the variance to be changing for a firm receiving a guarantee. That is, if the firm is successful and gets through the period when it needs the loan guarantee, the variance will, in all probability, go down. In fact, one of the reasons firms list to justify a loan guarantee is to get through a difficult period.

The other quibble I had was with the formulation of the call provision. Jones and Mason illustrate the value of a call feature by assuming that the firm starts out with \$50 debt and \$50 equity, and perhaps a commitment to pay 15 percent to bondholders. Then they let a project of the firm suddenly pay off. Because of the results of the project, it no longer is necessary for the firm to pay 15 percent on bonds. Starting over, it could finance debt at a lower rate. That is, it may be able to borrow at 12 percent because it is no less risky. In that case the firm will want to be able to call the debt and reissue it at a better interest rate. While the Jones and Mason example is relevant, an equally important reason for a call feature is changes in interest rates. Thus, a firm may have issued the debt at 15 percent and then the interest rates go down to 10 percent. So I would quibble with the formulation of the call provision. However, I did the same thing, and therefore cannot cast too many stones.

I also have five comments of a more general nature. The first is, after all this analysis is said and done, how costly are these programs? This is what everyone is interested in. I am referring to the purely pecuniary costs, not the social benefits.

1/ Howard Sosin, "On the Valuation of Federal Loan Guarantees to Corporations," Journal of Finance (forthcoming).

The following table presents evidence on this question. Here

T = years that the loan is guaranteed;

σ = variance rate of the units of the firm;

I = size of the project being guaranteed;

s = Equity/Total Value.

For this table it was assumed that the market value of the firm was initially \$100. This table illustrates that for firms with variances and capital structures approximating those of the market as a whole ($\sigma = 0.15$, $s = 0.75$) the cost of these guarantees are relatively small for five and ten year loans (about 5 percent) but nonnegligible for 15 year loans (about 14 percent). However, as the firm moves away from the market mold (especially as σ increases), the cost of the guarantee increases dramatically.

The second comment relates to the notion of redistributions that go on between various categories of shareholders. Jones and Mason mentioned that, if senior debt is guaranteed, the issuance of junior debt might increase the risk of the firm. However, other things are going on as well. Whenever a firm takes on a new subordinated debt, it grows in size, and therefore the riskiness of the senior debt goes down. So, *ceteris paribus*, the senior debtholders like to have new junior debt brought into the firm. And, in addition, if the junior debt is guaranteed, the senior debt benefits again. Why? Because the government has reduced the interest cost of junior debt, which means the assets of the firm are more available to the senior debtholders. This type of situation was a particular problem for the Korf guarantee. Here the senior debtholders were also potential junior debtholders. In addition, they supplied all the information that the government used to evaluate the riskiness of the firm, thus creating a potential conflict of interest. To be fair to the firm, however, who else would know anything about Korf?

My third comment is about the notion of pay-outs to shareholders, in particular dividends. Both Jones and Mason and I account for it, but there is a more general question. Why should they be allowed at all? That is, by making payments to shareholders you are taking assets out of the firm that could be available to help pay off the debt. It strikes me as rather strange for

ABSOLUTE AND RELATIVE VALUES OF LOAN GUARANTEES

<u>T = 5 Years, $\sigma = 0.15$</u>						
I	<u>s = 0.85</u>		<u>s = 0.75</u>		<u>s = 0.65</u>	
	G	(G/I)%	G	(G/I)%	G	(G/I)%
5	0.00	0.00	0.00	0.00	0.02	0.40
10	0.00	0.00	0.01	0.10	0.06	0.60
15	0.00	0.00	0.01	0.07	0.10	0.67
20	0.00	0.00	0.02	0.10	0.15	0.75
25	0.00	0.00	0.04	0.16	0.21	0.84

<u>T = 5 Years, $\sigma = 0.25$</u>						
5	0.01	0.20	0.13	2.60	0.40	8.00
10	0.05	0.50	0.30	3.00	0.79	7.90
15	0.11	0.73	0.50	3.00	1.21	8.07
20	0.20	1.00	0.73	3.65	1.66	8.30
25	0.32	1.28	0.99	3.96	2.10	8.40

<u>T = 5 Years, $\sigma = 0.35$</u>						
5	0.19	3.80	0.57	11.40	1.04	20.80
10	0.45	4.50	1.16	11.60	2.05	20.50
15	0.77	5.13	1.80	12.00	3.06	20.40
20	1.17	5.85	2.50	12.50	4.06	20.30
25	1.63	6.52	3.22	12.88	5.06	20.24

