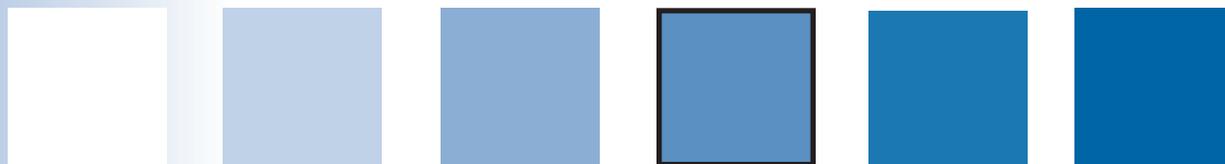


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Federal Credit and Insurance Programs

*Proceedings of the Thirtieth Annual Economic Policy Conference
of the Federal Reserve Bank of St. Louis*

Is the United States Bankrupt?

Laurence J. Kotlikoff

On the Importance of the Plumber: The Intersection of Theory and Practice in Policymaking for Federal Financial Institutions

Douglas J. Elliott

Federal Credit and Insurance Programs: Housing

John M. Quigley

On Asset-Liability Matching and Federal Deposit and Pension Insurance

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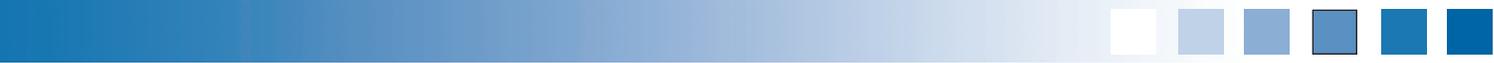
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President's Message

William Poole

Welcome to the Federal Reserve Bank of St. Louis's Thirtieth Annual Economic Policy Conference. This year's conference theme is "Federal Credit and Insurance Programs." We have assembled an outstanding group of scholars and policy analysts to discuss the current status and likely future direction of several important federal government programs for credit and insurance.

I'll frame the policy debate from an economist's perspective. Imagine a world in which every household could borrow and lend as much as it wanted within its lifetime budget constraint. Within that budget constraint, the timing of consumption could be divorced from the timing of income receipts. In this idealized world of complete financial markets, households and businesses can utilize their lifetime financial resources and manage their financial risks in the most advantageous way possible via private trading. Interest rates determined by the free exchange of claims on purchasing power over time would regulate the credit market. Suppose also that every household could insure itself financially, or sell insurance if it chose, against all possible future misfortunes. The insurance market would clear when all contracts were voluntarily settled at what economists call actuarially fair prices.

Moreover, suppose that all the information needed to make good decisions were available without cost. In this economy, every household's economic welfare would be as great as possible, given the economy's finite resources. Economists

describe such a world as one with perfect and complete markets.

If we lived in a world of complete markets, would there be any need for government intervention into financial markets? Government intervention into credit markets would probably not be an efficient way for society to deal with problems of income distribution and externalities. Thus, I think the correct starting point for analysis is a presumption that there is no justification for government intervention in private financial markets.

Justification for intervention requires two steps. First, that market failures can be corrected by intervention and, second, that actual functioning of government, in the real world and not in an ideal world, makes such correction possible and productive for society.

Perhaps the appropriate starting point for analysis of market failure in this context is that information is a valuable and sometimes scarce and costly good to obtain. Moreover, because debt contracts cannot be enforced to the point of slavery, credit markets do not and cannot allow a household complete flexibility in consuming its lifetime wealth—nor do insurance markets allow protection against all conceivable risks. Indeed, in our own nation's distant past, private markets for credit and insurance must be described as primitive. In some parts of the world, the same is true today.

Economists have created an enormous literature exploring the imperfections and incompleteness of actual financial markets during the 50-plus years since Kenneth Arrow (Arrow and Debreu,

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1954), one of our distinguished panelists, and a few others first wrote down mathematical models of an idealized economy of complete markets. The roster of market failures enumerated by Joseph Stiglitz (1988), another of our distinguished panelists, includes (i) failures of competition, (ii) public goods, (iii) externalities, (iv) incomplete markets, (v) information failures, and (vi) macroeconomic failures, sometimes also termed coordination failures.

We recognize that a market failure is a necessary, but not a sufficient, condition for improving welfare through government intervention. Market failure is not a sufficient condition because governments also fail, and they do so for systematic reasons explored in the public-choice literature. Professor Stiglitz lists four principal reasons for government failure when attempting to correct a market failure: (i) limited information, (ii) limited control over market responses, (iii) limited control over bureaucracy, and (iv) limitations imposed by political processes.

The first two reasons for government failure remind us that some market failures simply are intractable—that is, the same limitations that cause markets to perform poorly, such as insufficient information available to participants, may prevent government intervention from improving matters. The second two reasons for government failure—limits on effectiveness posed by bureaucracy and the political process—are handicaps government itself brings to the situation. Moreover, it is important to recognize that some government failures may be inherent in the nature of democracy.

Thus, we must keep in mind that identifying a market failure is not enough to justify a government intervention. We must also satisfy ourselves that any government failures that might result from the proposed intervention do not do greater harm than good.

Today, government interventions are extensive

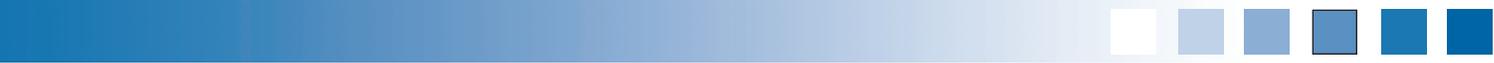
in private markets for credit and insurance in the United States and around the world. The record of government intervention in these markets is mixed. Part of the problem may be that interventions once appropriate are not phased out as conditions change. Thus, every government credit program deserves frequent evaluation and re-evaluation, and such an evaluation is the agenda of this conference.

The subject is a huge one, and not every issue can be examined in a single conference. Our sessions cover a range of federal programs in U.S. credit and insurance markets. These programs include social insurance of various kinds, including loan guarantees; extensive intervention into housing and mortgage markets; deposit and defined-benefit pension insurance; and insurance against disasters, both natural and man-made, such as terrorism. Our aim is to discuss the market failures these programs are designed to overcome and the performance of government interventions.

We have assembled a program of scholars and policy analysts of the highest rank who may disagree with each other in analyzing a particular program but who share a common interest in examining the rationale for, and execution of, a variety of federal credit and insurance programs. I know that our presenters and discussants will shed new light on some very important programs. I believe that we will provide assistance to policymakers who are responsible for these programs.

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Editors' Introduction

William R. Emmons and Anthony N.M. Pennington-Cross

What role does the federal government play in the private markets for credit and insurance today, and what role should it play in the future? These questions served as the organizing themes for the Thirtieth Annual Economic Policy Conference of the Federal Reserve Bank of St. Louis. This introductory article provides an overview of the conference presentations and discussants' comments.

A distinguished group of scholars and policymakers gathered on October 20-21, 2005, to describe, analyze, and propose reforms to a wide range of federal credit and insurance programs. The discussions took on added importance because virtually all the federal programs at issue were under active legislative consideration at the time of the conference. A note of immediacy was injected into the deliberations by the still-unfolding disaster unleashed by the Gulf Coast hurricanes of August and September 2005 and the hesitating response of national, state, and local governments to the crisis.

Conference participants discussed a wide range of federal credit and insurance programs. The programs included some that provide broad-based social insurance (Social Security, Medicare, Medicaid) and others that more narrowly target housing (low-income mortgage insurance and guarantees, housing-related government-sponsored enterprises [GSEs]), private pensions (defined-benefit [DB] pension insurance), or disaster relief (flood insurance, earthquake insurance, terrorism-risk insurance). In addition to extensive economic

and financial analyses of federal interventions into private credit and insurance markets, several sessions analyzed the political and policymaking processes that bring federal credit and insurance programs into existence and make their operation sometimes difficult to understand and resistant to change. Some speakers focused their remarks on micro-level details, such as program design and participant incentives, while others considered macro-level impacts on financial markets and the long-run sustainability of publicly financed credit and insurance programs.

LONG-TERM SOLVENCY OF THE U.S. GOVERNMENT

Is the United States bankrupt? Most people would scoff at the notion that the U.S. government cannot now, or in future will not be able to, pay its bills. Bankruptcy of the federal government seems particularly far-fetched since the U.S. Treasury continues to issue billions of dollars of long-term unsecured debt every month at historically low yields. Who would lend money to Uncle Sam at 5 percent interest for 30 years if there were any question about timely repayment in full? Indeed, the globally integrated capital markets seem to have imposed no risk premium on Treasury borrowings despite a rapidly growing outstanding debt of about \$5 trillion (\$8 trillion if all intra-government borrowings are included).

Laurence J. Kotlikoff believes the question of the bankruptcy of the U.S. government is not only

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worthy of serious discussion, but that the answer to the question is clearly “yes.” The primary sources of the problem are well-known—extensive social-insurance commitments together with prospective revenue streams that are grossly inadequate to fund these promises. The primary reason most people fail to appreciate the dire financial straits in which the U.S. government finds itself (and, by extension, the future burdens we U.S. taxpayers face), Kotlikoff suggests, is that government accounting is seriously flawed. Government accounts are presented on a “cash,” or non-accrual, basis, in which only those revenues and outlays that already have occurred are recognized. When, instead, a comprehensive, forward-looking accrual framework is applied to the current and likely future financial revenues and obligations of the U.S. government, the fiscal picture is dire.

Citing an estimate by Jagadeesh Gokhale and Kent Smetters (2005), Kotlikoff argues that the U.S. government’s fiscal gap as of 2004—the shortfall of the present discounted value of all likely future government revenues compared with the present discounted value of all likely future government outlays—amounted to \$65.9 trillion. Thus, rather than facing a cumulative federal government debt-to-current-GDP ratio of about 37 percent in 2004 (as suggested by the \$5 trillion of publicly held federal government debt), a more accurate estimate would be 562 percent of current GDP.

Kotlikoff points out that, in one way or another, future government budgets will have to bring revenues and outlays into balance. The issue is whether, as a matter of public policy, we are willing to let things sort themselves out, perhaps in a series of financial crises and forced choices, such as huge tax increases. To plan rationally involves either higher taxes, lower government spending, a partial repudiation or devaluation of government debt (via inflation), or some combination of these approaches. If we don’t choose now the combination of unpleasant policies we find least objectionable, we could face an uncertain and unpleasant economic future. Kotlikoff reviews several specific policy options, then proposes far-reaching reforms to the tax system and arrangements for retirement and medical insurance.

Discussant Anjan Thakor asks whether Kotlikoff’s proposition that the U.S. government may now be, or may become, bankrupt is the right way to think about the situation. Thakor describes three different stages of financial distress in a corporate setting: pre-bankruptcy financial distress, the bankruptcy process itself, and post-bankruptcy liquidation.

The hallmarks of pre-bankruptcy corporate financial distress are a marked deterioration in the business prospects of the firm and, consequently, loss of access to external financing sources. The typical responses of the distressed firm are to restructure its business and/or renegotiate its obligations. Presumably, neither the corporate creditors nor the debtor really want to incur the disruption and inefficiency associated with debt default.

Only when efforts to restructure and renegotiate fail would we expect a distressed firm or its creditors to file for bankruptcy. The formal bankruptcy process brings in an outside party—the bankruptcy court—to continue efforts to resolve the situation. Formal bankruptcy is a process of mediated renegotiation of formal obligations. The bankruptcy court breaks any stalemates that arose during pre-bankruptcy negotiations and imposes solutions on all interested parties. Finally, liquidation occurs only when the business prospects of the firm are judged so dire that no amount of restructuring or renegotiation justifies continuation of the firm.

Does the U.S. government’s financial situation bear any resemblance to any of these stages of bankruptcy? The government’s assets certainly are not in the process of being forcibly liquidated by creditors. For that matter, the notion of a formal bankruptcy process mediated by an outside party appears unrealistic, as well. After all, the vast majority of the U.S. government’s liabilities to foreigners are denominated in U.S. dollars, which can be supplied virtually at will. Furthermore, the relevant debt-to-GDP ratio when using a forward-looking framework would seem to include not only current GDP, but future GDP, as well. On this basis, the debt-to-GDP ratio would be much smaller and less foreboding.

Thakor concludes that the only sense in which the U.S. government's financial situation resembles bankruptcy is that future financial distress is conceivable, if not likely. The country's economic prospects may not be as bright as when earlier promises were made, and renegotiation of some kind may become necessary. But while it may need to renegotiate social and financial contracts between generations and with creditors, the U.S. government does not deserve the term "bankrupt." To avoid abrupt and painful course corrections later, Thakor nevertheless believes that Kotlikoff's reform proposals deserve serious consideration today.

MANAGEMENT OF FEDERAL FINANCIAL INSTITUTIONS

Douglas J. Elliott takes a "plumber's perspective" on federal financial programs and institutions. That is, rather than debating why federal credit and insurance programs of various types exist, or whether they should be changed or eliminated, he describes the challenges of actually managing them properly. The managers of federal credit and insurance programs and institutions operate at the intersection of national politics, regulatory policymaking, and government bureaucracy—a challenging working environment, to say the least.

A feature common to many federal credit and insurance programs is their off-budget headline appeal to politicians. Congress often extends multibillion-dollar government-lending authority or insurance protection without appropriating funds in that amount. This can occur in the form of unfunded programs, such as the National Flood Insurance Program, or in the form of government enterprises, such as the Pension Benefit Guaranty Corporation (PBGC) or the Government National Mortgage Association (Ginnie Mae), or even in the "off-off-budget" form of GSEs, which are privately owned, such as the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac). Thus, a politician can tout a multibillion-dollar federal program benefiting his or her constituents with-

out actually having to secure budget authority for spending in that amount.

Given the uncertain future costs and unclear lines of authority and responsibility inherent in many of these arrangements, program and enterprise managers may pursue goals other than, or in addition to, operating efficiency and minimization of the ultimate cost to the taxpayer. Moreover, Congress often writes rules and provisions into authorizing legislation that reflect political considerations—such as preferences for certain disadvantaged groups or targeted activities—that may conflict with standard management principles for a financial institution, such as risk-based pricing.

The Office of Management and Budget (OMB) and the General Accountability Office (GAO) are two federal government agencies that seek to analyze, and suggest resolutions to, some of the more difficult conflicts among the mandates delivered by Congress to federal credit and insurance programs and enterprises. However, the OMB and the GAO have no authority to restructure or sharpen the focus of any federal credit or insurance program or enterprise, so political considerations inevitably dominate.

Rather than despairing of any escape from the crass politicization of federal financial programs, Elliott points to examples of progress and suggests extending these reforms. An encouraging example of the federal government imposing some discipline and sound management principles on itself is the Federal Credit Reform Act of 1990. The Act required all federal direct loans, loan guarantees, grants, and credit insurance to be budgeted on a comparable basis. That is, rather than applying the government's usual cash-budgeting approach to these inherently long-lived commitments, the Act required all future program cash flows to be projected and then discounted back to the present at an appropriate discount rate. Any shortfall then would be recognized as a subsidy, while a positive net present value associated with the program's cash flows would be recognized as a surplus for the government.

Although the Federal Credit Reform Act of 1990 was a good start, Elliott believes much more can and should be done to improve the management of federal financial programs and institu-

tions. He raises several practical questions relevant to the analysis and management of these programs:

- What is the right discount rate to apply to cash flows arising from a government-made floating-rate loan?
- Should the government use a discount rate that reflects the uncertainty associated with future cash flows from a federal credit program?
- How, if at all, should the discount rate used for budgeting purposes be related to the price charged, if any, to the users of the program?
- Should a cost-benefit analysis be applied to all federal credit programs? If so, how will indirect and hard-to-measure costs and benefits, such as externalities and long-term effects, be incorporated?
- Should managers of federal credit programs and institutions be required to apply state-of-the-art modeling techniques to the financial risks they encounter, such as credit, market, and operational risks? If so, how will the programs and institutions acquire and retain the expertise necessary to conduct these analyses?
- Can the Federal Credit Reform Act be extended to encompass federal insurance programs and institutions, such as the PBGC, the National Flood Insurance Program, and the federal Terrorism Insurance Program?

In addition to budgeting and legislative reform, Elliott argues that more and/or better people and tools will be required to create meaningful and lasting improvement in the management of federal credit and insurance programs. To justify paying higher salaries to the highly skilled government employees needed to implement better management practices, Elliott proposes creating a “Certificate in Government Financial Institutions Management.” Like the private sector Masters of Business Administration (MBA) qualification, this credential would both motivate young people to acquire a core set of skills and signal to govern-

ment employers—and Congress—that certificate holders deserve a skill premium. At the same time, managers and employees in federal financial programs and institutions must be provided with up-to-date computing, telecommunication, and other tools necessary to master the business challenges they face.

Discussant George J. Benston commends Elliott’s recommendations for improving the management of federal financial programs and institutions, but insists that an understanding of the purpose of, and rationale for, every program or institution is necessary to set priorities and manage incentives in those settings. Benston suggests that cynicism about the origins and purposes of federal credit and insurance programs sometimes is appropriate. Some (many?) were created to benefit special interests, so program structure and details likely will reflect these priorities, despite the best efforts of managers to overcome them.

Benston provides tentative answers to several of the specific questions that Elliott raises, such as the proper discount rate to apply. He reminds us, however, that economic rationality is sometimes not applied to federal programs not because program managers do not know the “right” answer, but because the purpose of the program is to be politically expedient, not economically rational.

FEDERAL CREDIT AND INSURANCE PROGRAMS FOR HOUSING

Significant federal intervention in the private markets for housing construction, finance, and insurance dates from the Great Depression. Today, housing-related federal credit and insurance programs and institutions are administered or regulated in at least five cabinet-level departments: Housing and Urban Development (including the Federal Housing Administration [FHA] mortgage-insurance programs and regulation of housing-related GSEs); Veterans Affairs (VA Home Loan Program); Treasury (borrowing authority for housing-related GSEs and regulation of commercial banks and savings institutions); Homeland

Security (National Flood Insurance Program); and Agriculture (Rural Housing Service).

John M. Quigley analyzes housing-related federal credit and insurance activities covered by the departments of Housing and Urban Development and Veterans Affairs. Despite their flaws and the perpetual need for long-standing programs and institutions to evolve, Quigley believes that the FHA, VA, and the housing-related GSEs have “played major roles in the development of liberal and efficient primary and secondary mortgage markets in the United States.” Most of their activity has been indirect—that is, not dealing with households directly, but with financial intermediaries instead—and much of it has been conducted off-budget. Quigley has no quarrel with the former approach, but suggests the latter policy should be changed. Moreover, Quigley suggests that housing-related federal credit and insurance activities should be targeted more narrowly on first-time homebuyers, in pursuit of the federal government’s stated goal of maximizing the homeownership rate in the United States.

At the peak in 1957, FHA mortgage insurance (funded by borrower premiums) and VA mortgage guarantees (provided by the federal government) together covered as much as 40 percent of the dollar volume of new mortgage originations. Today, the share of new mortgage originations covered by FHA or VA programs has fallen into the single digits. Quigley suggests there are two factors that explain the relative decline of federal government mortgage insurance and guarantee programs during recent decades.

First, private sector mortgage lenders and insurers were able to observe the success of FHA and VA programs and copy them. This demonstration effect is easy to overlook today, when the private mortgage market is large and thriving. After the Depression and World War II, however, there was genuine uncertainty in the private financial market surrounding the feasibility of widespread use of long-term, self-amortizing, relatively high loan-to-value mortgages. Public sector mortgage innovations “primed the pump” for the private sector.

The second factor behind the relative decline

of FHA and VA mortgage programs was innovation or flexibility—or the lack thereof by the government housing agencies in the face of rapidly evolving private sector activities. The clearest example of rigidity imposing market-share losses on FHA and VA programs was fixed-dollar loan limits. In the face of inflation and rising incomes, fewer and fewer mortgage borrowers qualified for FHA and VA programs. Whereas 90 percent of new houses built in 1964 would have qualified for FHA insurance, only 15 percent of new houses built in 1995 would qualify, based on actual sales prices and FHA underwriting guidelines. Loan limits were increased in 1995, but the potential FHA share remains well below 50 percent of new houses being built each year.

Just as the FHA and VA played an important role in developing the primary mortgage market in the United States, Quigley argues that the government-owned Ginnie Mae and the privately owned housing-related GSEs—including Fannie Mae, Freddie Mac, and the Federal Home Loan Banks—played important roles in developing the secondary mortgage market. Quigley suggests that, paralleling the experience of the FHA and VA, a similar decline in the market shares of the government-related mortgage-financing institutions is under way (desirably so) as private sector players copy government initiatives and innovate in new directions.

Quigley reviews the extensive, but contentious, literature that investigates the subsidies received by the housing GSEs by virtue of their association with the federal government. Both the GSEs’ credit guarantees extended to their mortgage-backed securities and the debt they issue to fund portfolios of mortgage investments benefit from certain legal advantages and perceived, or “implicit,” recourse to the government. Quigley concludes that the subsidies are significant and that they are not passed through to mortgage borrowers in their entirety; instead, shareholders, employees, or other financial institutions involved in mortgage securitization appear to be “skimming off” some of the funds intended for borrowers. Regarding the GSEs’ affordable-housing goals, Quigley concludes that there is

“minimal” evidence that the GSEs are influencing credit or housing activity in targeted markets. There also is some evidence that FHA and GSE affordable-housing activities work at cross purposes to each other—that is, Fannie Mae’s and Freddie Mac’s targeted lending may crowd out lending that otherwise would have been provided under an FHA program.

Quigley also weighs in on the controversial topic of the broader economic and financial effects of the housing GSEs. Evidence of nationwide integration of previously local mortgage markets, along with a more robust supply of mortgage credit throughout the credit cycle in recent decades, are consistent with positive effects produced by the GSEs. Looking individually at the securitization and investment activities of the GSEs, the evidence suggests that the former is more important than the latter for both integration and stabilization of mortgage markets.

Quigley concludes by observing that “no one designing a housing-finance system anew would configure it much like the current system.” Government intervention in mortgage markets, including the FHA, VA, Ginnie Mae, and the housing GSEs, almost certainly spurred the development of our broad and deep mortgage markets. Our robust and flexible housing-finance system, in turn, has produced large benefits for society and the economy by helping to create a “nation of homeowners.” Yet, the continuing existence of these programs and institutions, along with massive tax expenditures and subsidies that favor housing, may have become perverse. The bulk of the evidence suggests that federal credit and insurance programs and institutions focused on housing today mainly affect the *amount* of housing consumed, rather than the homeownership rate. In other words, continuing large-scale government intervention in the housing and mortgage markets primarily constitutes a reallocation of economic resources toward housing and away from other, possibly more productive, investment areas. In Quigley’s words, “most of the housing market effects are inframarginal.” The obvious implication for reforming federal housing policy is to seek to target its benefits much more narrowly on first-

time homebuyers, especially those with low or moderate incomes.

Discussant John C. Weicher agrees with much of Quigley’s broad characterization of U.S. federal housing policy, but suggests several important qualifications. In particular, Weicher cites data that do not show large declines in the FHA share of home-purchase activity, except very recently. He also suggests that the FHA’s influence on homeownership should not be dismissed, particularly for minority groups and because FHA programs appear to accelerate homeownership for many households, perhaps by five years or so, on average. One also should not forget that the FHA pioneered the two most important innovations in the U.S. mortgage market—long-term, low-down-payment, self-amortizing mortgages and mortgage securitization (through Ginnie Mae in the early 1970s). If given the opportunity by Congress, the FHA likely would continue to innovate.

Weicher agrees with Quigley that the housing GSEs appear to exploit their federal charters to generate large profits for private shareholders, rather than passing through all of the subsidy, which was intended for homebuyers. Regarding their legal mission to “lead the industry” in serving low- and moderate-income households, Weicher believes the housing GSEs have failed; indeed, they actually have underperformed the private sector until very recently. Weicher demurs from Quigley’s assertion that the FHA and housing GSEs compete directly with each other.

While Quigley and Weicher agree that federal housing policy today is the awkward legacy of many earlier policy decisions taken independently of each other, they differ in how best to reform it. Quigley stresses narrow targeting on first-time homebuyers, but Weicher focuses on institutional reform. In particular, Weicher thinks the FHA should be unshackled and strengthened, while the GSEs should face much tougher oversight, especially in moving into new activities. Both believe the investment portfolios of the housing GSEs should be restricted or eliminated and that more ambitious affordable-housing and first-time homebuyer goals should be set for them.