<u>T = 10 Years, $\sigma = 0.15$</u>						
5	0.01	0.20	0.13	2.60	0.41	8.20
10	0.05	0.50	0.29	2.90	0.83	8.30
15	0.11	0.73	0.51	3.40	1.27	8.47
20	0.19	0.95	0.74	3.70	1.74	8.70
25	0.32	1.28	1.04	4.16	2.23	8.92

<u>T = 10 Years, $\sigma = 0.25$</u>						
5	0.34	6.80	0.85	17.00	1.43	28.60
10	0.78	7.80	1.76	17.60	2.82	28.20
15	1.33	8.87	2.71	18.07	4.18	27.87
20	1.98	9.90	3.71	18.55	5.52	27.60
25	2.70	10.80	4.75	19.00	6.85	27.40

(Continued)

ABSOLUTE AND RELATIVE VALUES OF LOAN GUARANTEES (Continued)

<u>T = 10 Years, $\sigma = 0.35$</u>						
I	<u>s = 0.85</u>		<u>s = 0.75</u>		<u>s = 0.65</u>	
	G	(G/I)%	G	(G/I)%	G	(G/I)%
5	1.05	21.00	1.78	35.60	2.39	47.80
10	2.21	22.10	3.54	35.40	4.67	46.70
15	3.48	23.20	5.31	35.40	6.88	45.87
20	4.82	24.10	7.08	35.40	9.03	45.15
25	6.26	25.04	8.86	33.04	11.13	44.52

<u>T = 15 Years, $\sigma = 0.15$</u>						
5	0.16	3.20	0.59	11.80	1.16	23.20
10	0.41	4.10	1.24	12.40	2.28	22.80
15	0.76	5.07	1.96	13.07	3.40	22.67
20	1.22	6.10	2.75	13.75	4.51	22.55
25	1.77	7.08	3.61	14.44	5.63	22.52

<u>T = 15 Years, $\sigma = 0.25$</u>						
5	1.00	20.00	1.77	35.40	2.44	48.80
10	2.14	21.40	3.55	35.50	4.75	47.50
15	3.40	22.67	5.33	35.53	6.98	46.53
20	4.77	23.85	7.12	35.60	9.14	45.70
25	6.22	24.88	8.93	35.72	11.24	44.96

<u>T = 15 Years, $\sigma = 0.35$</u>						
5	2.03	40.60	2.80	56.00	3.31	66.20
10	4.12	41.20	5.53	55.30	6.49	64.90
15	6.27	41.80	8.20	54.67	9.57	63.80
20	8.47	42.35	10.83	54.15	12.55	62.75
25	10.70	42.80	13.43	53.72	15.45	61.80

a firm that comes begging for a loan guarantee also to want to continue paying dividends.

My fourth comment relates to the motivation for guarantees. Why do we want to have them at all? In my paper I state that guarantees typically arise when a project is politically desirable but financially infeasible. One can formalize this notion by saying that a guarantee is proposed for a project that has a present value of profitability index that is less than one. Take a pollution control program. Here the firm would not choose to undertake the project on its own. However, there may be social benefits far in excess of the costs, but the rewards to the firm are not enough to encourage it to take on the project. For example, the expressed purpose of the Korf guarantee was to help preserve the jobs of 2,000 workers in Georgia and Texas. Implicit in the statement was the assumption that without the guarantee the firm would not have found it financially advantageous to maintain these jobs.

What I tried to do was to investigate the relationship between the profitability index (the ratio of the value of the project to the firm, to the cost) and the percentage of the loan that was guaranteed. As one would suspect, the larger percentage guaranteed, the smaller was the implicit profitability index.

I then tried to find a loan guarantee percentage (100 percent or less) that would make shareholders just indifferent between taking on the project or not taking it on. I don't think it is the government's business to be subsidizing shareholders. What you are trying to do is subsidize projects that shareholders would not otherwise undertake. My analysis allows one to determine an appropriate percentage for the loan guarantee.

My final comment is more philosophical in nature. Consider the example of Chrysler. I don't think this analysis makes much sense for Chrysler because it is such a big undertaking. We take everything in the capital market as given and assume nothing changes. I am not convinced that things don't change when large firms like Lockheed or Chrysler request aid from the government.

A more general question is: Is the Chrysler loan guarantee the type of thing that the government should be involved in? I will take a stand, and my stand is, "Probably not." Why? Because

by keeping the firm alive the government is subsidizing shareholders. True, it may preserve jobs. However, wouldn't it be better to bite the bullet? That is, wouldn't it be better to let the firm go into receivership, shed its unprofitable operations, and reemerge a stronger firm? Do we want to end up like the English--subsidizing unprofitable industries?

DISCUSSION

John Ward, the National Consumer Cooperative Bank. The last speaker said something that was intriguing, and I wonder if both speakers might want to address it. That is, if a guarantee of this type is politically advisable but financially unfeasible, can we view these contributions by the government in the economic abstract? On the one hand, we talk about it as being a subsidy to the stockholders, and on the other as a guarantee to the overall value of the company.

But what are the social implications, and do they play a role? Consider, for example, the possibility that workers will be thrown out of a job. According to one estimate, when CETA funds are cut, the saving is offset some 60 percent because of welfare payments and other expenditures that have to take up the slack. Now, what is the role of government? Is it purely in the abstract in an economic sense, or must we not grind in the social implications?

Mr. Sosin. I mentioned jobs being lost in South Carolina and Texas. Those are things that governments definitely want to weigh. The question is: Could these people have been employed elsewhere, or is this a short-term situation where they are temporarily out of jobs? Also, there is the loss of taxes that these people would be paying, and that could offset the cost of the loan guarantee.

Certainly, in deciding whether to take on a loan guarantee, one would want to ask what are the social benefits and costs, and also the question, why do it with a loan guarantee?

There is also the question of why these programs have grown so much. I believe they are popular because they are not part of the budget. Since the government is on a cash basis, and this is a liability incurred but not paid, it doesn't really exist. So every Congressman can say the loan guarantee is not costing us

anything. We do have to worry about social benefits and costs, but the only thing I can provide you with is some of the pecuniary costs.

Mr. Jones. You are quite right, there are benefits in these things too, but our notion is the following: Put the benefits and costs on opposite sides. We know a way to get reasonably hard numbers for this particular cost. If you think offsetting benefits are involved in certain programs involving workers, allocation of capital, or whatever, then put it on the other side as a benefit, quantify it, and compare it to the cost.

If you mix the two together, if you confound the market value or cash equivalent cost to the government on the one hand with social benefits on the other, it is not clear what you are getting.

Joseph Scherer, Federal Reserve Bank of New York. My question is a question of information. If a loan guarantee is against a junior instrument, and there is a default which is then paid off by the government, does the loan that is paid off get translated into a claim against the assets of the company? And if it does, does it get transformed into a priority claim against the assets of the company the way income taxes do? So that, in effect, it becomes the most senior of the claims against the company? Because if it does, then it changes some of those relationships.

Mr. Mason. I don't know. If the situation is as you suggested, then you are absolutely right. It would change the analysis. But it would seem to me you are saying that any guaranteed debt is always senior in the case of bankruptcy.

Mr. Sosin. That is a very serious question. What is bankruptcy? When is the firm unable to pay off its debt? Is that when the total assets of the firm, if they were all sold off, could not pay off the debtor? When they could not pay the interest obligation?

Mr. Scherer. Does the possibility exist of the transformation of a junior claim into the most senior claim of all? I don't know and I think it might be worth knowing.

Ann Hadley, Senate Budget Committee. I have noticed in reviewing legislation that, occasionally, the legislation specifies

the priority of the debt. It really varies according to what the legislation says.

Mr. Scherer. So that, depending upon the program, it might be almost anything?

Ms. Hadley. Yes, and sometimes the legislation leaves it up to administrative discretion; in Chrysler, for example, that is the case.

Mr. Mason. There are a number of other liabilities that appear on the landscape as soon as bankruptcy is talked about. Unfunded pension liabilities and severance pay can be two huge liabilities that were not on the balance sheet.

Ron Hoffman, the Treasury Department. I am not a lawyer, but I suspect that whatever is written into the legislation about the priority of claims will eventually get into court.

I would like to add a tag end on to Howard Sosin's comment. The question is: What would happen if Chrysler declared bankruptcy? It might go into receivership, and the government could offer the company the possibility of going into receivership. Suppose the company goes into bankruptcy, what is going to happen to those assets? Someone could use them to make something. There is a market value for those assets. In addition, if one is concerned about the disemployment of workers, one might ask whether the alternatives are restricted to "work" or "no work" for them. Is it possible that they might take a lower wage package in order to continue? There are all sorts of possibilities, if one allows the market to work in this case.