LESSONS FOR FEDERAL PENSION INSURANCE FROM THE SAVINGS AND LOAN CRISIS

Asset-liability mismatch was a principal cause of the Savings and Loan (S&L) Crisis of the 1970s and 1980s. Savings institutions held long-duration assets that were funded by short-duration liabilities.¹ This balance-sheet structure did not appear unacceptably risky to many observers in the early 1960s because, for decades, interest rate movements had been moderate and long-term interest rates had remained comfortably above short-term rates.

When the interest rate yield curve rose dramatically beginning in the mid-1960s and became inverted (long-term rates exceeded short-term rates) several times for significant periods of time through the early 1980s, the economic value of most S&L institutions vanished. The federal deposit-insurance fund for savings institutions was bankrupted because of the pervasive asset-liability duration mismatch that had existed among covered institutions. Subsequent attempts by the federal government to cover up or wait out the problems failed. The resulting taxpayer bailout ended up being even larger than it would have been if the initial devastating impacts of interest rate movements on the asset-liability mismatch had been recognized promptly, because moral-hazard and adverse-selection incentives compounded the system's losses.

Zvi Bodie believes a similar disaster—including both asset-liability mismatch and the compounding effects of moral hazard and adverse selection—may be unfolding in the federal government's insurance system for private DB pension plans. In fact, Bodie has been warning for 15 years that the possibility of just such a doomsday scenario for DB pension insurance exists. It was only when the federal government's PBGC plunged into deficit in 2002 that his warnings were widely recognized as plausible.

In the case of DB pensions, the asset-liability mismatch at issue is not short-duration liabilities funding long-duration assets. Instead, DB pension plans face long-duration liabilities (future pension obligations) that often are funded to a large extent by an asset class that might, at first glance, appear to be a good hedge—namely, corporate equity investments. After all, today's conventional wisdom is that, in the long run, stock returns essentially always exceed fixed-income returns, which pension liabilities could be expected to resemble (Siegel, 2002). According to this view, stocks actually are less risky than bonds, the longer the investment horizon. Thus, they are ideal for DB pension funding.

Bodie argues that this is a “fundamentally flawed belief about the nature of stock market risk and reward.” He notes that the cost of buying protection in the options or swaps markets against a shortfall in an equity portfolio against a fixed benchmark is increasing, the longer the investment horizon. As Bodie explains, “fluctuations in stock prices do not necessarily cancel out over time, no matter how long the time period.”

Conventional wisdom before the mid-1960s, of course, was that interest rates could be expected to remain low and that the yield curve would not invert, except in very rare and brief episodes. That conventional wisdom turned out to be wrong, resulting in a taxpayer bailout of several-hundred-billion dollars. Bodie suggests that today's conventional wisdom about stock market returns and pension liabilities could be obscuring a similarly expensive future taxpayer bailout of the PBGC. He believes that pension-accounting and -funding rules, together with PBGC insurance premiums, all should be reformed to recognize the risks inherent in DB pensions' mismatching of their assets and liabilities.

Discussant Deborah J. Lucas largely accepts Bodie's framing of the problems surrounding DB pensions and provides analysis of two specific questions. First, what is the PBGC's current risk exposure? Second, what motivates corporate pension managers to invest in stocks?

To quantify the PBGC's risk exposure, note that two things must happen simultaneously before the PBGC is exposed to loss: A sponsoring

¹ Duration is a measure of the price sensitivity of a financial instrument to changes in interest rates. A long-duration instrument, such as a 30-year mortgage, is more sensitive to a given interest rate change than are short-duration instruments, such as one-year time deposits.

company must encounter financial distress, and the company's DB plan must be underfunded. To quantify the PBGC's risk exposures, therefore, one must model a compound option.

Even though total underfunding of DB plans was about \$450 billion in 2004, Lucas estimates (using historical data through 2004 and a Monte Carlo simulation model) that the PBGC's expected net cost over a 20-year horizon is "only" about \$119 billion (\$63 billion over a 10-year horizon). This is because not all underfunded plans' sponsors will default on their pension obligations, nor do all defaulting DB plan sponsors have underfunded plans.

Lucas estimates that reducing the share of DB pension plans' assets held in equity from the current 70 percent level to only 30 percent would reduce the PBGC's 10-year expected net cost from \$63 billion to about \$53 billion—still a significant risk exposure. One reason that asset allocation apparently does not play a more significant role in the PBGC's risk exposure is that the extent of underfunding of a defaulting plan matters even more. Typically, a sponsoring firm approaching default stops making pension contributions; moreover, there often is a surge in pension liabilities at plan termination due to vesting and early-retirement rules. Lucas also concludes on the basis of her model that controlling the risk exposure of the PBGC by varying insurance premiums to sponsoring firms is almost certainly infeasible, because the level of premiums and their necessary variation across firms would be politically untenable.

The second important question Lucas addresses is why pension managers invest such a large fraction of plan assets in stocks. While she cannot rule out Bodie's claim that pension managers misunderstand the true risk-and-return characteristics of stocks, Lucas suggests a rational alternative.

Viewed realistically from a point long before a worker's retirement, pension liabilities are not fixed obligations, like nominal bonds. Instead, they are uncertain and share some characteristics of stocks—namely, a positive correlation with returns on human capital. In other words, benefit formulas that base the level of benefits on years

of service and/or the final average wage or salary depend on the worker's earnings profile, which, in turn, depends (in part) on the performance of the economy. Thus, pension managers may rationally invest a large fraction of plan assets in stocks because they constitute efficient hedging assets for the types of liabilities pension plans actually owe.

Lucas concludes that an outright ban on DB investments in stocks would be inappropriate. However, her results are consistent with Bodie's basic argument that U.S. pension managers tend to hold too much of their investment assets in stocks. Bodie and Lucas agree that a likely cause of DB overinvestment in equities is the current pension-accounting framework, which allows sponsoring companies to book current income on the basis of expected asset returns without regard to risk. In addition, the largely risk-insensitive PBGC insurance-premium schedule allows plan sponsors to share some of the downside risk of equity investments with taxpayers while keeping most of the upside risk.

PRIVATE AND PUBLIC RISK-SHARING FOR CATASTROPHES

J. David Cummins analyzes the frequency and severity of natural and man-made catastrophes in recent years, together with various private and public risk-sharing mechanisms. Natural catastrophes include hurricanes, earthquakes, floods, and tsunamis; while man-made catastrophes include oil-platform explosions, aviation disasters, and terrorism.

One conclusion of Cummins's analysis is that the frequency and severity of many types of catastrophes have increased in recent years. He suggests that long-term movements in nature's cycles, such as meteorological trends, or political developments could be at work.² One theme that Cummins uses to tie together trends in natural and man-made catastrophes is the idea that the scale of a catastrophe depends on both the nature of the shock event and our vulnerability to it. For

² Cummins is agnostic on the effect of possible global warming on the frequency and severity of hurricanes.

example, hurricanes Katrina, Rita, and Wilma in 2005 were unusually ferocious storms, but they also struck coastal areas that had been extensively developed and poorly protected. In one sense, therefore, the Gulf Coast hurricanes were both natural and man-made catastrophes. Rapid and continuing development of disaster-prone areas, such as California, Florida, the U.S. Gulf Coast, and Asia, make large future catastrophes more likely.

The escalating costs of catastrophes in recent years have stressed private insurance markets and exposed gaps and flaws in government insurance programs. The sheer scale of catastrophe losses also has forced a reconsideration of whether catastrophes are, in fact, “insurable,” in the sense that private buyers and sellers of catastrophe protection can agree to terms of coverage. Private insurance for terrorism risk was withdrawn by some underwriters immediately after the September 11 attacks, for example, while those policies that remained on the market were unattractively priced in the view of many potential buyers.

Breakdown in the terrorism insurance market led to government intervention in the form of a temporary federal terrorism risk reinsurance system (Terrorism Risk Insurance Act of 2002; renewed in 2005). Similarly, perceived insurance-market failures after Hurricane Andrew in Florida in 1992 and the Northridge earthquake in California in 1994 led to government interventions—in both cases, by the respective state governments. The National Flood Insurance Program was created in 1968 in response to perceived inadequacies in the private market. Governments in many other countries also are active in providing insurance coverage for catastrophes.

Cummins is optimistic with regard to the global insurability of many catastrophic events, suggesting that the vast financial capacity of financial markets can and should supplement the risk-underwriting capacity of private insurance and reinsurance companies. Catastrophe futures contracts were launched in 1992, and catastrophe bonds followed in 1994. Although the catastrophe futures contracts later were withdrawn because too little trading occurred, catastrophe bonds appear to have established themselves. They effectively expand the pool of capital resources

available to insure catastrophes, and they provide diversification opportunities for investors of all types.

As for the role of government insurance for catastrophe risk, Cummins believes there may be an appropriate risk-sharing role for certain narrow classes of risk, such as terrorism. The risk of terrorism depends, to some extent, on government foreign policy, and much of the information that would be needed for a private insurer to underwrite the risk is classified and, hence, unavailable. Efforts to mitigate terrorism risk depend crucially on the Department of Homeland Security, over which private insurers have no authority. Thus, one could argue that terrorism risk should be borne, at least in part, by the federal government.

Clearly, some existing government insurance programs are poorly designed. For example, the National Flood Insurance Program (NFIP) is not actuarially sound (individual households do not pay premiums that reflect their risks to the program); it does not collect aggregate premiums high enough to cover both losses and operating expenses, so it was insolvent even before the 2005 hurricane season; and there is no control over “repetitive-loss policies,” which are properties that flood repeatedly. Moreover, insurance-penetration rates are low even in areas that are designated as flood prone. In sum, the NFIP is a case study in moral hazard, adverse selection, and non-economic management of an insurance program. Cummins believes a private sector solution to the problem of flood insurance is feasible, especially if catastrophe bonds were created to diversify local risks. The appropriate role of the federal government in flood insurance is to reinsure private insurers at prices that would allow the government to break even.

More generally, Cummins believes governments should remove obstacles to private sector solutions to catastrophe insurance. Prime examples of obstacles that could be removed are disadvantageous accounting and tax rules and prudential regulations that affect banks, insurance companies, and other financial institutions. In some instances, governments should mandate universal insurance coverage, such as in earthquake zones and hurricane-prone areas.

Discussant Dwight M. Jaffee is more skeptical than Cummins that private markets can insure all, or virtually all, catastrophe risks. If these risks are drawn from probability distributions with “fat tails,” then standard statistical diversification techniques may fail to provide a sound basis for private sector insurance provision.³

Yet, private insurance for catastrophes has been provided in the past in the United States and in other countries (for example, flood insurance in London). Thus, there must be other impediments that interfere with market solutions to the problem of catastrophe risk. Jaffee suggests that these impediments include excessively risk-averse insurance-company managers; over-zealous insurance regulators; disagreements between insurers and customers about a fair price for coverage⁴; genuine uncertainty surrounding the key risk parameters (the probability of an event and the loss given an event); and the need to share catastrophic losses intertemporally (i.e., pay off losses over time), in addition to across insured parties.

Given that private markets for catastrophe insurance can fail for a number of reasons, Jaffee does not find it surprising that “citizens dependably call on their government to fix the failure.” The question of government involvement in catastrophe insurance, therefore, is “not so much ‘if’ as it is ‘how’ and ‘how long’.”

After reviewing federal flood and terrorism-risk insurance, as well as state-backed earthquake and hurricane insurance programs in California and Florida, respectively, Jaffee concludes that government intervention, when necessary, should mimic private sector insurance coverage to the greatest extent possible. In particular, Jaffee would not make catastrophe insurance coverage mandatory for all households or businesses, except where required by mortgage lenders, for example. Government intervention should be temporary, when feasible; governments should use risk-based

pricing, to the extent possible; and they should avoid using subsidies, to minimize budgetary cost and to prevent risk-increasing behavior on the part of the insured.

PANEL DISCUSSION

Three eminent panelists discussed the following questions during the last session of the conference:

- What is the appropriate role of the federal government in the private markets for credit and insurance?
- What is the outlook for government involvement in these markets?

Panelist Kenneth J. Arrow reflected on the imperfect role of government regulatory mechanisms in recreating the effects of competitive markets for risk-sharing.⁵ One reason competitive markets are missing in the first place is that households are not fully rational. Nor do we understand why risk-averse households do not fully use the risk-sharing opportunities that are available. Even a catastrophe such as a hurricane is a small event on a global scale, so financial markets and institutions surely could disperse the risks that households and businesses face.

Another example of a risk-sharing market that is poorly developed is health insurance. Because of information asymmetries between individuals and health insurers, too little health insurance is traded in the private market. Without government intervention, Arrow asserted, there would be little in the way of a health insurance market.

Some catastrophes, such as war, are too large for markets to be expected to provide full insurance. Other limits to insurability include desirable contracts that are not legally enforceable, or cases where the insurance company has more information than the insurance buyer. On the other hand, the insurance buyer may have more information than the insurance company, opening up the possibility of the well-known problems of adverse

³ A fat-tailed probability distribution is one in which extreme events occur more frequently than would be the case if the risk were drawn from a normal distribution.

⁴ For example, fewer than 14 percent of affected homeowners purchase earthquake insurance from the California Earthquake Authority, which is compelled by state law to offer coverage at “actuarially based” rates.

⁵ Professor Arrow did not provide written comments for this volume. This introduction includes a comprehensive summary of his comments at the conference.

selection and moral hazard. In some situations, the quality or quantity of information or service is difficult to monitor, as in medical care. In each case, the result is too little risk-sharing from the perspective of social welfare.

Arrow argued that deposit insurance is an example of a reasonable government response to information-based market failure that some policymakers do not understand. For example, some government advisors recommended abolishing deposit insurance in the aftermath of the S&L deposit insurance debacle in the early 1990s. Their argument was that, without deposit insurance, depositors would monitor their banks and impose discipline better than government regulators could. Arrow viewed this as a bad idea; how would depositors have enough information to monitor their bank's financial condition?

Another important role for government is ensuring the solvency of private insurance providers. As in the case of banks covered by deposit insurance, it didn't seem reasonable to Arrow to expect individuals to be able to monitor the financial health of their insurance companies. A similar information-gathering role could be played by government in assembling data about hospitals and physicians.

The crucial role of information explains why regulation is important. One form of regulation is required disclosure, as in securities markets. Another is to maintain the quality of buildings through building codes or other goods and services through technical standards. Of course, private bodies, such as rating agencies, sometimes provide adequate information. There is no clear-cut explanation of when private markets gather and disseminate information efficiently and when they do not. We must look at each case individually.

Arrow commended the new field of behavioral economics for questioning the tenets of classical economics. Do consumers choose rationally? Clearly, they do not always do so. It has taken a long time, but economists finally are facing up to the limitations of our assumptions about rational choice.

For example, economists and finance professors themselves may appear irrational by living in an earthquake-prone zone, such as the San

Francisco Bay area, but declining to buy earthquake insurance. Indeed, only 14 percent of Californians own such insurance. It appears to be the case that most people underestimate the probability of an earthquake but overestimate its severity. How does this affect their decisions about whether to buy earthquake insurance or not? The same set of complicated issues exists in the case of flood insurance, with the majority of flooded residents in New Orleans remaining uninsured when Hurricane Katrina hit. Our theories, even the celebrated loss-aversion theory of Kahneman and Tversky (1991), do not explain this behavior.

Another impediment to full risk-sharing is high transaction costs. For example, it is costly to avoid fraud, verify losses, and administer the entire premium-collection and claims-payment process.

Arrow also pointed out the difficulty we face in making rules and laws designed to create incentives to lower risk. For example, suppose we decide that motorcycle riders must wear helmets when they ride. This law will be accompanied by a rule that says no motorcycle rider who is injured while not wearing a helmet will be treated for his or her head injuries. Clearly, a tough set of helmet laws like this should increase the rate at which motorcycle riders wear helmets. It also should reduce the costs to society of treating head injuries. But, Arrow wondered, would we really deny medical treatment to an injured rider who had failed to wear a helmet? Given that everyone will anticipate this response, will the helmet law be credible?

Panelist Robert E. Litan focused his remarks on the unrecognized liabilities of the federal government, particularly with regard to natural disasters. Following the theme suggested by Arrow, Litan stressed the importance of two distinct objectives when governments intervene in the markets for catastrophe risk. First, the government should encourage individuals, businesses, and government at all levels to minimize the cost of disasters that occur. Second, losses should be compensated in a way that interferes least with loss-mitigation efforts.

A key point to remember is that government policies can affect the probability or severity of

disasters. For example, government policies on automobile emissions may affect the environment, which, in turn, may affect the frequency and severity of hurricanes and droughts.

A long-term view also is necessary when deciding whom to compensate and by how much after a natural disaster. The problem of moral hazard is of great importance because people learn quickly that government compensation observed in the past is likely to be repeated. For example, many houses were rebuilt in Florida after recent hurricanes because, one must presume, people saw how quickly homeowners' losses were compensated in the previous hurricanes.

Private insurance can and does play an important role in assisting government mitigation and compensation objectives. However, Litan believes the private sector cannot replace government involvement altogether for catastrophe risks. Nor is he optimistic about the capacity of catastrophe bonds to supplement insurance markets in a meaningful way.

Litan believes the government should establish a formal reinsurance system for megacatastrophes, in order to build an insurance surplus and provide incentives for loss prevention and mitigation. Actuarially based pricing would encourage people to choose the risks they undertake on a more rational basis. The unique ability of the federal government to share risks across generations through borrowing and taxation make it the appropriate insurer of last resort.

Panelist Joseph E. Stiglitz focused his remarks on the role of government in risk-bearing. He pointed to the many reasons why private insurance markets might fail, including risks too large for private insurers to bear; moral hazard on the part of individuals who anticipate a government bailout, leading to too little insurance and, perversely, the very bailout they anticipated; intergenerational risks, such as economic depressions; and a variety of contracting problems broadly described by the notion of asymmetries of information between buyers and sellers of insurance. To this list could be added the difficult problems of accounting for insurance liabilities, leading to some uncertainty about the solvency of individual insurance firms.

Stiglitz suggested that recent natural disasters have established two certainties—large numbers of people and businesses who face significant risks from natural disasters have no or inadequate insurance coverage; and, partly as a consequence, it is rational to expect government bailouts when disasters occur. It is not clear whether private or public approaches to these interrelated problems are better.

Stiglitz drew on his experience of the East Asian financial crises of the late 1990s to suggest that the failure of large numbers of individuals to purchase insurance can produce macroeconomic externalities. This consideration alone may constitute a justification for government intervention. On a related note, he argued that Social Security reforms could, under some circumstances, eventually lead to a large number of elderly people living in poverty. In effect, the reduction in risk-sharing implicit in the proposed reforms would leave many people underinsured against old-age poverty. Collectively, this underinsurance would create externalities for society. A government bailout of some sort then would become likely. Likewise, the health insurance system in the U.S. leaves large numbers of people chronically underinsured. The result is a variety of externalities that are borne in varying degrees by everyone else.

In sum, Stiglitz concluded that government bailouts are inefficient and inequitable. It would be preferable to establish more formal risk-sharing mechanisms in advance, both to provide incentives for reallocating risks efficiently and to avoid arbitrary and highly politicized redistributions of wealth in the wake of a catastrophe. To establish such a formal risk-sharing framework, government interventions of one sort or another are inevitable and desirable.

AN UNFINISHED AGENDA

Despite optimism among many participants at the conference that federal legislation would be forthcoming to improve the functioning of many federal credit and insurance programs, very little had occurred by mid-2006. Social Security, Medicare, and Medicaid remain on unsustainable

fiscal paths, with no reform legislation on the horizon. Legislation to reform GSEs remains stalled, as does legislation to reform defined-benefit pension plans. Federal flood insurance reforms await action, even as another hurricane season begins. The Terrorism Risk Insurance Act of 2002 was extended at the end of 2005, but the final form of federal reinsurance for terrorism risk remains uncertain.

The necessary first step in reforming federal credit and insurance programs is debate and discussion. The proceedings of this 2005 Economic Policy Conference of the Federal Reserve Bank of St. Louis provide a foundation of debate and discussion on which future reforms can be based.

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Is the United States Bankrupt?

Laurence J. Kotlikoff

Is the United States bankrupt? Many would scoff at this notion. Others would argue that financial implosion is just around the corner. This paper explores these views from both partial and general equilibrium perspectives. It concludes that countries can go broke, that the United States is going broke, that remaining open to foreign investment can help stave off bankruptcy, but that radical reform of U.S. fiscal institutions is essential to secure the nation's economic future. The paper offers three policies to eliminate the nation's enormous fiscal gap and avert bankruptcy: a retail sales tax, personalized Social Security, and a globally budgeted universal healthcare system.

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Is the U.S. bankrupt? Or to paraphrase the *Oxford English Dictionary*, is the United States at the end of its resources, exhausted, stripped bare, destitute, bereft, wanting in property, or wrecked in consequence of failure to pay its creditors?

Many would scoff at this notion. They'd point out that the country has never defaulted on its debt; that its debt-to-GDP (gross domestic product) ratio is substantially lower than that of Japan and other developed countries; that its long-term nominal interest rates are historically low; that the dollar is the world's reserve currency; and that China, Japan, and other countries have an insatiable demand for U.S. Treasuries.

Others would argue that the official debt reflects nomenclature, not fiscal fundamentals; that the sum total of official and unofficial liabilities is massive; that federal discretionary spending and medical expenditures are exploding; that the United States has a history of defaulting on its official debt via inflation; that the government has cut taxes well below the bone; that countries holding U.S. bonds can sell them in a nanosecond; that

the financial markets have a long and impressive record of mispricing securities; and that financial implosion is just around the corner.

This paper explores these views from both partial and general equilibrium perspectives. The second section begins with a simple two-period life-cycle model to explicate the economic meaning of national bankruptcy and to clarify why government debt per se bears no connection to a country's fiscal condition. The third section turns to economic measures of national insolvency, namely, measures of the fiscal gap and generational imbalance. This partial-equilibrium analysis strongly suggests that the U.S. government is, indeed, bankrupt, insofar as it will be unable to pay its creditors, who, in this context, are current and future generations to whom it has explicitly or implicitly promised future net payments of various kinds.

The world, of course, is full of uncertainty. The fourth section considers how uncertainty changes one's perspective on national insolvency and methods of measuring a country's long-term fiscal condition. The fifth section asks whether immigration or productivity improvements arising either from technological progress or capital

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deepening can ameliorate the U.S. fiscal condition. While immigration shows little promise, productivity improvements can help, provided the government uses higher productivity growth as an opportunity to outgrow its fiscal problems rather than perpetuate them by effectively indexing expenditure levels to the level of productivity.

We certainly have seen major changes in technology in recent decades, and these changes have coincided with major increases in measured productivity. But whether or not technology will continue to advance is an open question. There is, however, a second source of productivity improvements, namely, a rise in capital per worker (capital deepening), to consider. The developed world is not saving enough and will not be saving enough to generate capital deepening on its own. However, China is saving and growing at such extraordinarily high rates that it can potentially supply the United States, the European Union, and Japan with huge quantities of capital. This message is delivered in Fehr, Jokisch, and Kotlikoff (2005), which simulates the dynamic transition path of the United States, Japan, the European Union, and China. Their model suggests that China can serve as America's saver and, consequently, savior, provided the U.S. government lets growth outpace its spending and provided China is permitted to invest massive sums in our country. Unfortunately, recent experience suggests just the opposite.

The final section offers three radical policies to eliminate the nation's enormous fiscal gap and avert bankruptcy. These policies would replace the current tax system with a retail sales tax, personalize Social Security, and move to a globally budgeted universal healthcare system implemented via individual-specific health-insurance vouchers. The radical stance of these proposals reflects the critical nature of our time. Unless the United States moves quickly to fundamentally change and restrain its fiscal behavior, its bankruptcy will become a foregone conclusion.

FISCAL INSOLVENCY IN A TWO-PERIOD LIFE-CYCLE MODEL

Consider a model in which a single good—corn—is produced with labor and capital in either

an open or closed economy. Corn can be either consumed or used as capital (planted to produce more corn). Agents work full time when young and consume when old. There is no change over time in either population or technology. The population of each cohort is normalized to 1.

Let w_t stand for the wage earned when young by the generation born in year t , r_t for the return on capital at time t , and h_t for the amount the government receives from the young and hands to the old at time t .

The generation born at time t maximizes its consumption when old, $c_t + 1$, subject to

$$(1) \quad \frac{c_{t+1}}{1+r_{t+1}} \leq w_t - h_t + \frac{h_{t+1}}{1+r_{t+1}}.$$

If the economy of this country, called Country X, is open and agents are free to borrow, h_t can exceed w_t . However, consumption can't be negative, hence,

$$(2) \quad h_t - \frac{h_{t+1}}{1+r_{t+1}} \leq w_t.$$

The left-hand side of (2) is generation t 's remaining (in this case, entire) lifetime fiscal burden—its *generational account*. Equation (2) says that the government can't extract more from a generation than its lifetime resources, which, in this model, consists simply of lifetime earnings.

Suppose that, to keep things simple, the economy is small and open and that the wage and interest rates are positive constants equal to w and r , respectively. Also suppose that starting at some time, say 0, the government announces a policy of setting h_t equal to h forever and that

$$(3) \quad h_t - \frac{h}{1+r} > w,$$

meaning that the generational accounts of all generations starting with the one born at time 0 exceed their lifetime resources.

The old at time 0 have a generational account (remaining lifetime fiscal burden) of $-h$. These oldsters, who may have voted for the government based on the promise of receiving h , represent the creditors in this context. But the government can't deliver on its promise. The young may be fanatically devoted to the government, worship the

elderly, and care little for themselves, but they cannot beg, borrow, or steal this much corn to give to the government. The government can go hat in hand to foreign lenders, but to no avail. Foreign lenders will realize the government won't be able to repay.

The most the government can do for the elderly is to set h equal to $(1+r)w/r$. Let's assume the government does this. In this case, the government impoverishes each generation of young from time 0 onward in order to satisfy the claims of time-0 oldsters. In the words of the *Oxford English Dictionary*, we have a country at the end of its resources. It's exhausted, stripped bare, destitute, bereft, wanting in property, and wrecked (at least in terms of its consumption and borrowing capacity) in consequence of failure to pay its creditors. In short, the country is bankrupt and is forced to reorganize its operations by paying its creditors (the oldsters) less than they were promised.

Facing the Music

The point at which a country goes bankrupt depends, in general, on its technology and preferences as well as its openness to international trade. If, for example, agents who face confiscatory lifetime fiscal burdens refuse to work, there will be no lifetime resources for the government to appropriate. Consequently, the government must further limit what it can pay its creditors.

As a second example, consider what happens when an open economy, which has been transferring $(1+r)w/r$ to the elderly on an ongoing basis, suddenly, at time 0, becomes closed to international trade and credit. In this case, the government can no longer pay the contemporaneous elderly the present value of the resources of all current and future workers. Instead, the most it can pay the time- t elderly is the current young's resources, namely w_t . The reason is simple. The time- t young have no access to foreign loans, so they can't borrow against their future receipt of h in order to hand the government more at time t than w_t .

Clearly the loss of foreign credit will require the government to renege on much of its commitment to the time- t oldsters. And if the government was initially setting h below $(1+r)w/r$, but above

w_t , the inability to borrow abroad will plunge the country into bankruptcy, assuming the government sets h as high as possible. But bankruptcy may arise over time even if h is set below w_0 . To see this, note that capital per worker at time 1, k_1 , will equal $w_0 - h$. If $w(k_1) < w_0$, where $w(k_t)$ (with $w'(\cdot) > 0$) references the wages of generation t , the country will find itself in a death spiral for sufficiently high values of h or sufficiently low values of w_0 .¹ Each period's capital stock will be smaller than the previous period's until t^* , where $h \geq w_t^*$, making $k_{t^*+1} = 0$, at which point the jig is up, assuming capital as well as labor is required to produce output.

In short, general equilibrium matters. A policy that looks sustainable based on current conditions may drive a country broke and do so on a permanent basis. Of course, policymakers may adjust their policies as they see their country's output decline. But they may adjust too little or too late and either continue to lose ground or stabilize their economies at very unpleasant steady states. Think of Argentina, which has existed in a state of actual or near-bankruptcy for well nigh a century. Argentina remains in this sorry state for a good reason. Its creditors—primarily each successive generation of elderly citizens—force the government to retain precisely those policies that perpetuate the country's destitution.

Does Official Debt Record or Presage National Bankruptcy?

Since general equilibrium considerations play a potentially critical role in assessing policy sustainability and the likelihood of national bankruptcy, one would expect governments to be hard at work developing such models or, at a minimum, doing generational accounting to see the potential burden facing current young and future generations. That's not the case. Instead, governments

¹ If h is sufficiently large, there will be no steady state of the economy featuring a positive capital stock. In this case, the economy's capital stock will converge to zero over time, starting from any initial value of capital. If h is not so large as to preclude a steady state with positive capital, the economy will feature two steady states, one stable and one unstable. The capital stock in the stable steady state will exceed that in the unstable steady state. In this case, the economy will experience a death spiral only if its initial capital stock is less than that in the unstable steady state.

around the world rely on official debt as the primary indicator of fiscal solvency. So do the International Monetary Fund, World Bank, Organisation for Economic Co-operation and Development, and virtually all other monitors of economic policy, including most academic economists.

Unfortunately, the focus on government debt has no more scientific basis than reading tea leaves or examining entrails. To see this, let's return to our small open and entirely bankrupt Country X, which, when we left it, was setting h at the maximally expropriating value of $(1+r)w/r$. Can we use Country X's debt to discern its insolvency?

Good question, particularly because the word "debt" wasn't used at all in describing Country X's fiscal affairs. Neither, for that matter, were the words "taxes" or "transfer payments." This, by itself, indicates the value of "debt" as a precursor or cursor of bankruptcy, namely, zero. But to drive the point home, suppose Country X calls the h it takes from the young each period a "tax" and the " h " it gives to the old each period a "transfer payment." In this case, Country X never runs a deficit, never has an epsilon worth of outstanding debt, and never defaults on debt. Even though it is as broke as broke can be, Country X can hold itself out as debt-free and a model of fiscal prudence.

Alternatively, let's assume the government continues to call the h it gives the time-0 elderly a transfer payment, but that it calls the h it takes from the young in periods $t \geq 0$ "borrowing of $m_t h$ less a transfer payment of $(m_t - 1)h$ " and the h it gives generation t when it is old at time $t + 1$ "repayment of principal plus interest in the amount of $m_t h(1+r)$ less a net tax payment of $-h + m_t h(1+r)$." Note that no one's generational account is affected by the choice of language. However, the outstanding stock of debt at the end of each period t is now $m_t h$.

The values of m_t can be anything the government wants them to be. In particular, the government can set (use words such that)

$$(4) \quad m_{t+1} = m_t(1+g), \quad m_0 = -1, \quad \text{and} \quad g > r.$$

In this case, official debt is negative; i.e., the

government "runs" a surplus that becomes infinitely large relative to the size of the economy. And because $g > r$, the present value of the time- t surplus as t goes to infinity is infinite.

Alternatively, the government can set (use words such that) $m_{t+1} = m(1+g)$, $m_0 = 1$, and $g > r$. In this case, official debt becomes infinitely large and the present value of government debt at time t as t goes to infinity is infinite. So much for the transversality condition on government debt!

Thus, the government of bankrupt Country X is free to say it's running a balanced budget policy (by saying $m_t = 0$ for $t \geq 0$); a surplus policy, where the surplus becomes enormous relative to the size of the economy; or a debt policy, where the debt becomes enormous relative to the size of the economy. Or it could pick values of the m_t s that change sign from one period to the next or, if it likes, on a random basis. In this case, Country X would "run" deficits as well as "surpluses" through time, with no effect whatsoever on the economy or the country's underlying policy.

But no one need listen to the government. Speech, or at least thought, is free. Each citizen of Country X, or of any other country for that matter, can choose her own language (pattern of the m_t s) and pronounce publicly or whisper to herself that Country X is running whatever budgetary policy most strikes her fancy. Citizens schooled on Keynesian economics as well as supply siders, both of whom warm to big deficits, can choose fiscal labels to find fiscal bliss. At the same time, Rockefeller Republicans (are there any left and do they remember Rocky?) can soothe their souls with reports of huge surpluses and fiscal sobriety.

To summarize, countries can go bankrupt, but whether or not they are bankrupt or are going bankrupt can't be discerned from their "debt" policies. "Debt" in economics, like distance and time in physics, is in the eyes (or mouth) of the beholder.²

² By economics, I mean neoclassical economics in which neither agents nor economic institutions are affected by language. Kotlikoff (2003) provides a longer treatment of this issue, showing that the vapidness of conventional fiscal language is in no way mitigated by considerations of uncertainty, time consistency, distortions, liquidity constraints, or the voluntary nature of payments to the government.

ECONOMIC MEASUREMENT OF THE U.S. FISCAL CONDITION

As suggested above, the proper way to consider a country's solvency is to examine the lifetime fiscal burdens facing current and future generations. If these burdens exceed the resources of those generations, get close to doing so, or simply get so high as to preclude their full collection, the country's policy will be unsustainable and can constitute or lead to national bankruptcy.

Does the United States fit this bill? No one knows for sure, but there are strong reasons to believe the United States may be going broke. Consider, for starters, Gokhale and Smetters's (2005) analysis of the country's fiscal gap, which measures the present value difference between all future government expenditures, including servicing official debt, and all future receipts. In calculating the fiscal gap, Gokhale and Smetters use the federal government's arbitrarily labeled receipts and payments. Nevertheless, their calculation of the fiscal gap is label-free because alternative labeling of our nation's fiscal affairs would yield the same fiscal gap. Indeed, determining the fiscal gap is part of generational accounting; the fiscal gap measures the extra burden that would need to be imposed on current or future generations, relative to current policy, to satisfy the government's intertemporal budget constraint.

The Gokhale and Smetters measure of the fiscal gap is a stunning \$65.9 trillion! This figure is more than five times U.S. GDP and almost twice the size of national wealth. One way to wrap one's head around \$65.9 trillion is to ask what fiscal adjustments are needed to eliminate this red hole. The answers are terrifying. One solution is an immediate and permanent doubling of personal and corporate income taxes. Another is an immediate and permanent two-thirds cut in Social Security and Medicare benefits. A third alternative, were it feasible, would be to immediately and permanently cut all federal discretionary spending by 143 percent.

The Gokhale and Smetters study is an update of an earlier, highly detailed, and extensive U.S. Department of the Treasury fiscal gap analysis commissioned in 2002 by then Treasury Secretary

Paul O'Neill. Smetters, who served as Deputy Assistant Secretary of Economic Policy at the Treasury between 2001 and 2002, recruited Gokhale, then Senior Economic Adviser to the Federal Reserve Bank of Cleveland, to work with him and other Treasury staff on the study. The study took close to a year to organize and complete.

Gokhale and Smetters's \$65.9 trillion fiscal-gap calculation relies on the same methodology employed in the original Treasury analysis. Hence, one can legitimately view this figure as our own government's best estimate of its present-value budgetary shortfall. The \$65.9 trillion gap is all the more alarming because its calculation omits the value of contingent government liabilities and relies on quite optimistic assumptions about increases over time in longevity and federal healthcare expenditures.

Take Medicare and Medicaid spending, for example. Gokhale and Smetters assume that the growth rate in these programs' benefit levels (expenditures per beneficiary at a given age) in the short and medium terms will be only 1 percentage point greater than the growth rate of real wages per worker. In fact, over the past four years, real Medicare benefits per beneficiary grew at an annual rate of 3.51 percent, real Medicaid benefits per beneficiary grew at an annual rate of 2.36 percent, and real weekly wages per worker grew at an annual rate of 0.002 percent.³

Medicare and Medicaid's benefit growth over the past four years has actually been relatively modest compared with that in the past. Table 1, taken from Hagist and Kotlikoff (forthcoming), shows real benefit levels in these programs grew at an annual rate of 4.61 percent between 1970 and 2002. This rate is significantly higher than that observed during the same period in Germany, Japan, and the United Kingdom. Given the introduction of the new Medicare prescription drug benefit, which will start paying benefits in 2006, one can expect Medicare benefit growth to increase substantially in the near term.

³ See www.cms.hhs.gov/researchers/pubs/datacompendium/2003/03pg4.pdf from the Centers for Medicare and Medicaid website and <http://a257.g.akamaitech.net/7/257/2422/17feb20051700/www.gpoaccess.gov/eop/2005/B47.xls> from the *2005 Economic Report of the President*.

Table 1**Average Annual Benefit Growth Rates, 1970-2002**

Country	Rate (%)
Australia	3.66
Austria	3.72
Canada	2.32
Germany	3.30
Japan	3.57
Norway	5.04
Spain	4.63
Sweden	2.35
United Kingdom	3.46
United States	4.61

SOURCE: Hagist and Kotlikoff (forthcoming).

How are the Bush administration and Congress planning to deal with the fiscal gap? The answer, apparently, is to make it worse by expanding discretionary spending while taking no direct steps to raise receipts. The costs of hurricanes Katrina and Rita could easily total \$200 billion over the next few years. And the main goal of the President's tax reform initiative will likely be to eliminate the alternative minimum tax.

This administration's concern with long-term fiscal policy is typified by the way it treated the Treasury's original fiscal gap study. The study was completed in the late fall of 2002 and was slated to appear in the president's 2003 budget to be released in early February 2003. But when Secretary O'Neill was ignominiously fired on December 6, 2002, the study was immediately censored. Indeed, Gokhale and Smetters were told within a few days of O'Neill's firing that the study would not appear in the president's budget. The timing of these events suggests the study itself may explain O'Neill's ouster or at least the timing of his ouster. Publication of the study would, no doubt, have seriously jeopardized the passage of the administration's Medicare drug benefit as well as its third tax cut.

For their part, the Democrats have studiously avoided any public discussion of the country's

long-term fiscal problems. Senator Kerry made no serious proposals to reform Social Security, Medicare, or Medicaid during the 2004 presidential campaign. And his Democratic colleagues in Congress have evoked Nancy Reagan's mantra—"Just say no!"—in response to the president's repeated urging to come to grips with Social Security's long-term financing problem.

The Democrats, of course, had eight long years under President Clinton to reform our nation's most expensive social insurance programs. Their failure to do so and the Clinton administration's censorship of an Office of Management and Budget generational accounting study, which was slated to appear in the president's 1994 budget, speaks volumes about the Democrats' priorities and their likely future leadership in dealing with our nation's fiscal fiasco.

The fiscal irresponsibility of both political parties has ominous implications for our children and grandchildren. Leaving our \$65.9 trillion bill for today's and tomorrow's children to pay will roughly double their average lifetime net tax rates (defined as the present value of taxes paid net of transfer payments received divided by the present value of lifetime earnings).

Table 2, taken from Gokhale, Kotlikoff, and Sluchynsky (2003), presents the average lifetime net tax rates now facing couples who are 18 years of age and work full time. The calculations incorporate all major tax and transfer programs and assume that the couples work full time through age 64, experience a 1 percent annual real earnings growth, have children at ages 25 and 27, purchase a house scaled to their earnings, and pay college tuition scaled to their earnings. The table shows that average lifetime net tax rates are already fairly high for middle and high earners, who, of course, pay the vast majority of total taxes.

The table also presents marginal net work tax rates. These are not marginal tax rates on working full time (versus not working at all). They are not marginal net tax rates on working additional hours. They are computed by comparing the present value of additional lifetime spending one can afford from working full time each year from age 18 through age 64 and paying net taxes with the present value of additional lifetime spending

Table 2**Average Net Full-time Worker Tax Rates**

Multiple of minimum wage	Initial total household earnings (2002 \$)	Average lifetime net tax rate (%)	Marginal net tax rate (%)
1	21,400	-32.2	66.5
1.5	32,100	14.8	80.6
2	42,800	22.9	72.2
3	64,300	30.1	63.0
4	85,700	34.4	59.1
5	107,100	37.8	57.5
6	128,500	41.0	57.5
7	150,000	42.9	57.0
8	171,400	44.2	56.6
9	192,800	45.1	56.1
10	214,200	45.7	55.7
15	321,400	48.4	55.2
20	428,500	49.6	54.7
30	642,700	50.8	54.2
40	857,000	51.4	54.0

NOTE: Present values are actuarial and assume a 5 percent real discount rate.

SOURCE: Gokhale, Kotlikoff, and Sluchynsky (2003).

one can afford in the absence of any taxes or transfers.

Clearly, these marginal net tax rates are very high, ranging from 54.0 percent to 80.6 percent. The rates are highest for low-income workers. For such workers, working full time can mean the partial or full loss of the earned income tax credit (EITC), Medicaid benefits, housing support, food stamps, and other sources of welfare assistance. Going to work also means paying a combined employer-employee Federal Insurance Contribution Act (FICA) tax of 15.3 percent and, typically, state (Massachusetts, in this case) income taxes and federal income taxes (gross of EITC benefits).

Together with David Rapson, a graduate student at Boston University, I am working to develop comprehensive measures of lifetime marginal net taxes on working additional hours and saving additional dollars. Our early work suggests quite high marginal net taxes on these choices as well.

The point here is that trying to double the

average lifetime net tax rates of future generations would entail layering additional highly distortive net taxes on top of a net tax system that is already highly distortive. If work and saving disincentives worsen significantly for the broad middle class, we're likely to see major supply responses of the type that have not yet arisen in this country. In addition, we could see massive emigration. That sounds extreme, but anyone who has visited Uruguay of late would tell you otherwise. Uruguay has very high net tax rates and has lost upward of 500,000 young and middle-aged workers to Spain and other countries in recent years. Many of these émigrés have come and are still coming from the ranks of the nation's best educated citizens.

Given the reluctance of our politicians to raise taxes, cut benefits, or even limit the growth in benefits, the most likely scenario is that the government will start printing money to pay its bills. This could arise in the context of the Federal Reserve "being forced" to buy Treasury bills and

bonds to reduce interest rates. Specifically, once the financial markets begin to understand the depth and extent of the country's financial insolvency, they will start worrying about inflation and about being paid back in watered-down dollars. This concern will lead them to start dumping their holdings of U.S. Treasuries. In so doing, they'll drive up interest rates, which will lead the Fed to print money to buy up those bonds. The consequence will be more money creation—exactly what the bond traders will have come to fear. This could lead to spiraling expectations of higher inflation, with the process eventuating in hyperinflation.

Yes, this does sound like an extreme scenario given the Fed's supposed independence, our recent history of low inflation, and the fact that the dollar is the world's principal reserve currency. But the United States has experienced high rates of inflation in the past and appears to be running the same type of fiscal policies that engendered hyperinflations in 20 countries over the past century.

INCORPORATING UNCERTAINTY

The world, of course, is highly uncertain. And the fiscal gap/generational accounting discussed above fails to systematically account for that uncertainty. There are two types of uncertainties that need to be considered in assessing a country's prospects for bankruptcy. The first is uncertainty in the economy's underlying technology and preferences. The second is uncertainty in policy.

Let's take the former first. Specifically, let's return to our two-period model but assume that the economy is closed to international trade. And let's assume that at time 0 the economy appears to be going broke insofar as the government has set a permanent level of h such that the economy will experience a death spiral in the absence of any changes in technology. Thus, $k_1 = w_0 - h$, and $w(k_1) < w_0$, where $w(\cdot)$ references the wage-generation function based on existing technology.

Now suppose there is a chance, with probability α , of the economy's technology permanently changing, entailing a new and permanent wage-generation function, $w^*(\cdot)$, such that $w^*(k_1) > w_0$. If this event doesn't arise, assume that technology

permanently remains in its time-0 configuration. Further assume that $w(k_1) < h$, so that if technology doesn't change, the government will go bankrupt in period 1.

How should an economist observing this economy at time 0 describe its prospects for bankruptcy? One way, indeed, the best way, is to simply repeat the above paragraph; that is, take one's audience through (simulate) the different possible scenarios.

But what about generational accounting? How does the economist compare the lifetime burden facing, for example, workers born in period 1 with their capacity to meet that burden? Well, the burden that the government wants to impose, regardless of the technology, entails taking away h from generation 1 when the generation is young and giving h back to the generation when it's old. Because in the regular (the non *) state the government will, by assumption, do its best by its claimants (the time-1 elderly), generation 1 can expect to hand over all their earnings when young and receive nothing when old (because the capital stock when old will be zero). This is a 100 percent lifetime net tax rate.

In the * state, the lifetime net tax rate will be lower. Suppose it's only 50 percent. Should one then form a weighted average of the 100 percent and 50 percent lifetime net tax rates with weights equal to $(1 - \alpha)$ and α , respectively? Doing so would generate a high average net tax rate, but one below 100 percent. Reporting that generation 1 faces a high expected net tax rate conveys important information, namely, that the economy is nearing bankruptcy. But citing a figure less than 100 percent may also give the false impression that there is no absolutely fatal scenario.

Note that agents born at time 1 can't trade in a market prior to period 1 in order to value their lifetime wages and lifetime fiscal burdens. If such a contingent claims market existed, there would be market valuations of these variables (but no trades because all cohort members are assumed identical). In this case, we could compare the value of claims to future earnings with the negative value of claims to future net taxes. But again, this comparison might fail to convey what one really wants to say about national bankruptcy, namely,

the chances it will occur and the policies needed to avoid it. How about uncertainty with respect to future policy? Well, the same considerations just mentioned appear to apply for that case as well.

In my view, the best way for generational accounting to accommodate uncertainty is to establish lifetime fiscal burdens facing future generations under different scenarios about the evolution of the economy and of policy. This will necessarily be partial-equilibrium analysis. But that doesn't mean that the projections used in generational accounting have to be static and assume that neither policy nor economic variables change through time. Instead, one should use general equilibrium models to inform and establish policy projection scenarios to which generational accounting can then be applied.

In thinking about uncertainty and this proposed analysis, one should bear in mind that the goal of long-term fiscal analysis and planning is not to determine whether the government's intertemporal budget constraint is satisfied, *per se*. We know that no matter what path the economy travels, the government's intertemporal budget constraint will be satisfied on an *ex post* basis. The manner in which the budget constraint gets satisfied may not be pretty. But economic resources are finite, and the government must and will ultimately make someone pay for what it spends.⁴

Thus, in the case of the United States, one could say that there is no fiscal problem facing the United States because the government's intertemporal budget constraint is balanced once one takes into account that young and future generations will, one way or other, collectively be forced to pay \$65.9 trillion more than they would have to pay based on current tax and transfer schedules. But the real issue is not whether the constraint is satisfied. The real issue is whether the path the government is taking in the process of satisfying the constraint is, to put it bluntly, morally and economically nuts.

The above point bears on the question of valuing the government's contingent liabilities. The real economic issue with respect to contingent liabilities is the same as that with respect to any

government liability. The real issue is not how to value those liabilities, but rather who will pay them, assuming they end up having to be paid. The economy could operate with perfect state-contingent claims markets so that we could tell precisely the market value of the government's contingent claims and see clearly that the government's budget constraint was satisfied—that the market value of all of the government's state-contingent expenditures were fully covered by the market value of its state-contingent receipts. But this knowledge would not by itself tell us how badly generation X would fare were state Y to eventuate. Pricing risk doesn't eliminate risk. And what we really want to know is not just the price at which, for example, the Pension Benefit Guarantee Corporation can offload its contingent liabilities, but also who will suffer and by how much when the Corporation fails to do so and ends up getting hit with a bill.

CAN IMMIGRATION, PRODUCTIVITY GROWTH, OR CAPITAL DEEPENING SAVE THE DAY?

Many members of the public as well as officials of the government presume that expanding immigration can cure what they take to be fundamentally a demographic problem. They are wrong on two counts. First, at heart, ours is not a demographic problem. Were there no fiscal policy in place promising, on average, \$21,000 (and growing!) in Social Security, Medicare, and Medicaid benefits to each American age 65 and older, our having a much larger share of oldsters in the United States would be of little economic concern.