Allowing the market to work ought to be considered when we talk about loan guarantees for going enterprises.

Mr. Sosin. What you are alluding to is the distinction between the ongoing value of the firm and its residual value. If we were to try to sell off the machinery that Chrysler uses, it would not have much value.

Mr. Hoffman. That probably would not happen.

Mr. Mason. And little firms fail, but big firms don't.

Mr. Phaup. The moral to this story is, get big.

Mr. Scherer. W.T. Grant failed.

Mr. Mason. You cannot build cars with one piece of machinery, but some assets could be sold or somebody could come and buy the whole assets of Chrysler and put up his own logo. I think you are 100 percent correct. That is the way the process should work.

Howard hinted at something of which we are all aware. One of the reasons guarantees have been historically favored is that somehow the accounting for them has been shaky and it does not show up on the scorecard at the end of the year. To the extent you as a policymaker realize you must bear some cost to help someone else, be it CETA or whatever, you look at the expenditures. That is hard cash. If you get about the same result with a loan guarantee, you do so with a value that never gets counted. You have slipped another one by.

Mr. Phaup. Does this line of reasoning also suggest that the SEC, for example, has improved the functioning of financial markets? What I am getting at is this: there is a belief held by many that putting credit on budget would greatly reduce its growth. But does putting numbers on the official scorecard unequivocally change things? Don't people see through federal budget gimmickry? Does putting items "on-budget" amount to fuller disclosure?

Mr. Mason. I am convinced sophisticated investors will gather information and that prices will reflect that information. I am worried about the citizens in this city, let alone the citizens of the country, not being aware of the true liability; not getting an accounting of the debt, an accounting of the liability. I am not worried about the capital markets--they have shown great success in taking care of themselves.

SESSION IX. CONCLUDING SESSION

Marvin Phaup, Congressional Budget Office, led the concluding session.

We would like this session to be an opportunity for participants to make general statements about the state of knowledge and research in federal credit. Also, we would like to pose three questions to which we hope you will speak.

The first is this: From time to time CBO is asked to evaluate the economic effects of federal credit. We are asked to do so for current program levels and for proposed changes in those programs. One of the things I have heard from this conference is that in the past CBO may have overstated the economic effects of federal credit. We would like you to tell us how you think we should answer these requests for an assessment of the economic effects of federal credit in total and in part.

A second matter is: What questions do you believe belong at the top of a research agenda on federal credit for an organization like CBO?

The third issue is whether or not you think it would be worthwhile for the Congress to put an annual ceiling on the growth of federal credit. What benefits could we expect from fixing a limit on growth of federal credit? What criteria would be reasonable for setting those caps?

Jim Bickley, Congressional Research Service. The primary need is for more factual information. I would like to see each loan guarantee program reported on annually. I would like to see each loan guarantee report provide information concerning the change in loan guarantees for the year, the defaults for the year, the method of measuring the default rate in the program, and projected growth in the program.

At present, for many of the programs, it is difficult to get information about defaults or the amount of total guarantees

outstanding. From a research standpoint, such information is primary, before any sort of an analysis can be conducted.

Mr. Joe Scherer, Federal Reserve Bank of New York. I would like to ask whether more information could be developed on a comprehensive basis for each of the credit programs monthly, in a form similar to the Treasury statement. This would presumably come out with a lag, but it would be interesting to know, for example, if there are seasonal patterns in this activity. It is difficult to know what is happening among the various programs during the year. You wait until the budget comes out and then it has only an estimate for the current fiscal year.

Dave Gillogly, Office of Management and Budget. It is nice of you to make so much work for us. We have three credit experts; one is leaving, and we will not be able to fill his position because of the job freeze. But we are working on the problem of data availability. I do not know that we have even dreamed about monthly data, however. We might eventually get quarterly data.

I am chairman of a task group on loan guarantee accounting. This originated in a joint project by GAO and Treasury to develop consolidated financial statements for the whole government. The original objective was to consider programs that have contingent liabilities or deferred liabilities. But one of the problems in the loan guarantee area is that there is no central guidance in the federal government on how to keep the books on loan guarantees. The consolidated financial statement project originally sought to determine how to figure out an allowance for losses on these programs. We are interested in some of the techniques discussed here, but we also see as part of our responsibility the development of some central guidance on how to keep the books.

Many loan guarantee programs ostensibly insure private lenders. They do a lot more than that, because government agencies actually perform all the normal administrative and servicing functions of a lender. We may start out thinking about loans in the FHA mode--that we are merely insuring something a financial institution is doing anyway. But when we get to maritime programs, the REA programs, etc., these are direct loan programs. In a sense, they do not get on the books. The agency takes the paper up to Solomon Brothers and gets bonds issued that are very similar to government bonds except that they have orange ink instead of green ink. But for all investment purposes they are the equivalent of Treasury bonds. The administrative costs of some programs are

quite high. Certainly in student loans they must be enormous, quite aside from the high default rate.

Another thing that does not get on the books is loans to rural co-ops at 2 percent; we carry the assets on the books at par value. We have a basic policy principle that often is not carried through. That is, we normally require a program to pay interest to the Treasury for the use of government capital. In the case of the REA program, they have a portfolio of \$8 billion or \$9 billion worth of loans that may bear only 2 percent interest, but they are not required to pay any interest to the Treasury for the use of government capital. Moreover, the assets they have to play with keep on growing. They have the right to sell certificates of beneficial ownership. Depending on their skill in turning over the paper, there is no limit as to the number of loans they can make. It is, in any case, an enormous problem just to keep the books on a consistent basis in these loan programs, and to report on them sensibly. We know the problem. It just takes manpower and time to solve it.

John Clapp, UCLA. In analyzing the economic effects of federal credit programs, I think it is useful to make a distinction between equity and efficiency effects. Equity effects, of course, are related to the total amount of subsidy involved, who benefits, how benefits are distributed, and who pays the cost.

Efficiency is related to the question of, given an objective for these programs, how can that objective be met at minimum cost? How do you get the most bang for the government buck?

I suggest this theme of equity versus efficiency has been implicit throughout today's sessions. For example, running through the papers backward, the Jones-Mason paper seemed to be primarily concerned with the question of equity, how you measure or construct a model to estimate the total amount of subsidy involved in these guarantee programs.

The Baum paper had a similar kind of objective, although it may be rather hybrid between a goal of equity and efficiency, because Baum pointed out that a \$3 million loan guarantee would probably be very inefficient, \$6 million would be efficient, but \$8 million would be more efficient.

The Hunter paper was concerned largely with the efficiency issue of how SBA loan guarantees can make the insurance of small

business credit more efficient. That is, how SBA can compensate for a failure of the private market to adequately assess information on riskiness.

So, roughly speaking, two-thirds of today's session had to do with equity, one-third with efficiency. I am reminded of an analogy used by the late Arthur Okun.

Equity, said Okun, is a problem of bailing from the high trough to the low trough while efficiency has to do with holes in the bucket, or how leaky the bucket is. I submit that with today's concern over cutting the budget, the taxpayer revolt, and the effort to get more efficiency in government, we have to be much more concerned with patching the holes in the bucket than we have been in the past.

I think the Hunter paper stands out as being particularly timely in addressing this problem of efficiency. In my research at GAO, where I am looking at the efficiency of federal development programs, I find very little concern for efficiency; instead, the programs are heavily targeted on need. There are very explicit and detailed needs criteria, eligibility criteria, for participants in these programs. These needs criteria are debated, they are assessed, a lot of high-powered analysis goes into them. There is very little concern for efficiency in the programs I have seen so far. The government is throwing money at problems, but the primary concern is with equity, with shoveling, with the bucket, and not with patching the holes in the bucket. I think the priority has to be changed, and that would be my answer to your second question, Marvin, regarding CBO's research efforts.

I think the questions you should address should have to do with efficiency. That is, how do you target money more efficiently, given that you want to achieve certain ends.

Finally, I think that the third question will answer itself. If you do turn your attention primarily to efficiency, you will find a natural cap on federal credit programs. You will find that we can do a lot in terms of making the dollars go farther, and that there is no need for further growth in these programs. In fact, we could probably cut them back substantially.

I would suggest that you start with the Hunter paper and work from there, looking at ways that we can make Pareto-optimal moves,

which is really what Hunter was talking about. Moves such as that don't cost anything, or the costs are so small that they can be ignored because markets would be made more efficient as the government becomes involved in processing information.

Cary Leahey, OMB. I speak partly as a salesman for the federal credit budget that you mentioned in the last part of your question, but first I would like to give an informational point to the gentleman from the Congressional Research Service.

He asked where we can get information on the individual account detail level. On a fiscal year basis we have that information, at least for recent years. Exhibit 42, one of the exhibits agencies are required to submit to OMB, gives an account-by-account detail for direct loans and loan guarantees for virtually every federal credit program.