Second, it is mistake to think that immigration can significantly alleviate the nation's fiscal problem. The reality is that immigrants aren't cheap. They require public goods and services. And they become eligible for transfer payments. While most immigrants pay taxes, these taxes barely cover the extra costs they engender. This, at least, is the conclusion reached by Auerbach and Oreopoulos (2000) in a careful generational accounting analysis of this issue.

⁴ This statement assumes that the economy is dynamically efficient.

A different and more realistic potential cure for our fiscal woes is productivity growth, which is supposed to (i) translate into higher wage growth and (ii) expand tax bases and limit requisite tax hikes. Let's grant that higher rates of productivity growth raise real average wages even though the relationship between the two has been surprisingly weak in recent decades. And let's accept that higher real wages will lead to larger tax bases even though it could lead some workers to cut back on their labor supply or retire early. This isn't enough to ensure that productivity growth raises resources on net. The reason, of course, is that some government expenditures, like Social Security benefits, are explicitly indexed to productivity and others appear to be implicitly indexed.

Take military pay. There's no question but that a rise in general wage levels would require paying commensurately higher wages to our military volunteers. Or consider Medicare benefits. A rise in wage levels can be expected to raise the quality of healthcare received by the work force, which will lead the elderly (or Congress on behalf of the elderly) to push Medicare to provide the same.

Were productivity growth a certain cure for the nation's fiscal problems, the cure would already have occurred. The country, after all, has experienced substantial productivity growth in the postwar period, yet its long-term fiscal condition is worse now than at any time in the past. The limited ability of productivity growth to reduce the implied fiscal burden on young and future generations is documented in Gokhale and Smetters (2003) under the assumption that government discretionary expenditures and transfer payments are indexed to productivity.

But the past linkage of federal expenditures to real incomes need not continue forever. Margaret Thatcher made a clean break in that policy when she moved to adjusting British government-paid pensions to prices rather than wages. Over time, the real level of state pensions has remained relatively stable, while the economy has grown. As a result of this and other policies, Great Britain is close to generational balance; that is, close to a situation in which the lifetime net tax rates on future generations will be no higher than those facing current generations.

Assuming the United States could restrain the growth in its expenditures in light of productivity and real wage advances, is there a reliable source of productivity improvement to be tapped? The answer is yes, and the answer lies with China. China is currently saving over a third of its national income and growing at spectacularly high rates. Even though it remains a developing country, China is saving so much that it's running a current account surplus. Not only is China supplying capital to the rest of the world, it's increasingly doing so via direct investment. For example, China is investing large sums in Iran, Africa, and Eastern Europe.⁵

Although China holds close to a half trillion U.S. dollars in reserves, primarily in U.S. Treasuries, the United States sent a pretty strong message in recent months that it doesn't welcome Chinese direct investment. It did so when it rejected the Chinese National Petroleum Corporation's bid to purchase Unocal, a U.S. energy company. The Chinese voluntarily withdrew their bid for the company. But they did so at the direct request of the White House. The question for the United States is whether China will tire of investing only indirectly in our country and begin to sell its dollar-denominated reserves. Doing so could have spectacularly bad implications for the value of the dollar and the level of U.S. interest rates.

Fear of Chinese investment in the United States seems terribly misplaced. With a national saving rate running at only 2.1 percent—a postwar low—the United States desperately needs foreigners to invest in the country. And the country with the greatest potential for doing so going forward is China.⁶

Fehr, Jokisch, and Kotlikoff (2005) develop a dynamic, life-cycle, general equilibrium model to study China's potential to influence the transition paths of Japan, the United States, and the European Union. Each of these countries/regions is entering a period of rapid and significant aging

⁵ See www.atimes.com/atimes/China/GF04Ad07.html; www.channel4.com/news/special-reports/special-reports-storypage.jsp?id=310; and http://english.people.com.cn/200409/20/eng20040920_157654.html.

⁶ The remainder of this section draws heavily on Fehr, Jokisch, and Kotlikoff (2005).

that will require major fiscal adjustments. But the aging of these societies may be a cloud with a silver lining coming, in this case, in the form of capital deepening that will raise real wages.

In a previous model that excluded China (Fehr, Jokisch, and Kotlikoff, 2004), my coauthors and I predicted that the tax hikes needed to pay benefits along the developed world's demographic transition would lead to a major capital shortage, reducing real wages per unit of human capital by one-fifth over time. A recalibration of our original model that treats government purchases of capital goods as investment rather than current consumption suggests this concern was overstated. With government investment included, we find much less crowding-out over the course of the century and only a 4 percent long-run decline in real wages. One can argue both ways about the true capital-goods content of much of government investment, so we don't view the original findings as wrong, just different.

Adding China to the model further alters, indeed, dramatically alters, the model's predictions. Even though China is aging rapidly, its saving behavior, growth rate, and fiscal policies are currently very different from those of developed countries. If successive Chinese cohorts continue to save like current cohorts, if the Chinese government can restrain growth in expenditures, and if Chinese technology and education levels ultimately catch up with those of the West and Japan, the model looks much brighter in the long run. China eventually becomes the world's saver and, thereby, the developed world's savior with respect to its long-run supply of capital and long-run general equilibrium prospects. And, rather than seeing the real wage per unit of human capital fall, the West and Japan see it rise by one-fifth by 2030 and by three-fifths by 2100. These wage increases are over and above those associated with technical progress, which we model as increasing the human capital endowments of successive cohorts.

Even if the Chinese saving behavior (captured by its time-preference rate) gradually approaches that of Americans, developed-world real wages per unit of human capital are roughly 17 percent higher in 2030 and 4 percent higher at the end of

the century. Without China they'd be only 2 percent higher in 2030 and, as mentioned, 4 percent lower at the end of the century.

What's more, the major outflow of the developed world's capital to China predicted in the short run by our model does not come at the cost of lower wages in the developed world. The reason is that the knowledge that their future wages will be higher (thanks to China's future capital accumulation) leads our model's workers to cut back on their current labor supply. So the short-run outflow of capital to China is met with a commensurate short-run reduction in developed-world labor supply, leaving the short-run ratio of physical capital to human capital, on which wages positively depend, actually somewhat higher than would otherwise be the case.

Our model does not capture the endogenous determination of skill premiums studied by Heckman, Lochner, and Taber (1996) or include the product of low-skill-intensive products. Doing so could well show that trade with China, at least in the short run, explains much of the relative decline in the wages of low-skilled workers in the developed world. Hence, we don't mean to suggest here that all United States, European Union, and Japanese workers are being helped by trade with China, but rather that trade with China is, on average, raising the wages of developed-world workers and will continue to do so.

The notion that China, India, and other developing countries will alleviate the developed-world's demographic problems has been stressed by Siegel (2005). Our paper, although it includes only one developing country—China—supports Siegel's optimistic long-term macroeconomic view. On the other hand, our findings about the developed world's fiscal condition remain troubling. Even under the most favorable macroeconomic scenario, tax rates still rise dramatically over time in the developed world to pay baby boomers their government-promised pension and health benefits. However, under the best-case scenario, in which long-run wages are 65 percent higher, the U.S. payroll tax rates are roughly 40 percent lower than they would otherwise be. This result rests on the assumption that, while Social Security benefits are increased in light of

the Chinese-investment-induced higher real wages, federal government healthcare benefits are not; that is, the long-run reduction in payroll tax rates is predicated on outgrowing a significant share of our healthcare-expenditure problems.

FIXING OUR FISCAL INSTITUTIONS⁷

Determining whether a country is already bankrupt or going bankrupt is a judgment call. In my view, our country has only a small window to address our problems before the financial markets will do it for us. Yes, there are ways out of our fiscal morass, including Chinese investment and somehow getting a lid on Medicare and Medicaid spending, but I think immediate and fundamental reform is needed to confidently secure our children's future.

The three proposals I recommend cover taxes, Social Security, and healthcare and are interconnected and interdependent. In particular, tax reform provides the funding needed to finance Social Security and healthcare reform. It also ensures that the rich and middle class elderly pay their fair share in resolving our fiscal gap.

Tax Reform

The plan here is to replace the personal income tax, the corporate income tax, the payroll (FICA) tax, and the estate and gift tax with a federal retail sales tax plus a rebate. The rebate would be paid monthly to households, based on the household's demographic composition, and would be equal to the sales taxes paid, on average, by households at the federal poverty line with the same demographics.

The proposed sales tax has three highly progressive elements. First, thanks to the rebate, poor households would pay no sales taxes in net terms. Second, the reform would eliminate the highly regressive FICA tax, which is levied only on the first \$90,000 of earnings. Third, the sales tax would effectively tax wealth as well as wages, because when the rich spent their wealth and when

workers spent their wages, they would both pay sales taxes.

The single, flat-rate sales tax would pay for all federal expenditures. The tax would be highly transparent and efficient. It would save hundreds of billions of dollars in tax compliance costs. And it would either reduce or significantly reduce effective marginal taxes facing most Americans when they work and save.

The sales tax would also enhance generational equity by asking rich and middle class older Americans to pay taxes when they spend their wealth. The poor elderly, living on Social Security, would end up better off. They would receive the sales tax rebate even though the purchasing power of their Social Security benefits would remain unchanged (thanks to the automatic adjustment to the consumer price index that would raise their Social Security benefits to account for the increase in the retail-price level).

The sales tax would be levied on *all* final consumption goods and services and would be set at 33 percent—high enough to cover the costs of this “New New Deal’s” Social Security and healthcare reforms as well as meet the government’s other spending needs. On a tax-inclusive basis, this is a 25 percent tax rate, which is a lower or much lower marginal rate than most workers pay on their labor supply. The marginal tax on saving under the sales tax would be zero, which is dramatically lower than the effective rate now facing most savers.

Social Security Reform

My second proposed reform deals with Social Security. I propose shutting down the retirement portion of the current Social Security system at the margin by paying in the future only those retirement benefits that were accrued as of the time of the reform. This means that current retirees would receive their full benefits, but current workers would receive benefits based only on their covered wages prior to the date of the reform. The retail sales tax would pay off all accrued retirement benefits, which eventually would equal zero. The current Social Security survivor and disability programs would remain unchanged except that their benefits would be paid by the sales tax.

⁷ This section draws heavily from Ferguson and Kotlikoff (2005).

In place of the existing Social Security retirement system, I would establish the Personal Security System (PSS)—a system of individual accounts, but one with very different properties from the scheme proposed by the president. All workers would be required to contribute 7.15 percent of their wages up to what is now the earnings ceiling covered by Social Security (i.e., they'd contribute what is now the employee FICA payment) into an individual PSS account. Married or legally partnered couples would share contributions so that each spouse/partner would receive the same contribution to his or her account. The government would contribute to the accounts of the unemployed and disabled. In addition, the government would make matching contributions on a progressive basis to workers' accounts, thereby helping the poor to save.

All PSS accounts would be private property. But they would be administered and invested by the Social Security Administration in a market-weighted global index fund of stocks, bonds, and real-estate securities. Consequently, everyone would have the same portfolio and receive the same rate of return. The government would guarantee that, at retirement, the account balance would equal at least what the worker had contributed, adjusted for inflation; that is, the government would guarantee that workers could not lose what they contributed. This would protect workers from the inevitable downside risks of investing in capital markets.

Between ages 57 and 67, account balances would be gradually sold off each day by the Social Security Administration and exchanged for inflation-protected annuities that would begin paying out at age 62. By age 67, workers' account balances would be fully annuitized. Workers who died prior to age 67 would bequeath their account balances to their spouses/partners or children. Consequently, low-income households, whose members die at younger ages than those of high-income households, would be better protected. Finally, under this reform, neither Wall Street nor the insurance industry would get their hands on workers' money. There would be no loads, no commissions, and no fees.

Healthcare Reform

My final proposed reform deals not just with our public healthcare programs, Medicare and Medicaid, but with our private health-insurance system as well. That system, as is well known, leaves some 45 million Americans uninsured. My reform would abolish the existing fee-for-service Medicare and Medicaid programs and enroll all Americans in a universal health-insurance system called the Medical Security System (MSS). In October of each year, the MSS would provide each American with an individual-specific voucher to be used to purchase health insurance for the following calendar year. The size of the voucher would depend on the recipients' expected health expenditures over the calendar year. Thus, a 75 year old with colon cancer would receive a very large voucher, say \$150,000, whereas a healthy 30 year old might receive a \$3,500 voucher.

The MSS would have access to all medical records concerning each American and set the voucher level each year based on that information. Those concerned about privacy should rest easy. The government already knows about millions of Medicare and Medicaid participants' health conditions because it's paying their medical bills. This information has never, to my knowledge, been inappropriately disclosed.

The vouchers would pay for basic in- and out-patient medical care, prescription medications, and long-term care over the course of the year. If you ended up costing the insurance company more than the amount of your voucher, the insurance company would make up the difference. If you ended up costing the company less than the voucher, the company would pocket the difference. Insurers would be free to market additional services at additional costs. The MSS would, at long last, promote healthy competition in the insurance market, which would go a long way to restraining healthcare costs.

The beauty of this plan is that all Americans would receive healthcare coverage and that the government could limit its total voucher expenditure to what the nation could afford. Unlike the current fee-for-service system, under which the government has no control of the bills it receives,

the MSS would explicitly limit the government's liability.

The plan is also progressive. The poor, who are more prone to illness than the rich, would receive higher vouchers, on average, than the rich. And, because we would be eliminating the current income-tax system, all the tax breaks going to the rich in the form of non-taxed health-insurance premium payments would vanish. Added together, the elimination of this roughly \$150 billion of tax expenditures, the reduction in the costs of hospital emergency rooms (which are currently subsidized out of the federal budget), and the abolition of the huge subsidies to insurers in the recent Medicare drug bill would provide a large part of the additional funding needed for the MSS to cover the entire population.

Eliminating the Fiscal Gap

A 33 percent federal retail-sales tax rate would generate federal revenue equal to 21 percent of GDP—the same figure that prevailed in 2000. Currently, federal revenues equal 16 percent of GDP. So we are talking here about a major tax hike. But we're also talking about some major spending cuts. First, Social Security would be paying only its accrued benefits over time, which is trillions of dollars less than its projected benefits, when measured in present value. Second, we would be putting a lid on the growth of healthcare expenditures. Limiting excessive growth in these expenditures will, over time, make up for the initial increase in federal healthcare spending arising from the move to universal coverage. Third, we'd reduce federal discretionary spending by one-fifth and, thereby, return to the 2000 ratio of this spending to GDP. Taken together, these very significant tax hikes and spending cuts would, I believe, eliminate most if not all of our nation's fiscal gap.

CONCLUSION

There are 77 million baby boomers now ranging from age 41 to age 59. All are hoping to collect tens of thousands of dollars in pension and health-care benefits from the next generation. These claimants aren't going away. In three years, the

oldest boomers will be eligible for early Social Security benefits. In six years, the boomer vanguard will start collecting Medicare. Our nation has done nothing to prepare for this onslaught of obligation. Instead, it has continued to focus on a completely meaningless fiscal metric—"the" federal deficit—censored and studiously ignored long-term fiscal analyses that are scientifically coherent, and dramatically expanded the benefit levels being explicitly or implicitly promised to the baby boomers.

Countries can and do go bankrupt. The United States, with its \$65.9 trillion fiscal gap, seems clearly headed down that path. The country needs to stop shooting itself in the foot. It needs to adopt generational accounting as its standard method of budgeting and fiscal analysis, and it needs to adopt fundamental tax, Social Security, and healthcare reforms that will redeem our children's future.

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Anjan Thakor

In his interesting paper (Kotlikoff, 2006), Professor Laurence Kotlikoff confronts the provocative question suggested by his title. The answer the paper provides is strongly in the affirmative. And to bring home the point of what this means, Kotlikoff reminds us of a paraphrased version of the *Oxford English Dictionary* definition of bankruptcy: “at the end of its resources, exhausted, stripped bare, destitute, bereft, wanting in property, or wrecked in consequence of failure to pay its creditors.” Although he does not do this, he could have underscored his point further by citing from Hemingway’s *The Sun Also Rises*: “How did you go bankrupt?” “Two ways. Slowly, and then all at once.” In any event, after making the case that the United States is bankrupt, the paper proceeds to examine policy responses that politicians might be tempted to adopt in response to the impending bankruptcy, which are summarily dismissed as economically disastrous. The paper ends with a discussion of the policy responses that Kotlikoff recommends. Thus, the paper can be viewed as having three main components: an examination of the relevant macroeconomic data to assess whether the United States is bankrupt in present value terms, an assessment of seemingly politically expedient policy responses that are likely to be economically devastating, and recommended policy responses. I will comment on each in turn.

IS THE UNITED STATES BANKRUPT?

Kotlikoff scoffs at the use of government debt or budget deficits as a measure of fiscal solvency because these measures are highly sensitive to the *labels* one attaches to what the government takes in as revenues and what it pays out to its citizens. A country can run budget surpluses and have no debt and yet be broke. The paper therefore suggests relying on generational accounting to examine the lifetime fiscal burdens facing current and future generations. It refers to a study by Gokhale and Smetters (2005) that calculated the U.S. *fiscal gap*, measured as the present value of the difference between all future government expenditures, including servicing official debt, and all future receipts. Gokhale and Smetters (2005) use the federal government’s definition of receipts and payments in their calculation, but alternative definitions would not change the final answer. According to the authors, the U.S. fiscal gap is \$65.9 trillion. This is an astounding number because it is more than five times the U.S. gross domestic product (GDP) and a little less than twice the size of national wealth. Based on this, Kotlikoff concludes that the United States is truly bankrupt.

The contributors to the fiscal gap are the familiar culprits—Medicare and Medicaid spending and to a lesser extent Social Security—combined with tax cuts. Kotlikoff considers many of the potentially counterveiling forces that could ameliorate the situation, such as immigration

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and productivity gains in developing countries such as India and China. He concludes, based on Auerbach and Oreopoulos (2000), that the additional taxes the government collects from immigrants barely cover the extra costs they generate in terms of public goods and services, and thus immigration is unlikely to be the answer. He is more optimistic about the role of China, in light of China's high savings rate, its national account surplus, and its eagerness to make larger and larger direct investments in various parts of the world. He is critical of the U.S. government's recent role in the events that caused the Chinese National Petroleum Corporation to withdraw its bid for Unocal, particularly in light of the very low national savings rate in the United States and the obvious need for foreign capital to flow into the United States.

Although the paper makes these points persuasively and forcefully, I have three groups of comments on the underlying analysis: (i) the root causes of the problem, (ii) the notion of bankruptcy as applied to the United States and the alternative view that emerges if we actually take seriously the analogy of the U.S. fiscal gap with corporate bankruptcy as understood in corporate finance, and (iii) the role of the key assumptions in the analysis.

The Root Causes of the Problem

The basic problem the paper identifies as a root cause seems hard to deny: As a nation we are spending too much and saving too little. In particular, the rampant growth in the government's spending on social welfare and entitlement programs has created a huge gap between what has been promised to future generations and what can be afforded. This should, in the usual circumstances, lead to an increase in long-term interest rates to provide the incentives for politicians to rein things in. In fact, one could argue that the fiscal improvements in the 1990s had a lot to do with politicians' concerns about the reaction of the bond market to reckless spending.

However, that is not what is happening at present. Although politicians are talking a lot about fiscal discipline, they are doing little about it. The government has recently handed out huge

subsidies to energy producers and promised several hundred billion dollars for transport projects. Yet, long-term interest rates have remained low, thereby substantially weakening one of the market-based incentive effects that tends to curb the fiscal profligacy of politicians. Normally, such low interest rates would imply too much saving relative to what people want to invest. But we know that the United States certainly does not have an excessive-savings problem. Rather, as Ben Bernanke and others have recognized, it is the increasing flow of dollar capital from emerging Asian economies into the United States that has contributed to the underlying long-term interest rate dynamics in the United States, and this flow of capital is in turn driven by demographic and structural shifts in the global economy.¹

Although Kotlikoff's focus is on the fiscal gap and his criticism is of the irresponsible behavior of U.S. politicians over the past 10 to 15 years, it is nonetheless useful to recognize that this problem also has roots in the apparent failure of market forces to discipline these politicians because of what is happening elsewhere in the world. That does not make the problem of tackling the fiscal gap head-on any less important, but it highlights an aspect of the environment today that is different from that of the past.

The Idea of a Bankrupt Nation

In corporate finance, a distinction is made among three types of financial distress: pre-bankruptcy financial distress, bankruptcy, and liquidation. Pre-bankruptcy financial distress

¹ The phenomenon of capital being channeled from other parts of the world into the United States is not a homogenous one, in that the underlying dynamics differ from country to country. In China, where the savings rate is a staggering one-third of national income, there is also high investment and rapid growth, but much of it is exported rather than used for domestic consumption. The net effect is a savings surplus that China is investing all over the world through direct foreign investment and in the United States through the purchase of dollar-denominated financial assets. In other parts of the world, it is a lack of investment at home combined with central bank intervention in the form of purchasing dollars with local-currency-denominated liabilities for "currency management" that has generated the flow of capital from these countries into the United States. Thus, with the exception of China, there appears to be relatively low investment outside the United States and relatively high debt-financed consumption combined with very low savings and possibly unsustainable levels of government spending in the United States.

refers to a situation in which the firm suffers a shock so that (i) its operating cash flows seem temporarily insufficient to cover its debt repayment obligations and (ii) access to further credit dries up as a result of adverse selection, moral hazard, or other frictions. However, the firm is still an economically viable business, with potential access to positive-NPV (net present value) projects in the future. One outcome in this case is that the firm renegotiates its contracts with its employees to lower costs, improve cash flows, and enhance its debt-service capability. An example of this is the renegotiation of General Motor's labor contract with the United Auto Workers, as well as the many renegotiations that the airlines have had with their labor unions. Another outcome—not mutually exclusive of the first—is that the firm renegotiates with its creditors to lower its repayment burden now in exchange for something provided to creditors in the future. The idea in both cases is to avoid bankruptcy, which can create deadweight losses in the form of restrictions on the firm's ability to do business as well as direct out-of-pocket fees for lawyers and accountants. Increasingly, however, the threat of bankruptcy is being used *strategically* by firms as a tool to renegotiate contracts that seem economically unattractive in light of changes in the environment.

When attempts to renegotiate fail, the threat point of the renegotiation is reached and formal bankruptcy proceedings follow. However, even in such a case, what essentially happens is that there is a court-mediated renegotiation, and the firm continues to operate—albeit with some court-mandated restrictions on things such as asset disposals, acquisitions, and so on—as it did before. Creditors may end up taking a “hair cut” in the form of a reduced repayment by the firm; but even during bankruptcy proceedings the firm has the ability to access additional financing for working capital,² and it is also judged to have access to positive-NPV projects in the future. Firms eventually emerge from bankruptcy with a set of renegotiated contracts, and life goes on.

The direst form of financial distress is liquida-

tion. Here the business is simply judged to be no longer economically viable. It cannot operate without additional infusions of capital, and nobody is willing to put any more capital into it. In other words, the supply of positive-NPV projects is exhausted and only negative-NPV projects remain. The firm's assets are therefore liquidated. This must have been the condition of buggy-whip manufacturers after the automobile was invented.

When Kotlikoff compares the state of the United States to that of a “bankrupt” firm, it is not clear which form of financial distress he has in mind. The reliance on the *Oxford English Dictionary* definition of bankruptcy as “exhausted, stripped bare, destitute, bereft, wanting in property” seems closest to liquidation. Yet, one would be hard-pressed to find someone who believes this is the state of the U.S. economy. With \$35 trillion in national wealth and a growing economy, the United States could hardly be described as exhausted, stripped bare, or wanting in property.

Could the U.S. situation be described as analogous to corporate bankruptcy then? Hardly. The fiscal gap problem identified in this paper is *not* one in which the U.S. government owes foreign creditors more money than it has the ability to repay, and U.S. Treasury bonds are still viewed as risk-free securities from a credit-risk standpoint.³ Moreover, because the U.S. government's commitments are in nominal terms, the corporate form of bankruptcy does not seem even technically feasible. Rather, the fiscal gap is caused by the government having made social-safety-net promises that seem large, relative to its revenue base. These promises are both explicit, as represented by Medicare and Medicaid, and implicit, as represented by unplanned expenditures on “bailouts” of victims of natural disasters such as hurricanes, floods, and earthquakes. It is essentially caused by an unsustainable structure of transfer payments.

The more appropriate way of describing the U.S. situation is as follows. Suppose we have an economy that consists solely of a single fruit tree

² This financing, which has grown substantially over the past two decades or so, is called debtor-in-possession financing.

³ In any event, because the dollar is the world's reserve currency and U.S. government's debt obligations are in dollars, the government can always repay its dollar-denominated liabilities, even if it means printing more money and inflating the currency.

and two agents. The entire output of the fruit tree goes to agent A, and he has promised to pay agent B \$3,000 per year for his share of ownership in the economy. The promise includes a clause that permits agent B to receive more should unanticipated needs arise. The fruit tree is producing \$6,000 worth of fruit per year that agent A is able to sell externally and share the proceeds equally with agent B. However, in a couple of years, as a result of good fortune the fruit tree's output is worth \$8,000; coincidentally, in those years agent B's demand for consumption goes up to \$6,500 as a result of illness, so agent A gives agent B \$6,500, keeping \$1,500 for himself. In subsequent years, the fruit tree's output drops back to \$6,000, but agent A has promised to pay agent B \$6,500 and the expectation is that this payment will experience a growth rate of $g = 1$ percent per year perpetually. If one uses a discount rate $r = 3$ percent, the present value of the shortfall agent A is faced with is

$$\frac{\$500[1+g]}{r-g} = \frac{\$500[1+0.01]}{0.03-0.01} = \$25,250.$$

This is the analog of the U.S. fiscal gap that Kotlikoff refers to, and he would call this economy bankrupt.

Note, however, that the closest analog of this in the corporate context is the pre-bankruptcy financial distress that I discussed earlier. And what usually happens in that case is precisely what is likely to happen in the simple economy above. Clearly, agent A's promise to agent B is no longer sustainable and a renegotiation of the promise will have to occur. This economy is not bereft or wanting in property. It is producing \$6,000 worth of fruit per year and is just as viable as it was when agent B was promised \$3,000 per year. The economy simply needs to change its structure of transfer payments.

Similarly, promises made by the U.S. government to future Medicare, Medicaid, and Social Security recipients will have to be renegotiated. And what will make this politically feasible at some point is the same set of factors that allows firms like General Motors to be able to renegotiate contracts during pre-bankruptcy financial distress—namely, the threat of actual insolvency or

other dire economic consequences. In other words, the United States is not bankrupt. It is a nation with unsustainable promises to future generations of citizens that will need to be renegotiated. It is a bit surprising that Kotlikoff does not focus on this renegotiation aspect of financial distress, because doing so leads to very different conclusions from those he reaches.

Would the U.S. government ever renegotiate its promises or change the rules? Of course, it would. For example, during the 1980s it became painfully obvious that the deposit insurance scheme for savings and loan associations was deeply flawed and produced perverse risk-taking incentives. It took the Savings and Loan Crisis and the implosion of a \$3 trillion industry for this to become a priority for politicians, but eventually the passage of the Financial Institutions Reform Recovery and Enforcement Act (FIRREA) changed the rules of the game substantially, including disallowing the inclusion of supervisory goodwill as regulatory capital.⁴

The Role of the Key Assumptions in the Analysis

I will focus on three key assumptions in the analysis in the paper: the discount rate for calculating the fiscal gap, the role of the government, and the role of innovation and technology.

Consider the discount rate first. Given that spending more than receipts is unsustainable in the long run, the likelihood of the government *not* honoring its social-safety-net promises must be assessed as increasing through time. This should increase the discount rate used to compute the fiscal gap and thus reduce the size of the fiscal gap. Although I have not performed a sensitivity analysis of the fiscal gap calculations Kotlikoff refers to, we do know that present values of perpetuities are highly sensitive to the discount rate.⁵ Moreover, when the government does renegotiate its promises to future generations, the numerator

⁴ Prior to FIRREA, savings and loans could count supervisory goodwill as regulatory capital and many considered this a government "promise."

⁵ For example, in the illustration I provided earlier, an increase in the discount rate from 3 percent to 5 percent would cut the present value of the shortfall in half.

in the fiscal gap calculations will also decline, causing the gap to shrink further.

Let me now turn to the assumed role of the government in the analysis. As the analysis so starkly points out, it is the excessively intrusive role of the government, by means of the huge social safety net, that is largely responsible for the fiscal gap. Although the paper does not focus on this, it is this safety net, combined with the sophistication of our financial system in making credit relatively easily available to individuals, that is significantly responsible for the low and falling household savings rate in this country. By contrast, China, which admittedly has a substantial underinvestment in its social safety net, has households saving at an astonishing 25 percent of disposable income. Thus, one implication of the Kotlikoff paper is that part of the solution may lie in cutting back on the role of the government and creating stronger incentives for individual fiscal responsibility.

The impediment to such structural reform, of course, is that a lot of safety-net expenditures seem highly desirable *ex post* and are hence politically very attractive. But they generate lousy *ex ante* incentives, ranging from low household savings to a persisting desire to build costly infrastructure and communities in high-risk geographies.

I now turn to the role of the corporate sector, which the Kotlikoff paper does not spend much time discussing. The paper does note that productivity improvements are unlikely to be enough to solve the fiscal-gap problem. I want to discuss, however, the role of innovation and new technologies. These are unpredictable by their very nature, but when they do occur they provide discrete jumps in economic growth and tax revenues, introducing nonlinearities. These *nonlinear* patterns in economic growth seem to be in contrast to Kotlikoff's apparent linear extrapolations of historical trends in productivity growth. Moreover, they also ease resource constraints. In fact, an important function of a new technology is to relax a resource constraint or create a resource out of

something that did not exist before.⁶ But one thing is clear: Successful innovations will boost investments and economic growth and could significantly affect fiscal gap estimates. In light of my earlier discussion, the key questions here are also how future innovations will affect global investment patterns and hence the flow of foreign savings into the United States and how these innovations and possible changes in capital flows will affect U.S. economic growth and its fiscal gap. Moreover, foreign direct investments by U.S. companies in India⁷ and China will pay increasing dividends as those economies grow, not only through higher profit repatriations back to the United States but also through the innovations these investments will lead to.⁸

LIKELY POLICY RESPONSES TO THE FISCAL-GAP CRISIS

I will be very brief in this section because the paper devotes little space to this, dismisses the likely responses as economic suicide, and moves on.

The most obvious short-term fixes would appear to be to raise taxes and/or cut government spending. However, as the paper correctly points out, this would call for infeasible levels of tax increases or cuts in discretionary spending. Consequently, Kotlikoff concludes that the most likely response will be for the government to print more money. An increase in the money supply will eventually lead to significant inflation worries and an increase in interest rates, possibly leading to spiraling expectations of higher inflation and then hyperinflation.

I agree with Kotlikoff's view that none of these policy responses make much economic sense. Where I disagree is in his assessment that hyperinflation is likely to follow. I think the government's other promises are much more likely to be renegotiated before we get to that state.

⁶ For example, land was not a resource to hunter-gatherers before the advent of the technology of farming; it's what they could hunt and gather from the land that was a resource. Similarly, sand was hardly a resource before silicon chips.

⁷ Currently, the annual flow of foreign direct investments in India is only about 10 percent of that in China, but this number will almost surely grow.

⁸ For example, General Electric's engineering research center in India generates more patents every year than any other General Electric research center.

REFORM PROPOSALS

The paper focuses on reforming three parts of our economic system to address the fiscal-gap problem: tax reform, social security reform, and healthcare reform.

On tax reform, Kotlikoff proposes eliminating all income taxes, the payroll tax, and the estate and gift tax and replacing them with a simple federal retail sales tax (or value added tax [VAT]) with a rebate. The sales tax would be levied on *all* final consumption goods and services and is estimated to be 33 percent to cover all of the government's expenses.

At first blush, one may wonder why it makes any difference at all whether the tax imposed on us is called a sales tax or an income tax, as long as the aggregate amount of tax paid remains unchanged. The reasons why the VAT proposal differs from the current system are twofold.

First, it is obviously a much simpler system, which is attractive. Second, and more importantly, it fundamentally changes the nature of intergenerational transfers. The current system taxes those who are earning and saving. According to Kotlikoff, these tend to be the young. Kotlikoff's proposed system would tax those who are consuming out of previous savings, that is, those who are dissaving. Thus, his proposal shifts the tax burden from the young earners to the old consumers.

I like this proposal. It is a much better system from the standpoint of the incentives to save and consume. I have just two thoughts on this. One is whether the 33 percent VAT is too high and whether such tax reform should also be combined with a fundamental rethinking of the role of the government and the extent of its safety nets. Second, I wonder if a VAT-based system may make it easier for politicians to raise taxes over time. Anecdotal evidence from Europe suggests that it is often politically more expedient for politicians to push through tax increases with a VAT-based system.

On social security, Kotlikoff proposes scrapping the retirement portion of the current Social Security system at the margin by paying in the future only those retirement benefits that were

accrued at the time of the reform. Current retirees would be grandfathered in and would therefore receive their full benefits, but current workers would receive benefits based only on their covered wages prior to the date of the reform. Individual accounts (a Personal Security System [PSS]) would replace the existing retirement system, with all workers contributing 7.15 percent of their wages into an individual PSS account. The government would contribute to the accounts of the unemployed and disabled and make matching contributions on a progressive basis to workers' accounts. The government would also guarantee a zero minimum nominal return from investing the PSS accounts in a global portfolio.

I like most aspects of this proposal too. It is a definite improvement over the current system, but then almost anything would be. However, I would want to go further in reforming the system. We know that the Social Security system generates poor savings incentives for individuals and also creates massive contingent liabilities for the government. In light of this, my main questions are these: Why do we need PSS accounts for everybody? Why do the relatively wealthy need PSS accounts with a return floor guaranteed by the U.S. government? Why not limit these accounts to the bottom 10 or 20 percent of the economic ladder?

I now turn to healthcare reform. Here Kotlikoff proposes reforming not only Medicare and Medicaid but also our private health insurance system. Basically, the proposed system would replace the current fee-for-service Medicare and Medicaid programs with a universal health insurance system called the Medical Security System that would provide individuals with *needs-dependent* vouchers to purchase health insurance each year. The government would have complete access to everybody's medical records and would assess how much health insurance a person needs, so that the sicker would get bigger vouchers than the healthier.

Again, the current system is such a mess that it is hard not to like the Kotlikoff proposal. My concerns here are threefold. First, there is an obvious concern with complete government access to everybody's medical records, even though Kotlikoff brushes this issue aside. Second, what

happens if no insurance company is willing to provide the benefits needed to cover someone with a particular voucher? That is, the size of the voucher communicates information about the person's health problems, but the market fails to clear in the sense that no insurance company is willing to provide the appropriate coverage at that price. We have examples of rationing in credit markets due to informational frictions, so this deserves some thought. Third, the quality of healthcare in countries where universal healthcare is provided is not very good. Canada is an example of this. While well over half of all U.S. doctors are specialists, the Canadian percentage is much lower, which means that there are far longer waiting lines for specialists in Canada. The point is that changing the system has far-reaching consequences, particularly supply-side effects induced by the career choices of individuals in the medical services industry, that one would want to think about.

CONCLUSION

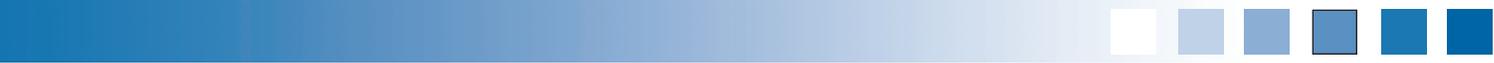
This is a nifty and thought-provoking paper. Although I do not agree with the implicit assertion that the U.S. fiscal gap puts the country in the same position as a bereft and destitute firm that is bankrupt and on the verge of liquidation, I do agree that the current state of affairs is alarming and the problem needs to be tackled head-on sooner rather than later. I also would like to see how the fiscal gap calculation would be affected by alternative discount rate assumptions, but I doubt that different numbers would change the qualitative nature of the conclusions or the appropriateness of reform proposals. Moreover, it is

worth thinking about the intertemporal stability of fiscal gap estimates. I recall it was not that long ago that politicians in Washington were fretting over how to spend the *surplus*!

At its very core, this paper makes a powerful case that the existing promises by the government, both explicit and implicit, are simply not tenable going forward. My belief is that the fiscal crisis identified by this paper will become so painful at some point that the political will to renegotiate these extravagant promises and diminish the nation's contingent liabilities is likely to emerge. But even if that happens, the three areas for reform that this paper has identified are sorely in need of critical examination. The proposals this paper has identified, while not immune to criticisms, are excellent places to start. I hope those in a position to do something will heed the unmistakable warning in this paper.

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On the Importance of the Plumber: The Intersection of Theory and Practice in Policymaking for Federal Financial Institutions

Douglas J. Elliott

The federal government's role as lender and insurer is very important, with over \$1.4 trillion of loans and guarantees and at least \$7 trillion of insured risk. Tens of millions of Americans benefit from housing loans, student loans, flood insurance, etc. Yet the federal financial institutions established to run these activities are often created almost as an afterthought, with little focus on their structure. This paper emphasizes the crucial importance of ending this neglect and recognizing how proper structure can help avoid major failures, such as the current problems at the Pension Benefit Guaranty Corporation, and enhance successes. The author also challenges the economics profession to provide more guidance on a range of specific analytical issues with real-world implications, because economists have often failed to extend analyses derived from the private sector into useful formulations for public sector practitioners.

Federal Reserve Bank of St. Louis *Review*, July/August 2006, 88(4), pp. 259-71.

I'd like to start by thanking the Federal Reserve Bank of St. Louis for sponsoring this conference on a very important topic that is dear to my heart, but is often neglected by others. I was thrilled to hear about the conference even before our hosts did me the honor of inviting me to speak.

My talk today will be very different from the brilliant economic analyses that you will likely hear from the other speakers. It will be full of personal opinions and observations rather than mathematical logic or statistical analyses that can be proven or disproven. In some ways it is a letter from the front-lines where public policy, politics, and bureaucracy clash. In consequence, you deserve some explanation of who I am and from where my opinions derive.

BACKGROUND

I was an investment banker for nearly two decades, principally with J.P. Morgan, and my

clients were insurers, banks, and other financial institutions. My job responsibilities and my analytical nature thoroughly taught me how to take apart and analyze a financial institution. When I reached a point in my life where I wanted to actively contribute to public policy, it was only natural that I focused on the federal government's own financial institutions. After extensive informational interviews with policymakers, it became clear that these important institutions do not receive nearly the attention that they deserve. In consequence, I gathered together a board of directors of like-minded policy experts and founded the Center On Federal Financial Institutions (COFFI). We are a nonpartisan, and non-profit, think tank that focuses solely on federal lending and insurance activities. You can find out more at www.coffi.org.

We have carved out a role in educating policymakers, journalists, and the public about issues surrounding these critically important institutions.

Douglas J. Elliott is the president and founder of the Center On Federal Financial Institutions.

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We largely avoid advocacy of policy positions because we believe this would risk alienating some policymakers who would otherwise benefit from a greater understanding of how these institutions actually work. We are still at the phase of explaining that if you push this button, certain things will happen, and if you pull that lever, other things will happen. I will be a bit more opinionated than that today, secure in the knowledge that this audience does not need basic points elucidated and hopeful that you will accept our political neutrality. You can do so in some confidence.

For example, the *New York Times* referred to our material as being “without a hint of dogma or advocacy” as well as “refreshingly understandable.” Naturally, the opinions I express today are my own and not those of COFFI.

I apologize if I seem to be more of a “man with a mission” than the methodical, intellectual economists who are making the other presentations. I believe three things passionately:

- **Federal financial institutions are extremely important in the lives of tens of millions of Americans.** \$1.4 trillion of credit and over \$7 trillion of insurance make a big difference, for good and ill, especially given the focus of the programs on policy issues important to our country.
- **These institutions do great good when run well and great harm when run badly.**
- **Our nation needs your help.** Some of the most brilliant minds in this country are here as speakers, and everyone here is involved in setting the terms for public policy or in executing those policies. The rest of my talk will center on issues that I believe deserve your attention.

THE IMPORTANCE OF THE PLUMBER

To put my chosen focus in a broader context, I would like to propose a metaphor, borrowed from Bob Litan, one of my Board members and a fellow speaker here. I am here as a plumber, devoted to managing the massive liquidity that

is at the disposal of the federal government and is directed toward so many policy goals. The other speakers are the scientists and visionary engineers who show us what can be done. I am grateful for their important work, but sometimes it seems that we collectively neglect the simpler things that actually keep the fluids going where we want them to go. Yet, we all know how bad things can get when the plumbing breaks and we know the feeling of helplessness when the water will not come out of the tap.

Economists and political scientists have written great analyses examining the circumstances under which the federal government might usefully be in the business of lending money or insuring risks. This research matters a great deal because it is an important factor in framing how policymakers think about proposed new federal financial institutions. It helps filter out bad ideas and encourages good ones, although it will always be true that political considerations are likely to play the predominant role in the final decisions. I applaud the previous research, and I would encourage more.

LIKE DIAMONDS, FEDERAL FINANCIAL INSTITUTIONS ARE FOREVER

However, my primary interest lies at a different level, beneath the existential questions of whether these institutions should be here. The federal government has a long history as a lender and insurer, and there is no sign that this is going to change. If anything, concerns about the federal budget deficit are likely to encourage an expansion of these programs. Lending and insurance programs allow politicians to throw out multibillion dollar figures for the volume of good their proposals will provide, without having the budget cost approach those levels. This is especially true if politicians use overly optimistic figures for the proportion of borrowers who will actually pay the loans back or the proportion of insureds who will submit claims. There are not a lot of other areas in the government where you can propose a program that directs \$10 billion to some sector and claim at the same time that it will directly make

money for the government, at least not areas where the budget scoring might back you up.

Even if new programs are not introduced, it is a very rare occasion when an existing federal financial institution slides off into the sunset. Doubtless, this is sometimes because the underlying need remains, but in other cases it is probably more a function of the creation of constituencies who come to value an existing program. Politicians are very aware that it is much easier to withhold something in the first place than it is to take something back.

So it seems that the federal government is likely to remain a massive lender and insurer indefinitely. Given this, it behooves us to make sure that these financial institutions are run well. Notice my constant references to “financial institutions.” I strongly believe that one of the underlying reasons for financial crises and chronic underperformance at some of these institutions is that their structures were established with insufficient regard for how they would function as a financial institution. There is a strong tendency in Washington to focus on the grander policy issues, such as ensuring access to a college education, and to assume that creating a financial institution will naturally follow in an optimal manner. Therefore, the pension insurance system was designed by pension experts, student lending by education experts, etc. Of course, the specific policy expertise is critical, but it needs to be leavened with an understanding of financial institutions. Otherwise bad things can, and do, happen.

Most of the key issues to be discussed fall into one of four categories: structure, budget rules, human resources, and management tools.

STRUCTURE

The failure to think about programs as financial institutions can be very harmful if it results in a flawed structure.

Federal Communications Commission Spectrum Auction

An extreme example of this is the Federal Communications Commission (FCC) spectrum auction that occurred in the midst of the late,

lamented bubble. The federal government determined that parts of the radio spectrum could be turned over to the private sector and that the most effective way to do this was through an auction. This may have been an excellent general idea, but appended to it was an egregious flaw. Congress wished to ensure that smaller businesses and minorities not be locked out of the bidding because of difficulty in finding up-front funding. Again, in itself this may have been a very laudable goal. However, almost as an afterthought, it was determined that the FCC should agree to accept installment payments from small and minority-owned businesses that met certain criteria.

What this meant was that the FCC, with no previous experience as a lender, was now going to effectively lend certain bidders the money to buy the spectrum they desired. Thus, Congress set up a multibillion dollar lending operation from scratch and without much consideration of the optimal structure. The actual structure contained many risky features:

- **The borrowers generally were betting the success of their companies on the use of their particular spectrum.** Therefore, the program’s role basically was to provide project finance, which is riskier than general lending.
- **There was little lending expertise at the FCC.**
- **Borrowers were targeted based on their likely difficulty in attracting private finance.**
- **There was little requirement for equity to exist at the bidding firms, but installments were priced as if they were true loans.** Every smart lender knows that calling something a “loan” is much less important in reducing risk than ensuring that someone else takes the first loss. Many a project has been pitched to lenders as “borrowing,” when it is apparent that the risk is basically equity risk and should have been priced that way.

I should stress that it was not necessarily wrong to set up a program that took on certain of

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these risks, particularly lending to borrowers with market-access problems. It is the combination of these structural risks that compounded to dangerous levels.

The results were sadly predictable. The bubble burst after the auctions were completed but before most of the installment payments were made. This might not have mattered as much if the FCC's new unit had nailed down the ability to take back spectrums. There would have been an opportunity cost from reselling spectrum under less propitious market conditions, but this still would have provided substantial recoveries. Instead, companies that collapsed have been able to retain control of their spectrum in bankruptcy, leaving the federal government as one more unhappy creditor.

Proper thought given to this program as a financial institution would undoubtedly have raised questions that would have led to a superior structure. I know that the Office of Management and Budget raised objections to the approach that was ultimately followed, but various political and bureaucratic issues trumped their logic.

Pension Benefit Guaranty Corporation

Another example of a failure to focus on the nature of an entity as a financial institution is the Pension Benefit Guaranty Corporation (PBGC). This is a less clearcut example in some ways, since there was considerable discussion of certain insurance principles from the beginning, including the need to have some risk remain with employees and retirees in order to reduce moral-hazard issues. Yet, the outcome was still to design an insurer with structural risks, including the following:

- **No ability to choose clients.** All corporate pension funds with certain minimal characteristics were insured.
- **Overall price levels were fixed on an ad hoc basis.** I'm told that, back in 1974, the pension insurance premium was going to be set at 50 cents per participant per year, based on a study of historical losses that did not take into account likely changes in behavior once there was a federal insurer. In the end, it was bumped up to a dollar per participant because an important senator

just thought that it was worth having a margin for error and that a round dollar sounded right. It is hard to imagine this kind of ad hoc decision, or the earlier mentioned structural problems, if the establishment of a federal financial institution were seen as more than an ancillary activity.

- **Prices initially did not vary with risk levels and still have only a loose relationship to risk.**
- **No meaningful regulatory authority.** Regulatory power often substitutes for the lack of an ability to choose whether to take a client and how much to charge. Mandating certain operational and financial standards can reduce risks to levels more appropriate to the premiums charged. Private sector banks do this by insisting on loan covenants that give them great leverage if a company deteriorates too far. The Employee Retirement Income Security Act does set down certain standards of behavior for pension funds, but the regulatory power is at the Department of Labor and the Internal Revenue Service, not the PBGC.
- **Little authority to negotiate workouts with troubled insureds.** Private lenders naturally prefer not to lend to firms that will become troubled, but they recognize that concessions are often necessary when a company does fall on hard times. More-lenient terms are combined with tough requirements to fix operating and financial problems. The PBGC's ability to effectively negotiate such a workout is very limited.

As with the FCC example, let me stress that structural issues must be looked at in combination. Sometimes a structural risk is justified by other policy objectives but becomes excessively dangerous in tandem with another risk.

THE NEED FOR NEW "COMMANDMENTS"

It would be a real step forward if we could persuade Congress to establish a statutory require-

ment that any new federal financial institution must have a business plan that addresses a number of key structural issues. Admittedly, it would be difficult to enforce quality standards for these business plans, but bureaucrats and politicians do not like writing things down that will sound stupid later. Putting words on paper and having them reviewed can often help avoid the worst potential problems. By the way, I do not mean to suggest that the private sector is any better when dealing with seemingly peripheral issues where no one is reviewing the thinking. Having worked on Wall Street for almost 20 years, I have heard a lot of stupid ideas. It's just that private financial institutions and markets have many built-in checks that cause most ideas to be reviewed by people with a monetary stake in the outcome.

The Office of Management and Budget (OMB) generally opines already on the creation or significant revision of federal financial institutions. However, statutory authority would significantly increase their institutional ability to resist bad structures. Besides, the OMB is stretched thin and it would be better to eliminate many of the bad ideas before they reach that agency, to minimize the chance that some will slip through. I do not mean to neglect the role of the Congressional research arms, such as the Government Accountability Office, the Congressional Budget Office, and the Congressional Research Service. However, they also have serious resource and institutional constraints that limit their ability to completely filter out bad structural ideas.