We took those exhibits and added them up to arrive at the total figures that we put in the Special Analysis of the Budget under federal credit programs. So I can give you the numbers you need for 1977, 1978, and 1979, along with estimates for 1980 and 1981.

We have a lot of information that, to be honest, we don't process beyond adding it up and throwing it into tables. But if you have questions about individual programs, we do have some of that information.

Then the gentleman from the Federal Reserve Bank of New York asked whether we can get quarterly or monthly federal credit data. I would say yes, but you will have to wait.

With the credit budget, we will invoke a system of apportionment that allows a timely disbursement of federal loans and loan guarantees. Most federal programs are apportioned on a quarterly basis, so that we will have a quarterly statement for most federal loan and loan guarantee programs. As for monthly figures, the last time anyone at OMB brought it up the Director said this would require an increase in staff, and that was the end of it.

In answering the CBO questions, the first question you have is how CBO can review individual federal credit programs. It is my preliminary opinion that the best route to take is some variant of the capital asset pricing model that other people have latched

onto. Essentially, you just try to figure out if an individual program is well targeted. In other words, the only rationale for a loan guarantee program is to reduce risks--that is, to reduce the risk premium to essentially zero. You can look at a new program in SBA or Farmers Home Administration and determine whether the program is well targeted or not. There is a universe of recipients of loan guarantees. What are the firm characteristics? You can do a composite and get an idea what those firms look like. Then you can talk to the financial community and find out whether there are firms of similar characteristics that do not have guarantees. First off, you need to discern whether we are just giving the guarantee as a windfall grant to people who don't need it.

The second question is, given the limited resources of the Congressional Budget Office, which issues should they look at first? The number one question that would come out of someone at OMB, would be: Given the economic projection for the next 18 months, what is the total level of loan guarantees consistent with a healthy economy? Is it \$40 million in net new loan guarantees, or \$50 million, or \$60 million?

And then the third point that Marvin asked about: What good will come from the federal credit budget? From my brief experience at OMB, I have discovered that the only way you can control the individual credit programs is to control the total. I think that is what is going to make the administration's program viable. You have a fixed pie; it has costs; and from that given pie, you can actually get at the pieces.

John Mitrisin, Department of Energy. I used to be at the Congressional Research Service. One of the problems I have seen running through the discussion is the problem that Congressional offices have when they must deal with particular legislation. The legislation is going to the floor tomorrow. Questions are asked today as to what impact it is going to have. CBO gets those kinds of questions. I used to get them. I tried to avoid answering them as best I could. But when you want to have an impact on policy, on bills that are being written now, you have to respond instantly. You don't have three months or six months or nine months to come up with an evaluation of the impact of a program. One of the things CBO can do is to keep tabs on who is doing what, and be able to refer inquiries to those people quickly.

Nancy Rose, Boston Technologies, Inc. Our research on loan guarantees has identified at least three areas that I think

have been neglected during this conference and that merit attention.

The first of the three is a need to move toward establishing a reserve for loan losses. We are not suggesting that this could be done immediately. We are suggesting that very soon we ought to implement at least a rough type of reserve system because, as long as there are no reserves, Congressmen are going to continue to believe that guaranteed loan programs have zero or at least very low costs. As long as the policymakers have those perceptions, I don't think you are going to get limits on overall credit.

The second problem that merits further attention is incentives in various guarantee programs. EDA currently has the authority to require commitment of personal assets of either managers or owners of firms that are trying to get government guarantees. This creates an incentive within the firm for people to make sure those guarantees are repaid, because if the loan is in default then managers or owners can be required to repay, out of their personal assets, part of the loan. These incentives do not occur across all programs, but it would be worthwhile examining what implications they have both for the question of moral hazard and for the question of applying a model such as Jones and Mason describe.

It would also be worthwhile to look at the rapidly growing expansion of the market in guaranteed loans. A lot of dealers are making substantial profits on guaranteed loans from banks. An example of one agency that is expanding the market is the Small Business Administration. Now, granted that there are substantial profit opportunities, we feel one of two things is possible. You can eliminate those profit opportunities and bring them back down to a normal rate of return, and then either increase the subsidy to borrowers or decrease the cost to the government.