Let me say again that I understand that politics, in a democratic system, always has the potential to overcome financial expertise—and sometimes even common sense. However, I also believe that a systematic discipline can avoid many errors. A happy example of this is the Federal Credit Reform Act of 1990, the budget rules that have guided federal lending activity for over a decade.

Budget Rules

Budget rules are a very powerful way of influencing behavior in any large organization, especially one with few binding external constraints. Prior to the implementation of the Act in 1992,

federal credit programs faced the same budget rules as other federal programs. If a dollar of cash went out as a loan, it looked on the budget pretty much the same as if a grant were made with that dollar or part of a weapons system were bought. Similarly, receiving a dollar in repayment had the same effect as collecting a dollar in taxes or user fees. Needless to say, this simplistic approach created major distortions in government decision-making because lending is a multiyear activity that needs to be viewed that way. The practical problems often stemmed from the strong political incentives to minimize budget costs in the near-term, particularly the first year, even if long-term costs were increased. Three distortions stand out:

- **There was a significant disincentive to expand even worthy direct loan programs.** The new outlays would hit the budget in the politically critical first year, whereas the offsetting repayments would be years in the future. It is interesting to remember that President Johnson first sold part of Fannie Mae to the private sector partly to take the growing program off-budget. Whether that was a good or a bad decision, it was too important to be decided as a result of bad budget rules.
- **Incentives existed to destroy economic value by taking certain actions that raised a great deal of cash up-front.** For instance, packaging government loans together and selling them to the private sector at a distinct economic loss would still reduce the near-term budget deficit by bringing in cash. This is not to say that loan sales were necessarily uneconomical, but rather to point out a structural bias.
- **Cash budgeting heavily tilted the playing field in favor of loan guarantees, even when direct loans made more programmatic sense.** Loan guarantees were essentially costless in their first year, since defaults rarely occur that quickly. They could even show an initial profit if there were an upfront guarantee fee that more than covered administrative expenses.

A related structural problem stemmed from the use of “revolving funds” as the basis for many loan programs. Congress would start a program with an appropriation to its revolving fund, which would be used to fund loans. Loan repayments and interest went back into the revolving fund and could be lent out again, without further Congressional action. Many advocates of credit reform felt that this excessively limited Congressional scrutiny and control of loan programs.

The Federal Credit Reform Act completely changed the rules, in an attempt to level the playing field between loans, guarantees, credit insurance, and grants. A projection is made of future cash flows for each year of new credit authority. These cash flows are then discounted back at the zero coupon government borrowing rate for bonds maturing in the same year as the cash flow. The net present value shows up as a subsidy expense on the budget, assuming the value of outflows exceeds that of inflows. If the inflows are worth more, then a negative subsidy is shown, equivalent to revenue dollars from other sources. It is worth noting that administrative expenses are not included in the subsidy calculations but continue to be budgeted on an annual cash basis. Congress has been reluctant to give up specific control over administrative costs.

There is a strong consensus among budget experts that the Federal Credit Reform Act has improved decisionmaking, as would be expected. There is always room for gamesmanship in any budgeting process, as well as room for ignorance and misunderstanding, but this law clearly acts as a restraint on bad decisions and as a subtle encouragement for good ones.

Nonetheless, this is an area to which I would like to devote a considerable part of my time here today because there are a number of practical questions for which we could use the help of top economic thinkers. Some of these questions may seem to have obvious answers, but that is precisely my larger point. There is often a great lag between advances in economic thinking and when these concepts become part of the policymaking process. Indeed, it may sometimes seem as if there is a disconnect rather than simply a time lag. We need help making the case for sound economics and

well-considered thinking on how answers that were formulated primarily for private financial institutions may need to be modified for the public sector. This latter point is important because many in Washington assume that answers developed for private sector institutions are not likely to be valid in the public sector. They are sometimes right in that concern, and so our analysis needs to consider that factor.

Discount Rates and Floating-Rate Loans

Let me start with what seems like an easy question. What discount rate should we use for a floating-rate loan made by the government? The Federal Credit Reform Act indicates that the “effective maturity” should be used in determining the appropriate discount rate. This has generally been interpreted, in the traditional sense of maturity, as being the point in time when the money is repaid. The student loan programs are the main federal credit programs that use floating-rate loans, and the final maturity on these loans tends to be about 10 years, although it varies considerably. The lending rate is based on a 91-day Treasury-bill rate but is reset only once per year, not every quarter. Currently, this is scored for budget purposes in the same way—as if there were a series of payments based on a fixed rate. That is, the principal and interest payments expected in year one are discounted with a 1-year T-bill rate, the second year’s payments with a 2-year rate, etc. (We will return later to the question of whether the government’s cost of funds should be used, as it is now, or whether a risk-adjusted rate would be more appropriate.)

This has raised the analytical question as to whether it would be more appropriate to use a discount rate based on short-term interest rates rather than using a rate based on the final maturity of the loan. There was little or no discussion in Congress of this issue when the Federal Credit Reform Act of 1990 was passed, in part because there were no significant floating-rate lending programs at that point. (Student loans were still offered on a fixed-rate basis at that time.) There has been discussion of this issue periodically since then, including in the early days of the Direct Lending program, but no changes have been made.

Let me lay out the case for changing the approach. As noted above, Congress has chosen to use the government's cost of funds as the basis for the discount rates. Congress further chose to define the cost of funds not as the actual borrowing rate experienced by the Treasury Department for a particular program, but as the borrowing rate that eliminated any interest rate risk on a fixed-rate loan. That is, the rate on a 10-year government borrowing is used as the discount rate for a payment 10 years in the future, even if the likelihood is that the Treasury Department would finance the 10 years through a series of shorter-term borrowings that were rolled over. Regulators, financial markets, and financial economists agree that this is the least-risky way to finance a future payment.

Similar logic would suggest that the least-risky way to finance a floating-rate lending program would be to borrow at a floating rate with similar characteristics. That is, funding the student loan program through 91-day T-bills would produce future interest costs that would most closely match the expected interest receipts. (The most precise match would have to take account of the fact that the rate is a 91-day rate but is only reset once per year. The best fit might therefore be an instrument a bit longer than the 91-day T-bill, although not as long as the 1-year T-bill.)

This funding pattern might not intuitively seem to be the least-risky choice, since the cost of funds would be considerably more variable than locking in a 10-year fixed rate. However, this looks at only one-half of the equation. Congress presumably cares about the net cost of the program, which is determined by the *difference* between the lending rate and the cost of funds. This difference is highly volatile today because the 10-year bond rate can move significantly differently from the 91-day T-bill rate. Using the same rate for both would eliminate this source of volatility.

Congress appears to make decisions as if the discount rate were the actual underlying cost of funds. On that basis, evaluating the floating-rate student loan program by using a 10-year fixed rate is equivalent to a private lender borrowing long term and lending short term. Lenders sometimes do this for pieces of their overall portfolio as an

explicit interest rate bet, but it is considered irresponsible if applied as a consistent strategy to the whole firm.

For a private lender, this mismatch would produce major swings in profitability. For the government, the mismatch between the basis for determining the discount rate and the interest rate paid by students has produced similar oscillations in the budget cost of student lending. These swings could be dampened sharply by eliminating the artificial mismatch in the federal budget.

A friend of mine who is a respected financial economist believes strongly that a floating rate would be more appropriate economically, but is frustrated in proving this to policymakers because there is so little written on the subject. The problem seems too simple for a research journal, given that this question is a settled one for private sector firms, even though it is important and not settled in the real policy world. We could use your help in showing that the private sector analysis applies here, or that it needs to be modified, or even that the current budgeting approach is actually right for reasons unique to government budgeting.

The issue of using a floating discount rate has important real-world implications. Switching to its use would likely trigger two policy changes, assuming normal yield curves prevail. First, it would tend to be more favorable to direct lending by the federal government, in comparison with guaranteed lending by the private sector, than is true under today's rules. The direct loan program experiences upfront cash outflows when the government makes a loan, which are offset by receipts spread over many years. In contrast, the guaranteed loan program has payments and receipts that are more mixed over time. This timing differential makes the direct loan program much more sensitive to discount rates than is the guaranteed loan program. This provides two disincentives for direct lending: (i) The average long-term discount rate is likely higher than a floating rate would be and (ii) current rules create the mismatch that I described, resulting in budget volatility. Congress does not like volatility of budget costs any more than private sector firms like volatile profits. The other major effect would be to lower the average budget cost of student

loans, again assuming a normal yield curve. This would likely result in the authorization of higher volumes of lending.

Discount Rates and Risk Adjustments

The second question that I will highlight may also seem simple, depending on your viewpoint, but has even greater implications for federal lending. Should the federal government use a discount rate that reflects the uncertainty of future cash flows from a lending program? Congress made the decision in 1990 to base the discount rate on the federal government's cost of funds rather than on a risk-adjusted basis. Unlike the floating-rate question, there was a great deal of discussion on this point, to which I may not do full justice, as I was not involved in the debate.

The arguments for a risk-adjusted rate were largely modeled on the arguments that have prevailed in economic analysis of private sector financial institutions. Essentially, debt and equity investors are risk-averse and therefore require a higher return from activities that have uncertain future cash flows. This is captured with discount rates by using a higher discount rate for riskier expected cash flows. A variation of this argument that focuses on the allocation of public resources suggests that if the interest rate for all borrowers is held constant in a lending program, more value is being provided to a high-risk borrower than to a low-risk borrower, if for no other reason than that their private sector alternative borrowing rate would be higher. This is useful to know for two reasons. First, it is desirable to keep track of where we are allocating valuable resources. Second, the value to the recipient means that there is an opportunity cost to the government in failing to charge the full amount that the borrower would be willing to pay and this opportunity cost varies with the riskiness of the borrower.

The theoretical arguments for using a government rate include the contention that the government is an entity with an almost infinite ability to spread costs over time and across large numbers of taxpayers and wide ranges of activities. This diversification ability is so wide that the uncertainty of any particular cash flow is insignificant and therefore there need be no extra charge.

Essentially, everything will average out without creating problems.

A counter to this argument is that taxpayers, like shareholders, are the holders of residual risk. Taxpayers may indeed be comfortable ignoring unsystematic risk, but should wish to be paid for systematic risk, such as the business cycle risk inherent in Small Business Administration (SBA) loans. Arguments that taxpayers should not care about lending risk would therefore hold up only if they would work equally well if we were talking about shareholders in an analogous situation.

Another argument in favor of using government borrowing rates hinges on the contention that there is a difference between a budget and an economic analysis. This has two variations. First, if we view budgeting as more of an accounting exercise, then it is the borrowing rates of the government that matter, not the theoretical costs. The further argument is that these borrowing rates are not much affected by the volatility of cash flows. Second, some argue that it is more important to avoid budgeting gamesmanship by using a rate we can all look up than it is to get the precisely right economic rate.

There are big implications for public policy, and for politics, that depend on the outcome of this debate. Use of risk-adjusted rates would tend to lower the amount of federal credit activity because any risk-adjusted rate would be higher than the government's cost of borrowing. Every credit program would, by definition, have a higher budget cost or a lower benefit. This point was certainly not lost on the politicians who ultimately decided what to put into the Federal Credit Reform Act, and I am morally certain that it was a major underlying reason for the choice of the government's borrowing rate as the discount rate.

The other effect of changing to a risk-adjusted discount rate could well be to decrease the political attractiveness of lending to higher-risk borrowers, unless interest rates on the loans themselves were also increased. I should note that riskier borrowers already have a higher budget cost because the best estimate of their credit defaults is above that for other borrowers. However, use of an increased discount rate would add to this difference.

Cost-Benefit Analyses

Intertwined with questions concerning optimal budget rules is a need for good measures of lending effectiveness. These will probably vary with the underlying policy issue addressed by the lending program, but perhaps we can find a few common metrics. I am sure there are whole textbooks on cost-benefit analysis that could be consulted, but one of the keys to dealing effectively with policymakers is to find measurements that are simple and intuitively appealing. (Again, I'm not sure this is that different in the private sector. I did much better with CEO's and top officials of insurers and banks when I could show them the likely effect of an action on a simple metric, like return on assets, than when I tried to get much fancier.)

I have been wrestling with appropriate metrics relating to the SBA. Currently, there is a disconnect between what policymakers give as the reasons for the existence of the SBA and the measures that politicians use in practice. Many who defend the SBA on policy grounds point to perceived market failures that channel too little money to minorities and to high-risk ventures that could have major positive externalities—the next Google, for example. In essence, they see private sector lending as having a tendency to play it too safe, whether that is an actual difference of risk or one produced by discriminatory perceptions.

Unfortunately, politicians seem to impose a combination of two metrics that produces the same result within the SBA. They want as high a lending volume as possible at as low a budget cost as possible. Ideally, each of their constituents would borrow \$10,000, but the budget cost would be zero. There is a way to maximize this combined objective: lend large volumes, but only to businesses that clearly have the resources to pay the SBA back. Unfortunately, minority businesses and high-risk ventures are not likely to fall into these categories. Some minority businesses would qualify as low risk, but discrimination in our society produces risks that disproportionately handicap these businesses. After all, the very reason that policymakers want the SBA to focus on minorities is because they have more trouble

getting financing from conventional sources. Lack of access to private market funds is itself a risk factor because a future cash need could arise that the SBA could not or would not be willing to fill.

What we need is a way to measure either the net gain to society from allocating resources to deserving borrowers who were not getting them, or at least a way to measure the benefit to the borrowers in terms of greater access or lower cost. We may not really need an SBA if all it is going to do is to lend at a few basis points less than borrowers would have paid for money they could have obtained without the SBA.

It may be that the only answer is a full-fledged cost-benefit analysis of some kind, but it would be very helpful if there were a simple way of approximating the same result. Simple measures, even if crude, can be preferable in some circumstances.

I have focused here on the SBA, but the same types of questions can be raised for any lending program where there is a measure of choice in who receives a loan or where there is a question as to whether to add a category of borrowers. It is a less pressing issue with student loans or other programs that take all comers who meet a fairly wide set of criteria.

Simplifying Models and Data Requirements

This leads me naturally to another general question. Is there a way to simplify some of the more advanced techniques so that data estimation and input problems do not overwhelm the theoretical advantages? There is always a practical tension in modeling between the desire to incorporate greater realism through additional variables, and a finer division of categories and time periods, versus the need to strive for an elegant simplicity. For the first years after passage of the Federal Credit Reform Act, the big modeling issues seemed to involve persuading agencies to make the commitment to model in sufficient detail and to capture the data necessary for the basic analysis.

I have started to sense that some government departments have now overshot in the other direction, adding more variables because they can rather than because they make a significant differ-

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ence. This strikes me as a particular temptation in a bureaucracy, private or public, for at least two reasons. First, it is safer to be able to say that a variable has been taken into account than it is to argue that it is not important. Second, there is an advantage sometimes in having a model so complicated that no one can dispute your conclusions. Clarity may not always be seen as a virtue.

This temptation probably cannot be eliminated, but it may be that economists can help us focus on some key variables that ought to be considered or statistical techniques that would help us capture the essence of a financial institution.

Budgeting for Insurance Programs

Perhaps I have already been in Washington too long, but I would now like to expand my empire beyond my stated mandate of federal credit programs by talking a little about federal insurance activities. The big theoretical question is, How can we improve federal budgeting for insurance programs? There was a plan to follow up the Federal Credit Reform Act of 1990 by expanding the concepts to include insurance. This fell through, and we have continued to use the current inadequate system of cash budgeting.

Cash budgeting for insurance activities is a disaster, in my opinion. Let me give you two examples.

PBGC. Exhibit A is the PBGC. At last count, it was \$23 billion in the hole and digging deeper every day, according to generally accepted accounting principles (GAAP), which appear to reflect the PBGC's economics quite well. However, the cumulative effect of the PBGC on the federal budget, since it came on-budget in the early 1980s, is a \$12 billion contribution to deficit reduction. There is a \$35 billion difference between these two numbers, and they have opposite signs.

Here's how it happened. The federal budget essentially treats the PBGC as if it were two entities. There is an on-budget revolving fund that takes in all premiums and earns investment income on those premiums. There is an off-budget quasi-trust fund that represents all of the assets taken over from failed pension funds and the investment earnings on those assets. Pension

payouts come partially from the revolving fund and partially from the quasi-trust. The proportion is based on the original funding ratio of the pension plan for which the check is being paid. If a company's plan was 60 percent covered by its assets when the PBGC took over, then 60 percent of the pension checks paid out for their retirees come from the quasi-trust and the rest from the revolving fund. Other expenses are split on a formula basis that is managed so that almost all expenses are covered from the off-budget quasi-trust and do not contribute to the federal deficit.

Pension payments are very long-term obligations, so the PBGC is collecting large premiums now to build up a reserve to eventually pay all of the pensions for the claims it has taken on. This means that for many years the cash inflows from these premiums have more than offset the early years of pension payments.

The PBGC's excellent GAAP reporting has helped to highlight its problems and is one of the reasons why Congress is close to acting to reduce the ultimate problem by increasing premiums and forcing higher levels of pension funding. However, I firmly believe that, if the PBGC's effect on the federal budget had shown the same pattern of increasing GAAP deficits, there would have been action earlier. It was around April Fool's Day only last year that Congress actually loosened funding requirements by raising the discount rate used for funding calculations and allowing airlines and steel companies to put in only 20 percent of their annual minimum required contributions. If this had been seen to raise the short-term risk of a significant hit to the budget, there might have been a more serious examination of the desirability of the funding changes. Perhaps it was the right public policy outcome or perhaps politics would have forced it through even if it were not, but at least the issues would have been addressed.

Flood Insurance. Flood insurance is another example of the perils of cash accounting for insurance. The National Flood Insurance Program (NFIP) is the only flood insurance provider for most homes in flood-prone areas. Premiums are deliberately subsidized for older structures, so that about a quarter of all flood insurance policies are charged a rate roughly 40 percent of the best

actuarial estimates. My calculations from the insurer's actuarial review suggest that the subsidy amounted to \$1.3 billion last year. The other three-quarters of the structures, mostly newer, are charged actuarially derived rates that are intended to cover the expected cost of all future flood events, including the most catastrophic. For comparison, total premiums for the program amounted to \$2 billion last year, so the subsidy rate for the entire program would be over one-third on an economic basis, despite the fact that many subprograms bear no subsidy at all.

It happens that, until this year, the flood insurance program was lucky enough not to have suffered the kind of massive flooding that resulted from Hurricane Katrina or even something a notch or two smaller but still huge. Thus, the NFIP could proclaim that it charged sufficient premiums to pay for a "historical average loss year," even though it also stated that there were substantial subsidies to one group and that the other group paid actuarially fair rates (which implies no overpayment to make up for the subsidies on the other group). It also proudly reported that since the early 1980s it had never been a drain on the taxpayer, except for three borrowings that it had paid back with interest.

There is something wrong when a government agency can be explicitly subsidizing premiums by \$1.3 billion while presenting itself as being break-even and no drain on the taxpayer. Obviously, the circle is squared by the fact that insurers against catastrophic losses who charge actuarially fair premiums make money 9 years out of 10 and lose most of it back in the 10th year. In the NFIP's case, it was more like 34 years out of 35, but this current, 35th year is a doozy. Hurricane Katrina will cost the program \$23 billion, compared with a figure of \$14 billion for all previous claims since inception in 1969, not adjusted for inflation. This far exceeds the program's capacity to pay and will certainly come principally from taxpayers.

"Credit Reform" for Insurance

There seems to be a fairly strong consensus among budget policy analysts that there does need to be an equivalent to the Federal Credit Reform Act for federal insurance activities. However,

there is also concern for how to design such a system so that it precludes an excessive level of gamesmanship. I have spoken with prominent budget experts who would be very scared to let agencies start using probability analysis with relatively unpredictable insurance risks. What should one do about terrorism risk insurance, for example? Private insurers argue strongly that the risk is uninsurable in the first place partly because it is too difficult to ascribe probabilities to potential attacks. Do we want government agencies trying this at home?

My own view is consistent with a comment from Lord Keynes, which I will paraphrase, "a bad measurement on sound principles is better than no measurement at all." We effectively use measurements at or close to zero for these events now. It seems sounder and more conservative to use a positive, probabilistic estimate.

If we had adopted this approach earlier, the debate about the last loosening of pension funding rules would have required a discussion of the probable loss to the PBGC. Congress could always have fudged the analysis, but I would much rather have a standard set of rules that made some sense and force them to be explicitly overridden if politics intervenes. I want inertia to be our friend, not our enemy, because there is certainly enough of it around, and not just in the public sector.

The flood insurance numbers would even more certainly have been accurate. The data is already there, as I noted, in the actuarial review and much of it is based on technical, engineering estimates. Good budgeting would have highlighted the figure rather than obscured it.

To repeat, a budget reform act for federal insurance programs would be very helpful. The economics profession could do a real public service by helping to shape the principles under which such an act would operate and to raise the visibility of the issue so that policymakers will view it as a priority.

It may be worth underlining the obvious, which is that there will be political opposition. Right now the budget costs appear lower than the economic costs would be. Every decade or so the costs shoot up as a catastrophe hits, but that, as we are seeing once again, is the easiest time to

get funding. It is politically easiest to have low costs for the large majority of years and shockingly high costs in the occasional year that you can blame on Mother Nature.

PEOPLE AND TOOLS

I started this talk with a focus on overall structural issues for federal financial institutions and then segued to budgeting issues. Structure and budget together carry a very heavy weight of responsibility for the success of any public institution, especially in the absence of a private financial market to provide another kind of discipline. However, there is more to running a financial institution than this. It takes people and it takes tools to make the institutions run.

Human Resources

Unfortunately, there are some human resources issues that are important but difficult to resolve. The most basic is that government service is considerably less lucrative than working for a private sector financial institution. Many arms of government face this difficulty, but it is particularly acute for the federal financial institutions, simply because similar skills fetch so much more in the private sector.

This problem is not unique to the public sector. The rating agencies, for example, need employees with excellent finance skills, but are not in a position to pay as much as investment banks or the more sophisticated commercial banks. The solution they have developed is to find ways to retain a relatively small senior staff, who can maintain the culture and quality standards, while organizing the rest of the work so that it can be performed by younger analysts who will remain for a few years at a time. The rating agencies end up serving as one of the training grounds for budding bankers and equities analysts.

Government financial institutions can often obtain quite talented staff for positions with real prestige and authority, but only with the implicit understanding that the new hire will probably only stay for two years and then move to the private sector to exploit their government experience

and new connections. This biennial pattern is so common that it is sometimes referred to as a “Mormon Mission,” since most adult males in that church go off for two-year missionary stints once in their life.

This turnover is an issue, but the more difficult problem is probably at the levels starting just below these more prestigious positions. There is a real need for financial sophistication, but it is not structurally easy to provide the requisite training and it is even harder to retain employees once they have those valuable skills.

We could use the advice of labor economists on this one. I have wondered if it would be beneficial to have a Certificate in Government Financial Institutions Management that would require a specific set of training, but would entitle employees to higher pay. Congress is very leery of increasing pay, but is more likely to be convinced by a pay-for-skills trade-off than by a simple increase for financial institutions employees. Government doctors and certain employees of bank regulatory agencies have higher compensation limits, so there is some scope for adjustment.

Management Tools

There is also a problem that most federal financial institutions have too low a ratio of capital to labor. This is a serious deficiency because there has been a whole revolution in the financial services industry in the private sector in the last couple of decades. Much more information is now collected on each borrower, and loan and statistical techniques have been honed to understand how to market, price, and manage loans. Management systems have evolved to ensure every advantage is wrung from this greater understanding.

Unfortunately, Congress persists in viewing administrative expenses as a bad thing, rather than considering what the best trade-off might be between expenses and total profit or loss. Switching to the insurance side for a moment, many of the private property-casualty insurers that I have admired most have focused on intensive, and expensive, underwriting and management. They have accepted higher expense ratios, recognizing that the more important ratio was

the loss ratio, which can be reduced by careful client selection and pricing.

Once again, by the way, there is a budget process issue that exacerbates the basic problem. The net-present-value calculations that I described earlier for calculating the budget effects of federal lending activity explicitly do not include administrative expenses. Congress wished to maintain its control of the annual appropriations process for expenses rather than having future expenses be projected as part of the net-present-value calculations. As a result, investments in systems that should reduce future expenses still show up as a hit to the budget deficit now, without any immediate benefit from the expected future savings.