Finally, the third area where more attention is needed is information on overall credit activity. Take, for example, small businesses that seem to be the target of many guaranteed loan programs. Currently no agency collects data on how much credit is available to small business overall. Nobody collects data on loans disaggregated by size. As long as this information isn't available, we have no way of determining the impact of guaranteed loans on small businesses because we don't know what percentage they are in terms of overall credit.

Diana Day, Peat, Marwick, Mitchell. I would like to respond to two of the questions that Marvin brought up.

One is the question of how CBO should go about examining the effects of federal credit programs both in the aggregate and individually. It is my impression, especially after hearing what we have said in the last two days, that CBO is likely to get greater benefit for its research dollar by looking at individual programs rather than at federal credit in the aggregate.

I would present as evidence for this statement two observations I have made during the course of this conference. One is that the people who have looked at aggregate data have by and large emphasized that their study was not designed to assess the impact of a federal credit program or of programs in the aggregate. On the other hand, I think the Jones-Mason presentation has specifically addressed an impact, a cost impact, and has done so by examining a particular program design rather than credit in the aggregate.

To move on to Marvin's second question, I would suggest that for areas of future research perhaps the most beneficial role that CBO could play would be to look at the costs of federal credit programs rather than their benefits. I am sure it comes as no surprise to people at CBO and OMB that the federal agencies operating these programs tend to collect information on their benefits.

However, I think we have seen a lot less work done on their costs. As evidence for this, I would point to one of the findings in the study that we conducted for CBO several years ago. Our study focused on 21 federal loan guarantee and insurance programs. As part of the study, we asked people operating those programs for the definitions they were using. As Dave Gillogly pointed out, a variety of definitions are being used for various concepts, particularly accounting concepts.

One of the questions we asked was, what is your definition of the word "subsidy"? The question comes back to haunt us after yesterday's discussion. The response: In 20 out of 21 cases there was no definition of the word "subsidy." In 15 out of 21 cases, the people operating the program believed that no subsidy was involved.

Dave Small, University of Wisconsin. I think I would like to take a different view and disagree with some of the previous

comments. I think it would be dangerous to get too quickly into a numbers game and then decide whether we should be pushing out numbers weekly or monthly.

Let me use the papers given today to justify this.

I personally was somewhat intrigued by the last paper. It had two aspects. One was a computation technique for calculating hard numbers, as they are called, on the liability incurred by the government for guarantees. The second question the paper dealt with was, if the guarantees come in with junior or senior debt, what is the difference between the programs? You have different effects on the holders of equity in the firm, depending on whether the guarantees are on the junior or senior level. That has implications for the total amount of equity and capital people will want to hold. For example, if we guarantee junior equity, will people want more holdings in a firm that is investing in the housing market or in synthetic fuel projects? You want to look at the effect on total demand for the capital stock.

You also want to consider the more general issue that capital may be held in portfolios in which there are bonds and demand deposits, and how those portfolios can be readjusted. What are the changes in the rates of return?

You will want to look at the rates of return on other capital, and then you will want to get out of the financial markets into other markets in the economy. I think the last of today's papers is very useful. But to use that good information, you need a much more general framework to understand what those numbers are, and, more importantly, what they are not.

Christopher Baum, Commonwealth Research Group. I would agree to some considerable degree with Professor Small, albeit I presented perhaps the narrowest paper in today's discussion. I am philosophically very much inclined to go a broader route. However, I think one of the reasons why some comments have been made against that spirit of looking at broad generalizations is that when you take a general equilibrium framework you all too often get into a world where the effects are negligible. Then one can argue that, oh well, whatever it is, it is not significantly different from zero.

That tends to have the wrong emphasis. I was working on an RFP the other day that came out of EPA, where one of the sample

tasks was to evaluate the macroeconomic effects on prices, interest rates, balance of trade, growth of gross national product, etc., of establishing a specific regulation regarding radiation in a specific industry that probably exists only in Beaumont, Texas.

Well, I am sure it will have some effect on Beaumont, Texas. It might even have an effect on the Congressman from Beaumont, Texas, but I really doubt that a macro model is going to give you anything more than garbage with very wide confidence intervals on what the effect on aggregate growth in 2010 is going to be.

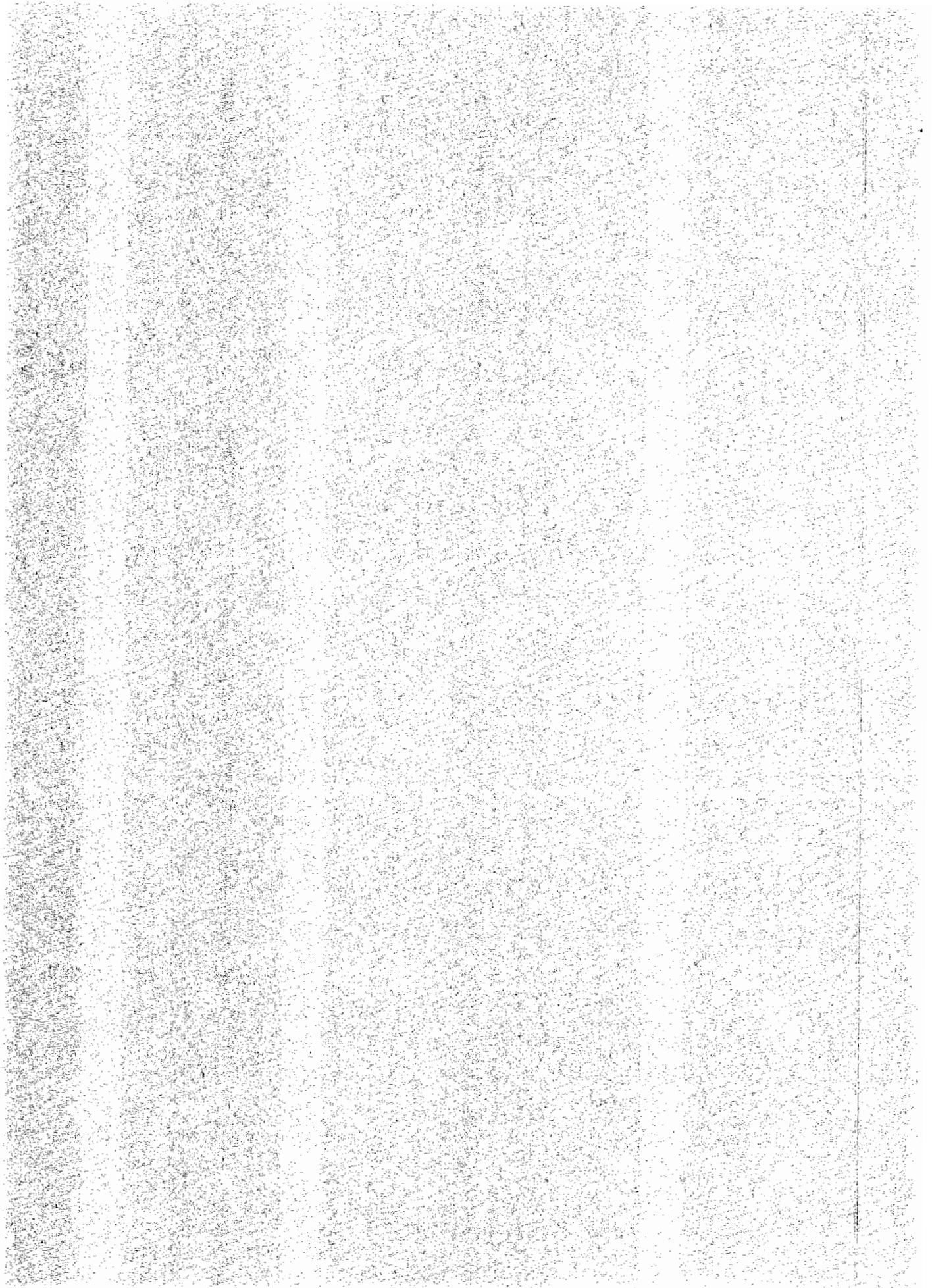
I think the danger with a general equilibrium framework of the sort presented yesterday is that it may overlook the kinds of dynamic considerations and the kinds of stochastic considerations that we really do need to take into account.

I think we must look at the problem of guarantees and the budget on a year-by-year basis as something other than static. That is, hold all stocks fixed, and look for Pareto-optimal cases.

I think we have been trying to go beyond that in economics, but I fear that we are not responsive to the needs of people who have to call the shots. I would rather tell someone who wants an answer tomorrow, that he can't have it tomorrow, but that in nine days we can get something with some precision about it.

I think that in the political/economic interface, the best thing CBO can do is try to look at the various kinds of programs, both on a case-by-case basis and from a broader perspective, and try to evaluate just how some of them can be alternatively viewed. What would happen if instead of guaranteeing this activity through a loan guarantee, we gave an interest subsidy? What would happen if we entered into a purchase agreement or some other sort of contingent plan?





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