The unwillingness to invest in systems may be a chicken and egg type problem, since I understand that many of the computer systems that were supposed to bring government departments into modernity have instead cost large sums of money to little purpose. Nonetheless, I believe that appropriate software and management tools must be brought into the federal financial institutions, even if the transition is at times a painful one.

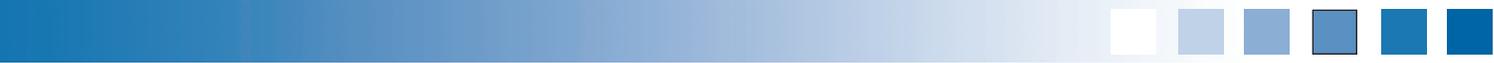
CONCLUSIONS

My summation will be brief.

- Federal financial institutions are extremely important.
- Not enough attention is paid to them.

- Too much of the advice policymakers receive comes from vested interests and too little from objective sources.
- Developing clear answers to a series of analytical questions would provide firmer guidance to those policymakers and reduce policy errors.
- We all need to help. Theorists can focus on answering those questions that are genuinely open and on explaining the answers to those that are known. Practitioners can redouble their efforts to apply sound principles to specific issues. Both groups need to talk more to the other.
- Finally, I highly recommend www.coffi.org. We welcome your suggestions as to how we can be more helpful to policymakers, journalists, and the interested public.

Thank you very much.



Commentary

George J. Benston

Douglas Elliott (2006) begins his discussion of some important issues concerning how federal government financing and insurance programs should be structured by assuming that these programs are here to stay. He writes (p. 260): “The federal government has a long history as a lender and insurer, and there is no sign that this is going to change. If anything, concerns about the federal budget deficit are likely to encourage an expansion of these programs.” He perceptively explains that “Lending and insurance programs allow politicians to throw out multibillion dollar figures for the volume of good their proposals will provide, without having the budget cost approach those levels. This is especially true if politicians use overly optimistic figures for the proportion of borrowers who will actually pay the loans back or the proportion of insureds who will submit claims.” Having presented both the fact of the programs and reasons why they are attractive to legislators, Elliott turns from a positive (or descriptive, albeit very brief) introduction, to the normative (or prescriptive) issues of how the programs should be structured, the budget rules that should be adopted, the human resources that should be harnessed to manage the programs efficiently, and the tools those managers should use.

Considering how much of value he has to say and the important questions he raises on how the programs should be run, it is reasonable for him to restrict his paper to normative issues. However, I suggest that the questions he raises cannot be answered successfully without first understanding

and delineating the reasons or justifications for the programs. In particular, were they established to serve a public or a special-interest benefit? The extent to which a given procedure is efficient depends on what the program is expected to achieve. For example, if a student-loan program is supposed to make it possible for poor students to attend colleges so that they can become wealthier than they otherwise would be, the interest rate charged might be a market rate. If this is the purpose of the program, an essential question is whether there is market failure—that is, why and to what extent do private sector lenders not offer such loans? Is there some legal or regulatory impediment that forecloses or restricts private sector lending? Is such lending insufficient because there is a positive (negative) externality that could effectively be achieved (alleviated) with a government program? If the purpose of the program is to benefit colleges, though, by allowing them to charge higher tuition to poor students rather than offer them scholarships and/or if the purpose is to help poor students become better educated in general because this benefits the nation, the interest rate should be below market rates for all poor students.

An understanding of the reason for specific programs also is necessary to answer Elliott’s concerns and questions of how those programs should be administered. The “law of unintended consequences” plays a particularly important role here. An example is the bidding procedure for rights to the Federal Communications Commission (FCC) spectrum that Elliott discusses.

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If the objective were to benefit smaller and minority businesses, the auction rules should be structured to give these companies an advantage. The situation he describes, where smaller businesses and minority-designated firms with little equity were awarded rights to spectra, is consistent with that objective. But, why was the contract written so that, when these firms could not pay their contractual obligations, they nevertheless could still control the spectra they were awarded? This might be an unintended outcome that was not foreseen by drafters of the legislation because of inadequate analysis. In this event, a better analysis could have avoided the situation and it could be corrected with new legislation. But, it might be that the drafters of the legislation intended to benefit particular constituents. These drafters might have known people represented by favored lobbyists and other donors to their campaigns who controlled “smaller” businesses and minority-owned companies (or companies fronted by minorities). If this were the case, the procedures adopted did what was intended.

Despite what might appear to be cynicism (or reality) on my part, I agree with Elliott that understanding the extent of a subsidy or wealth transfer would be useful to many. Legislators who sponsored the program may not have realized that it would cost as much as it does and, therefore, might move to repeal or restrict it. Or, legislators and others who do not want to favor a particular group could use these numbers to defeat or reduce the cost of financial programs, in part by appealing to citizens to vote against politicians who are shown to be misusing public resources. It would be useful, therefore, to examine the extent to which government financing and insurance programs are likely to provide public or special-interest benefits.

THE BENEFITS AND LIMITATIONS OF PRIVATE-MARKET SOLUTIONS

Benefits

It is virtually a truism (that I presume I need not describe here) that private-market solutions usually are preferable to government solutions.

This conclusion, though, is subject to five important assumptions. Note, though, that even when these assumptions obtain, the benefits from government intervention might be more than offset by the cost of inefficiencies because of the absence of a profit and loss motive. Although government agents have incentives to increase their budgets, and often to stay within their budgets, exceptional performance (above-normal profits or lower costs) rarely increases the agents’ wealth. Further, excessive losses not only do not result in the bankruptcy of their organizations and the consequent loss of their personal wealth, but may bring forth additional budget allocations to keep the programs alive. In addition, government agents may find it difficult to determine what price to charge different recipients for the services provided by their agency. Unlike privately owned organizations, they do not face competitors who tend to pick-off overcharged clients and often do not have the political ability to increase charges on underpriced clients. An example presented by Elliott is federally provided flood insurance, which undercharges owners of older structures and overcharges owners of new structures.

LIMITATIONS AND CAVEATS: THE FIVE ASSUMPTIONS

One basic assumption is that people are the best judges of what is best for them. This is not always the case. Generally, children and people of severely diminished intelligence are seen as not capable of making decisions that are in their own self interest. But, this caveat does not apply to the government programs in question.

A second assumption is that distribution of wealth is optimal (however that might be defined operationally). Of course, the citizens of a democracy may believe that the nation benefits when wealth is redistributed to bring the poorest citizens up to some level of well-being and keep the richest citizens from controlling too great a proportion of resources (even though both levels are difficult to define with much precision). In this event, given the assumption of the primacy of individual choice, direct redistribution is prefer-

able to subsidized loan and insurance programs. However, particularly when it comes to giving up some wealth for the benefit of others, people (through their elected representatives) often want those resources to be used in specific ways. Thus, they may not want the recipients to spend transferred wealth on alcohol or other drugs, but may want them to spend it on education or housing. People who give up some of their wealth also might believe that one form of transfer is more effective than another in achieving a desired outcome. For example, a loan rather than a grant to poor students may be more effective in getting them to take full advantage of their educational opportunities because they will have to repay the funds advanced. Loans also could be effective in screening out those who are pretending to be students in order to get a grant. If these are the reasons for giving students subsidized loans rather than grants, students should not be permitted to avoid repayments by declaring bankruptcy just after they leave school.¹

Third, there should be evidence of a market failure that can be effectively alleviated with a government program. For example, presumably the Small Business Administration was established because (it was alleged) established lenders (banks, in particular) employed market power to charge small businesses higher interest rates than justified by costs.² Direct or indirect loans to minority, poor, or female home buyers have often been based on the belief that private lenders are biased, perhaps as a result of bigotry or ignorance borne of limited experience, and either charge these borrowers more onerous terms or refuse to offer loans.³ But, given the situation in the United States of substantial competition among financial institutions and anti-trust laws that make cartels and agreements to fix prices illegal, there are likely

to be few market failures. Furthermore, where there are government-imposed barriers to or constraints on entry and competition, the most effective way to help consumers is to remove these restrictions rather than to establish an alternative government program.

Fourth, government programs can be justified as beneficial to the public if the government has a cost advantage over private companies. This can occur when there are economies of scale that can be achieved only by a nationwide operation. Restrictions on nationwide bank branching (which were not fully removed until 1994) exacerbated this situation. Given these constraints on the markets, mortgage financing by government-sponsored (lending) enterprises (GSEs), particularly Fannie Mae and Freddie Mac, was beneficial. Considering that this constraint is no longer present and that these GSEs are now privately owned, there is no justification for continued government support in the form of investors' expectation that the GSEs' debt is de-facto guaranteed (as shown by the interest rate the GSEs pay on that debt, even though they have low capital/asset ratios).

The interest rate that should be charged for government loans or assumed for government projects should take into account losses from defaults and poor outcomes, in the same way that private parties include these risks, assuming that government agents are as capable of assessing the risks. Considering that political considerations often play a role in determining the loans and projects that are made by government agencies and that these considerations are likely to result in higher losses, the applicable interest or discount rate should be greater than that employed in private transactions.

The government discount rate should mimic the private discount rate and take into account timing as well as the amount of the net cash flows expected to be generated from the loan or project. Like the private loan rate, the government rate should include an additional "systematic risk" premium that is similar to the premium on high-beta stocks. Loans have higher payouts (less loss due to default) in good times, when returns on other assets are high, and lower payouts when times are bad, when returns on other assets are

¹ Indeed, this is the situation now. However, it has a possibly unintended consequence, in that it gives purveyors of worthless occupationally directed "education" programs strong incentives to oversell their programs to gullible, often poor, people seeking to better their situations.

² An earlier study, though, found that 75 percent of the difference in rates on smaller loans is explained by higher marginal operating costs per loan (Benston, 1964).

³ Empirical studies, though, do not support this belief (Benston, 1999).

low. Because of this positive covariation, loans are less desirable compared with assets that covary negatively with economic conditions—hence the systematic-risk premium.⁴

Furthermore, it should be noted that lower observed interest rates on state and municipal obligations result from the exemption from income taxation of the interest. Hence, the lower interest rate on these obligations is not a net benefit to the public but simply a transfer of wealth among taxpayers.

The fifth basic assumption is that the government programs reduce negative externalities (such as pollution) or enhance positive externalities (such as research by professors), net of costs. Student loans might achieve a positive externality to the extent that it would be detrimental to the nation if some people would otherwise not be able to use their talents effectively. An educated public might also be seen as necessary or at least desirable for democracy and a well-functioning modern economy.

To summarize, government-sponsored or -supported finance and insurance programs might achieve some public benefits. These programs could be effective for encouraging specific behavior among recipients that voters (or their representatives) favor, such as education and homeownership. However, there are likely to be both honest and dishonest (that is, actually self-serving) disagreements as to which people or programs should be subsidized. Government could provide financing or insurance where there is a market failure. However, I believe that this rationale is of doubtful validity, particularly in the Internet age, when those who want financing or insurance can readily find and be contacted by many private suppliers. Finally, there are few negative externalities that I can think of related to finance and insurance. Nor are there many positive externalities.

If my conclusions are correct, government finance and insurance programs primarily serve to enhance special interests. As Elliott points out, these programs offer legislators the substantial

advantage of shifting public resources to favored individuals, groups, and organizations at what appears to be a smaller cost to taxpayers than direct subsidies. Furthermore, as he also points out, the cost of government-provided loans or loan guarantees and of insurance tends to be understated in the budget. As he puts it so well (pp. 260-61), “There are not a lot of other areas in the government where you can propose a program that directs \$10 billion to some sector and claim at the same time that it will directly make money for the government, at least not in areas where the budget scoring might back you up.”

SPECIAL-INTEREST BENEFITS FROM GOVERNMENT LOAN AND INSURANCE PROGRAMS

Two types of special-interest benefits should be distinguished. One that I believe most people would support (other than those that give rise to net public benefits, as discussed earlier) is a program that offsets costs imposed by other government actions or inactions or “acts of God” that are seen as having a collective impact on all citizens. An example is damage from an unexpected natural disaster, such as the massive wave surge due to Hurricane Katrina that damaged properties many more miles inland than expected from previous experience. However, damage from recurrent hurricanes or likely-though-imperfectly-predicted earthquakes is expected. Private insurance could be purchased, and the cost would and should be borne by people who own properties that are at risk. Events that are extremely difficult to predict that might affect large numbers of people, though, such as extreme acts of terrorism, might justify some form of government-provided insurance.

The second type of special-interest benefit is much more common. It involves a transfer of wealth from taxpayers to favored people, groups, and organizations in the form of direct or indirect subsidies, such as lower interest rates and fees and the assumption of risks. As Elliott points out, these programs abound, in large measure because the cost to taxpayers is difficult to discern and publicize. Furthermore, when enacted they often

⁴ I am indebted to George Pennacchi for clarifying my thinking on these issues. See Chap. 4 in his forthcoming asset-pricing text when it comes out (as it surely will).

are cloaked in the mantle of “the public interest” and said to have no cost to taxpayers. Federally provided flood insurance is an example. The risk is no different from other risks that typically are insured, such as fire and wind damage. Why, then, should the federal government be involved except to transfer wealth to people who own structures and property in flood-prone areas?

Unintended Consequences

It is likely that many government lending and insurance programs were enacted to help a particular group or sector of the economy that people in general want to help. For example, given the past history of racial and gender discrimination in the United States, I believe that most people are in favor of, or at least not strongly opposed to, helping minorities and women get financing to start new businesses. A perhaps romantic sympathy for small farmers probably has motivated people to support farm-loan programs. (The initial questions, though, should be whether, why, and to what extent loans are not available from private lenders.) Concern for workers losing their pensions when their companies declared bankruptcy (dramatized by the bankruptcy of Studebaker in 1974, which did not fund its retirement fund adequately) led to the creation of the Pension Benefit Guaranty Corporation (PBGC) in 1974 as part of the Employee Retirement Income Security Act of 1974.

Legislators and citizens generally, though, often do not adequately take into account the incentives for and ability of “undeserving” individuals to benefit themselves at the expense of others. For example, minorities may indeed be deserving of help in starting businesses. But others may set up companies that appear to be controlled by minorities in order to garner the subsidies. In fact, such people are likely to be more skilled than real minorities in drafting successful applications for subsidized loans. Although some small farmers have benefited from subsidized loans and insurance, most of the subsidies have gone to large corporate farms. The PBGC has benefited many employees, but its costs have increased sufficiently for it to be economically bankrupt: Financially distressed corporations covered by the PBGC had

incentives to promise their employees higher guaranteed pensions in exchange for current wage concessions. Furthermore, the PBGC was not given the authority or resources (or it did not use the powers it had) to impose high costs on corporations that did not adequately fund their pensions and require that the corporations invest pension funds in close-to-riskless assets. Of course, as noted earlier, it may be that drafters of the legislation realized that the programs would benefit favored people and companies and would be much more costly than they admitted at the time. If this were the case, the outcome was not unintended.

THE RELEVANCE OF ELLIOTT'S QUESTIONS

Elliott raises several intellectually interesting and challenging questions, most of which are related to the “proper” interest rate that should be charged. As noted earlier, he assumes that the goal is to use rates that correctly measure the cost of the programs. Given his focus, I accept this assumption, for two reasons. First, legislators may not be aware of the cost of some programs that they supported based on the belief that the programs were almost costless to taxpayers. A second related reason is that public knowledge of the actual cost to taxpayers of programs might result in a demand for their cancellation or restriction or, where the programs are cost effective, expansion. Considering that the Congress and presidency are now controlled by Republicans, who presumably are opposed to government waste and taxation (deficits, of course, are just the present value of future taxation), such calculations might not be disregarded.

MY ANSWERS TO SOME OF ELLIOTT'S QUESTIONS

Interest Rates on Loans

With respect to Elliott's concerns about interest rates, it should be useful to consider initially the factors that determine interest rates generally. Six such factors may be distinguished:

1. Forbearance, or the opportunity cost of time. This is measured best as the risk-free real rate (which excludes the effects of changes in purchasing power).
2. Expected change in purchasing power. The nominal rate on risk-free obligations of a given duration provides an effective measure of the first two factors. It often is termed the “cost of funds.”
3. The cost of default to the lender. This is the amount of loss given default by the borrower at a particular time because of the borrower’s inability or unwillingness to repay a loan as contracted. The interest rate is increased such that the higher present value (discounted at the nominal rate of interest) of the higher interest payments and the loss given default is zero.
4. Administrative costs. These include the cost of determining default risk, recording the loan and payment thereon, monitoring the loan, and collecting the payments. As with the cost of default, the interest rate should provide the funds required for these costs.
5. Systematic risk. Such risk increases the discount rate if the returns on the loan or project covary positively with the economy’s discount rate (as is likely for loans, because both rates are higher [lower] in good [bad] times).
6. Uncertainty (e.g., variance of expected cash flows). This affects the interest rate if the lender is risk averse or cannot construct a sufficiently diversified portfolio of loans to reduce uncertainty to a very small number. Although, as Modigliani and Miller established, the effect of risk aversion is eliminated when there is cost-effective arbitrage, such arbitrage of government loans may not be possible.

If a loan is not subsidized, the interest rate charged should include the effects of the first four factors. Assuming that both government and private lenders are risk (uncertainty) neutral and

the government agency is as efficient as a private lender in assessing the risk of default and in monitoring and administering the loans, the “correct” rate is the same rate a private lender would charge for a similar loan.

In responding to Elliott’s questions, I assume that the goal is not to subsidize borrowers or insurees. If the goal is to subsidize them, the rate charged should be lower.

His first question (p. 264) is, “What discount rate should we use for a floating-rate loan made by the [federal] government?” My answer is, the rate charged by commercial lenders for a loan with similar terms (duration, etc.). The rate should not be the government’s borrowing rate on similar obligations with the same duration, as this rate does not include default and administrative costs and systematic risk. It might seem that the cost of defaults should not be included in the relevant rate because the federal government cannot default on its obligations (not as long as Federal Reserve notes are accepted for the payment of debts). However, some people who borrow from the government do not repay these debts and some government-sponsored projects fail. Those costs necessarily must be borne by taxpayers. Hence, although the holders of government debt do not incur losses, they must be borne by someone. The expected returns from government-financed programs should cover those expected losses (assuming, still, that a subsidy is not intended). Further, losses from default are difficult to estimate and may be biased to serve special interests. Hence, reference to the commercial rate is a desirable check and is likely to underestimate the relevant discount rate.

His second question (p. 266) is, “Should the federal government use a discount rate that reflects the uncertainty of future cash flows from a lending program?” I assume that here Elliott means what I call the “cost of default.” Assuming no bias in estimating cash flows, my answer is “yes.” It also should include administrative and monitoring costs and systematic risk. However, he later brings in risk aversion, which I call “uncertainty.” As noted above, this aspect of the interest rate should not be included in the interest rate.

Insurance

Elliott poses an overall question with respect to insurance (p. 268): “How can we improve federal budgeting for insurance programs?” He then shows that the present cash budgeting system is “a disaster,” particularly with respect to the PBGC and flood insurance. I assume for this question that repeal of these programs and their transfer to private insurance companies is not politically feasible.

With respect to the PBGC, I cannot imagine any public benefit of a taxpayer subsidy to corporate pension grantors or pension recipients (who certainly are not among the poorest of our citizens). Consequently, the PBGC should be restructured and be required to operate as a self-contained unit that will get no taxpayer funds, directly or indirectly by being allowed to borrow from the Treasury Department if it falls short of funds. It should have the independent authority to increase premiums, adequately penalize corporations that do not make payments sufficient to fully fund their plans, and regulate and monitor fund assets. I expect that as premiums are increased, corporations with well-funded plans will drop out by converting to defined-contribution plans (e.g., 401(k) plans) and the PBGC will become even more insolvent. The Congress and president will then have to decide whether to bail out present and prospective pension holders (which Elliott and I expect them to do).

Elliott does not ask any questions about flood insurance, but presents data showing that the National Flood Insurance Program charges premiums that do not reflect the actuarial risks and that it reports on a cash basis. Both procedures distort the costs of the program to taxpayers. As he makes clear, this should be changed if the goal is to achieve public benefits. However, it may be that the goal is to benefit some people at the expense of others and to deceive voters and perhaps legislators of the real economic costs of the program.

People and Tools

Finally, Elliott questions whether government agencies can employ the people and tools that

would improve the performance of federal credit and insurance agencies. I suggest that appointing inexperienced political supporters and cronies to head such agencies is not desirable.

CONCLUSION

To summarize, I believe that there are few public but many private-interest benefits from government loan and insurance programs. I agree, though, with Elliott, that these programs are unlikely to be disbanded and more such programs are likely to be established. Consequently, from the viewpoint of taxpayers generally, it would be preferable to have them organized as self-sustaining agencies. If they make direct loans, the Congress can appropriate the funds necessary to get them started. Loan repayments and fees collected by the agencies would not be recorded as federal budgetary inflows, and loans and operating expenses would not be recorded as budgetary outflows. To the extent that legislators determine that their activities should be subsidized, the necessary amounts would be provided through appropriations that would be recorded as budget outflows. The agencies, then, would have an incentive to operate efficiently so as to maintain and possibly expand their programs and reduce the amount of additional funding that the Congress would have to appropriate.

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Federal Credit and Insurance Programs: Housing

John M. Quigley

This paper reviews the evolution of the major credit and insurance programs undertaken by the U.S. government in support of urban housing. As the review makes clear, the Federal Housing Administration (FHA), Veterans Administration, Federal National Mortgage Association, and Federal Home Loan Mortgage Corporation have played major roles in the development of liberal and efficient primary and secondary mortgage markets in the United States. The development of capacity in mortgage lending and securitization in the private sector does suggest, however, that federally subsidizing mortgage market activities can be restrained with little effect on homeownership—the principal goal of this federal activity. In particular, the orderly reduction in the mortgage investment activities of the government-sponsored enterprises (GSEs) and the imposition of guarantee fees on mortgage-backed securities insured by the GSEs are first steps in restraining federal activity. More generally, a concentration of FHA and GSE activity on first-time homebuyers would reduce federal risk exposure while preserving the economic rationale for government activity.

Federal Reserve Bank of St. Louis *Review*, July/August 2006, 88(4), pp. 281-309.

Federal policy affecting housing is dominated by indirect off-budget activities—tax expenditure policies and credit, insurance, and guarantee programs—rather than the direct subsidy of housing production or the payment of shelter allowances to deserving households. This paper reviews federal activity in providing credit and insurance for housing. I begin by reviewing mortgage insurance and guarantee programs: the Federal Housing Administration (FHA) and the Veterans Administration (VA). These large programs are administered by different cabinet agencies: the Department of Housing and Urban Development (HUD) and the Department of Veterans Affairs, respectively.¹

I then review federally supported credit activities: the Federal National Mortgage Associa-

tion (Fannie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac), and the Government National Mortgage Association (Ginnie Mae). Freddie Mac and Fannie Mae are government-sponsored enterprises (GSEs). Both are publicly chartered, privately owned corporations. They are regulated by the Office of Federal Housing Enterprise Oversight for financial safety and soundness and by HUD for compliance with their public mission. Ginnie Mae is a wholly owned government corporation within HUD.

For these organizations, I briefly recount their history and operations. I review their economic functions and highlight current issues about their

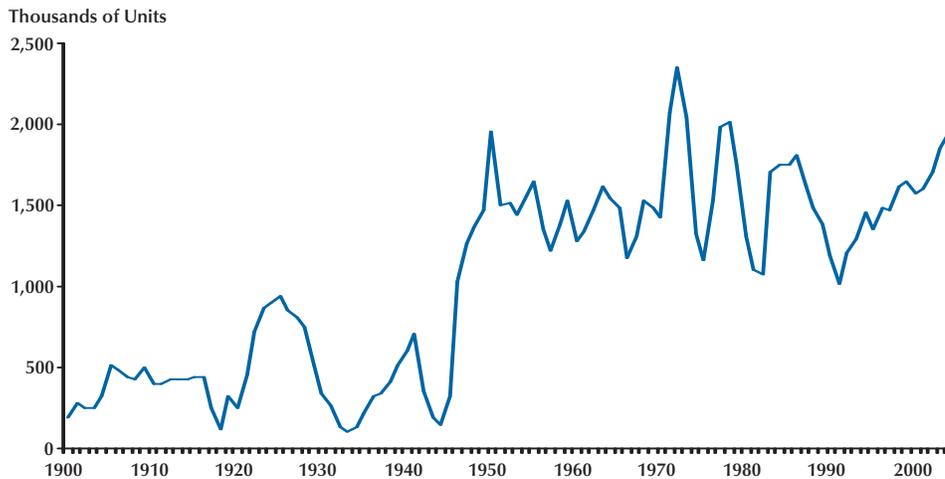
¹ A third program, the Farm Service Administration, insures farms and some rural homes. It is administered by the Department of Agriculture.

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Figure 1

U.S. Housing Starts, 1900-2004



SOURCE: Doan (1997); www.census.gov/const/startsan.pdf.

roles in the housing system and the broader economy.

FEDERAL INSURANCE AND GUARANTEE PROGRAMS

Before the depression of the 1930s, home mortgage instruments were typically of short terms (3 to 10 years) with loan-to-value ratios (LTVs) of 60 percent or less. Mortgages were non-amortizable, requiring a balloon payment at the expiration of the term. The onset of the Great Depression engendered a liquidity crisis beginning in 1930, preventing renewal of outstanding contracts. Other borrowers were simply unable to make regular payments. The liquidity crisis affecting new mortgage loans, together with elevated default rates on existing loans, had catastrophic effects on housing suppliers as well as housing consumers.

Figure 1 shows the course of house building during the twentieth century. It reports the sustained boom in housing construction in the 1920s—peaking in 1925 but averaging more than 700,000 housing starts per year from 1920

through 1929. The figure also depicts the collapse of the housing market at the onset of the Great Depression. During the period 1930-35, housing starts declined by 75 percent, to about 193,000 per year.

Despite voluntary forbearance on the part of some lending institutions and mandated forbearance enacted by many state legislatures, the system of mortgage lending that existed in the early 1930s continued to contract, and many lending institutions simply failed. The establishment of the Home Owners' Loan Corporation in 1933 within the Federal Home Loan Bank System (established a year earlier) provided stop-gap refinancing for a million mortgages.² Passage of the National Housing Act of 1934 established the structure of home mortgage insurance and facilitated the growth of the modern system of mortgage finance in the United States.

The 1934 Act established the Federal Housing Administration (FHA) to oversee a program of home mortgage insurance against default. Insurance was funded by the proceeds of a fixed premium charged on unpaid loan balances. These

² These measures are described in Doan (1997).

revenues were deposited in Treasury securities and managed as a mutual insurance fund. Significantly, default insurance was offered on “economically sound” self-amortizing mortgages with terms as long as 20 years and with LTVs up to 80 percent.

Diffusion of this product across the country required national standardization of underwriting procedures. Appraisals were required, and borrowers’ credit histories and financial capacities were reported and evaluated systematically. The modern standardized mortgage was born.³

The Mutual Mortgage Insurance Fund, which was established to manage the reserve of annual premiums, was required to be actuarially sound. This was generally understood to involve very small redistributions from high-income to low-income mortgagees. (See, for example, Aaron, 1972.) By its original design, the FHA was clearly intended to serve the vast majority of homeowners. Initial loan amounts were restricted to be no larger than \$16,000 at a time when the median house price was \$5,304.⁴

Near the end of World War II, it was widely feared that the peacetime economy would return the housing market to its depression-era performance. From Figure 1, note that housing starts in 1944 were at about the same level as they had been a decade earlier. The VA loan program, passed as a part of the GI bill in 1944, rapidly evolved from a temporary “readjustment” program to a long-range housing program available to veterans for a decade or more after returning to civilian life. This transformation contributed to the boom in the residential construction industry that began in the late 1940s. Ultimately, a liberal program of veterans’ home loans was established in 1950 and subsequently extended. In contrast to the insurance provided by the FHA, the VA provided a federal guarantee for up to 60 percent of the face value of a mortgage loan made to an eligible veteran, subject to a legislated maximum. The VA program facilitated loans by private lenders on favorable terms, with no down payments and with moderate interest rates.

These two programs providing insurance and mortgage guarantees brought homeownership opportunities to middle class American households in a short space of time. As noted in Figure 1, since 1950, annual housing starts have rarely fallen below one million. Figure 2 reports the remarkable growth of mortgage originations attributable to these programs. In 1960, about \$5 billion in FHA-insured mortgages and \$2 billion in VA-guaranteed mortgages were issued. By 2003, about \$165 billion in FHA-insured mortgages and about \$66 billion in VA-guaranteed mortgages were issued. In real terms, FHA mortgage activity has quadrupled during the period since 1960 and VA originations have increased by 430 percent.

Over time, the fraction of mortgage originations attributable to the FHA and VA has declined systematically. Figure 3 reports that the fraction of originations (in dollar volume) insured by the FHA declined from as high as 25 percent in 1957 to a bit under 5 percent in 2004. Similarly, VA-guaranteed mortgages declined from about a quarter of the value of originations in 1955 to a couple of percent in 2004. Overall, these programs accounted for over 40 percent of the dollar volume of originations in 1957 and 8 percent at the turn of this century.

The relative reduction in FHA and VA originations over time has arisen from two factors. First, the modern private mortgage market—mortgage banks and suppliers of private mortgage insurance—arose under the shadows of these public institutions.⁵ The behavior of consumers with long-term, low-interest-rate, government-insured mortgages made it clear that reliance on these liberal instruments to provide credit could be profitable activities for mortgage suppliers and private insurers. Default rates just aren’t very high. This was not well-known or appreciated until the experience of FHA and VA mortgages was accumulated. Balances in the Mutual Mortgage Insurance Fund were easily observable to private actors.⁶ This

³ See Green and Wachter (2005) for an extensive discussion of this history.

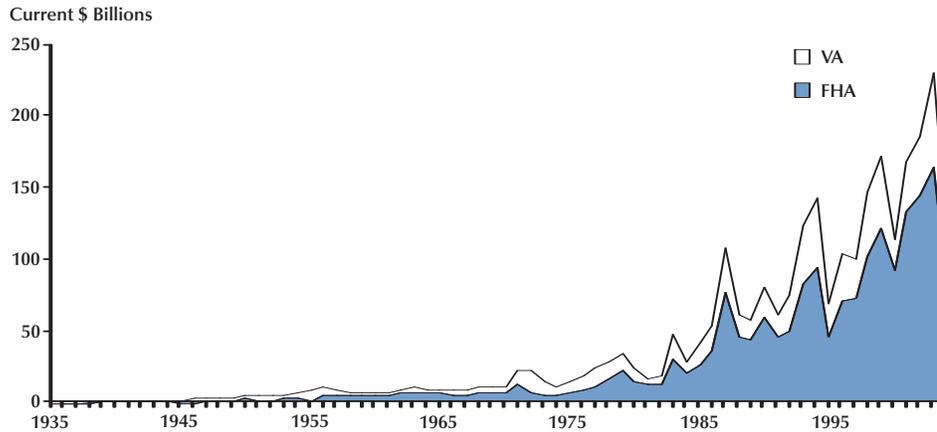
⁴ The FHA ceiling was reduced to \$6,000 in 1938, but that level was still above the median house price at the time, \$5,804.

⁵ For example, in 1957, the Mortgage Guaranty Insurance Corporation became the first private mortgage guarantee firm established since the Great Depression.

⁶ The original structure of FHA insurance premiums—an annual premium against the unpaid mortgage balance—was changed to a fixed-percentage payment at closing (in 1983) and then to a sliding scale based on the LTV (in 1990).

Figure 2

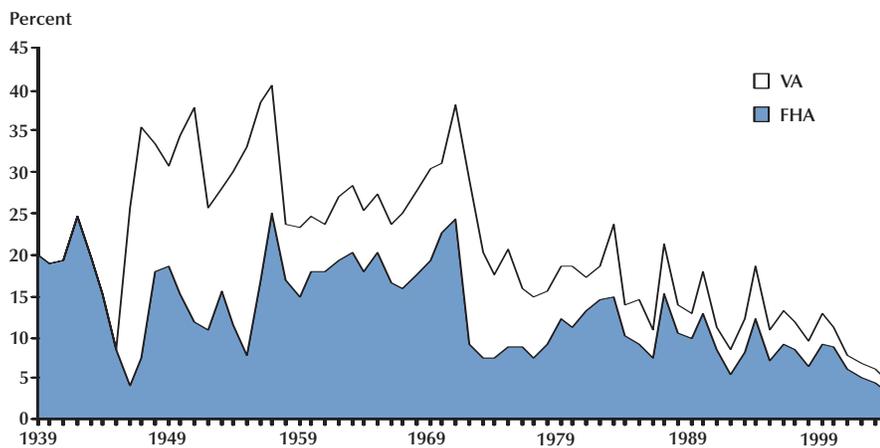
Value of FHA- and VA-Guaranteed Originations, 1935-2004



SOURCE: U.S. Census Bureau, *Statistical Abstract of the U.S.* (various years); National Association of Homebuilders (1986); www.fanniemae.com/ir/pdf/resources/housingmortgage.pdf; www.fanniemae.com/ir/pdf/resources/housingmortgage.pdf.

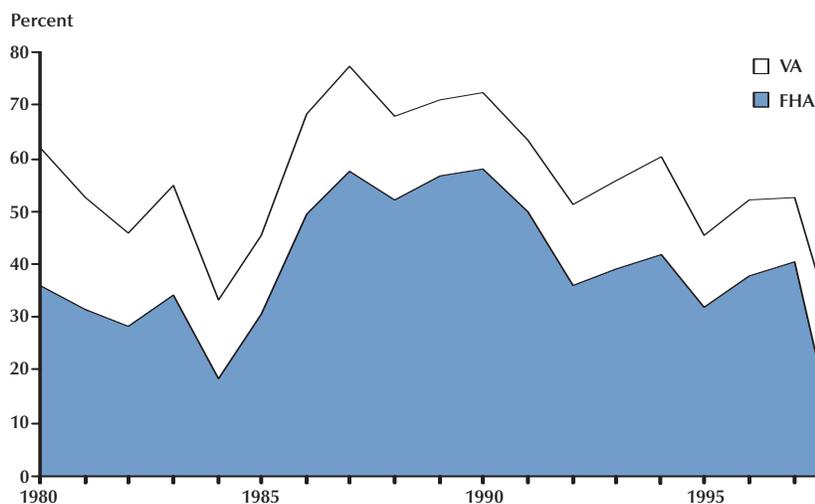
Figure 3

FHA and VA Shares of Total Originations, 1939-2004



NOTE: Data for 1965-69 total originations are approximate.

SOURCE: U.S. Census Bureau, *Statistical Abstract of the U.S.* (various years); www.huduser.org/periodicals/ushmc/summer99/histdat5.html; www.fanniemae.com/ir/pdf/resources/housingmortgage.pdf.

Figure 4**FHA and VA Shares of All Insured Mortgages, 1980-99**

SOURCE: www.huduser.org/periodicals/ushmc/winter99/histdat4.html.

made private lenders more inclined to offer competitive liberal mortgage products.

Second, variations in policy—by statute or practice—affect the extent to which insured mortgages can “compete” with the private mortgage industry. Expansions in coverage shortly after World War II—higher LTVs and longer repayment terms—made FHA and VA mortgages more attractive to lower-income households. But, over time, fixed-dollar limitations on the loan amounts greatly reduced the role of the FHA and the VA in providing insurance to middle- and upper-middle-income households. Figure 4 reports the number of FHA and VA mortgages as a fraction of all insured mortgages. As the figure shows, FHA and VA mortgages were almost 80 percent of all insured mortgages in 1987. This fraction declined by half through 1995 before increasing again when lending limits were liberalized. Figure 5 estimates, from the era of the Great Society to the present, the fraction of new single-family homes whose selling prices made them eligible for FHA mortgage insurance. As the figure indicates, limitations on the maximum loan amount reduced the potential coverage from about 90 percent of new homes completed in 1964 to about 15 percent of new

homes completed three decades later.⁷ Systematic increases during the past decade in the maximum size of mortgages eligible for FHA financing has increased eligibility again, to as much as one-third of the new houses completed in 2004.⁸

The trends reported in Figures 4 and 5 are the outcomes of policy decisions about the segments of the owner-occupied housing market in which the FHA has been authorized to offer mortgage insurance. Figure 6 shows analogous estimates of the fraction of new homes eligible for VA guarantees. Until 1988, the trend was quite similar.⁹

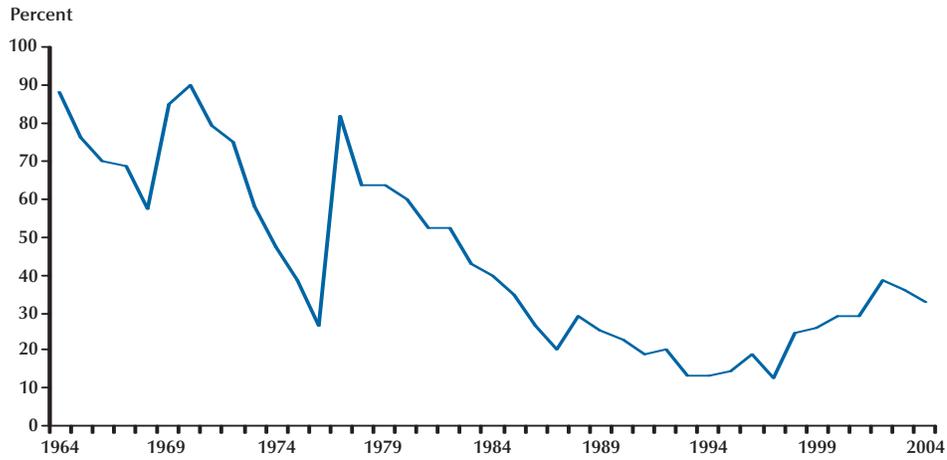
⁷ The estimates in Figure 5 are quite crude. The distribution of prices for new homes is reported in gross categories (but the distribution of prices for existing homes is not available at all). No adjustment is made for higher-cost FHA regions (for which higher limits were permitted beginning in 1994).

⁸ In 1994, the FHA loan limit was increased from a fixed amount to a fraction of the limit imposed on GSE purchases of mortgages (the “conforming limit”). As noted below, this limit is revised annually on the basis of average home prices. The FHA loan limit was set at 38 percent of the GSE limit and 75 percent of the GSE limit in high-cost metropolitan areas. In 1998, these limits were further liberalized to 47 percent and 87 percent, respectively.

⁹ In 1988, the VA eligibility limit was extended from houses valued at 1.67 times the maximum guarantee to houses valued at 4 times the maximum guarantee. This immediately made many more high-valued homes eligible for federal guarantees.

Figure 5

Estimated Percent of New Single-Family Homes Eligible for FHA Insurance, 1964-2004

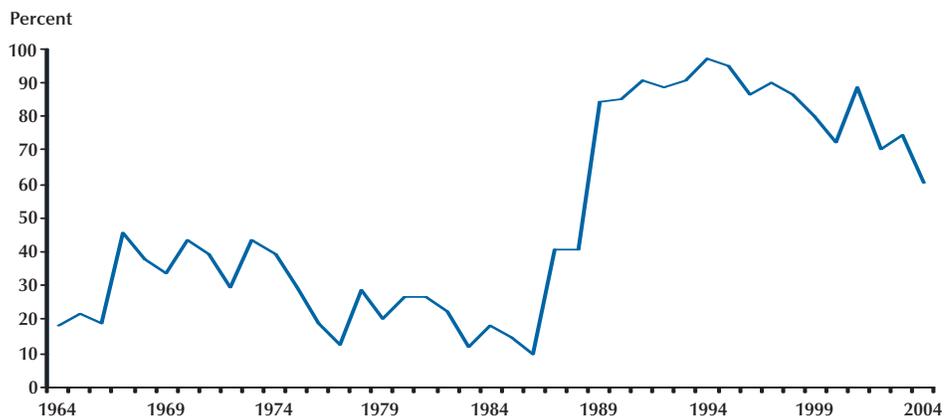


NOTE: Reported figures are underestimated after 1993.

SOURCE: Vandell (1995); U.S. Census Bureau, Construction Statistics Series C25 (various years).

Figure 6

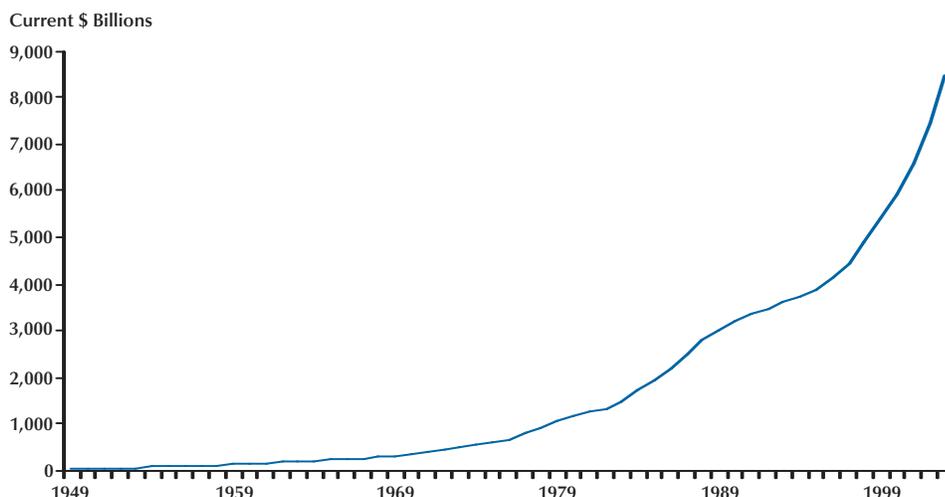
Estimated Percent of New Single-Family Homes Eligible for VA Insurance, 1964-2004



SOURCE: U.S. Census Bureau, Construction Statistics Series C25 (various years).

Figure 7

FHA-Insured Mortgage Debt Outstanding, 1949-2003



SOURCE: Council of Economic Advisors, *Economic Report of the President* (various years, Table B-76).

The rules governing coverage affect the “market share” of government-insured mortgages in total originations. Because it was demonstrated that liberal mortgage terms could be privately profitable, the eligibility of mortgages for federal insurance, especially mortgages for the high-valued properties demanded by high-income buyers, could be reduced. In this way, a reduced “market share” of guaranteed mortgages is evidence of the success and increased targeting of these programs. To be sure, national house-value limits for FHA and VA coverage are reflected in the market share of federally insured properties in various markets. Until 1994, a much smaller fraction of originations in high-priced housing markets, especially Western and Coastal housing markets, were eligible for FHA insurance. As noted below (see Figures 9 to 11), currently about 15 percent of newly issued mortgages are federally insured.

Despite these relative declines in the importance of the FHA in new originations, the volume of FHA debt outstanding has continued to rise steadily. Figure 7 reports the long-term trend. Note that FHA debt outstanding has increased from under \$30 billion in 1985 to about \$440 billion in 2003, a real increase of about 140 percent.

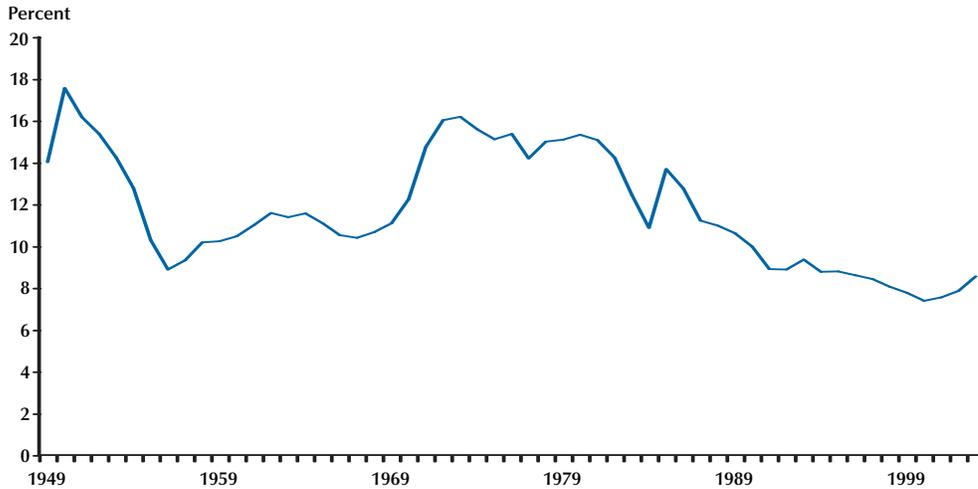
The mission of the FHA was expanded to include multi-family housing shortly after it was established. The National Housing Act of 1938 included provisions for a separate insurance program for multi-family housing for middle-income households. A separate reserve fund, the General Insurance Fund, was created, and it was envisioned that the General Insurance Fund would also be actuarially sound. But it was not until the 1960s that FHA multi-family housing programs became significant in size and scale.

A series of Great Society housing programs relied for the first time on privately owned multi-family housing to provide subsidized rental accommodation. Other programs subsidized homeownership directly.¹⁰ These programs combined subsidized interest rate mortgages, lower underwriting standards, and government insurance provided by the FHA.¹¹ The volatile

¹⁰ Aficionados of U.S. housing policy may recall the “colorful” program titles: Section 221(d)(3), Section 235, and Section 236, to name the most notorious.

¹¹ Beyond these specific programs, the National Housing Act of 1968 directed the FHA, more generally, to lower underwriting standards in declining metropolitan areas.

Figure 8
Multi-family and Commercial Share of FHA and VA Portfolio, 1949-2003



SOURCE: Council of Economic Advisors, *Economic Report of the President* (various years, Table B-75).

combination of liberal underwriting standards and loss insurance was enough to cause “smoke and fire,” and additional allegations of inefficiency and corruption drew further attention to the “problems” of the FHA.¹² It should be noted, however, that even in the absence of waste, fraud, or corruption, the design of these programs made the insurance provided by the FHA very expensive to U.S. taxpayers.

Two decades later, in the late 1980s, many of the successful FHA-insured subsidized multi-family projects reached the end of their compliance terms without the prospect of new subsidized financing and after the Tax Reform Act of 1986 had greatly reduced the returns to the syndication of apartments in the private-rental market. With long-lived capital, initial mistakes can be manifest for a long time. The General Insurance Fund and other reserve funds for the FHA multi-family housing programs have repeatedly required legislative appropriations to remain solvent.

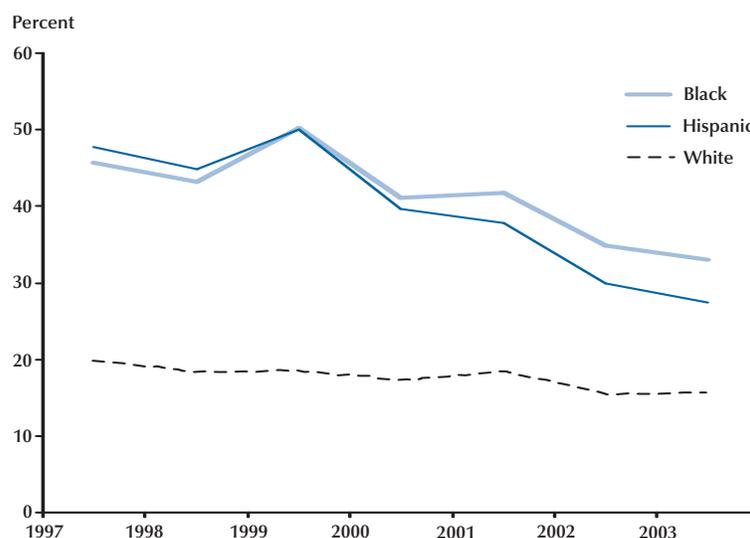
Although these problems with the multi-family housing component of the FHA subsidized portfolio have been widely reported, it should be noted

that lending for multi-family housing has never been a large fraction of the FHA portfolio, and its relative importance has systematically declined. As noted in Figure 8, multi-family housing insurance as a fraction of guaranteed and insured mortgages declined from about 15 percent in 1970 to less than 8 percent at the turn of this century.

In contrast, the mortgage insurance fund for the FHA single-family housing insurance program has remained solvent continuously and, with the exception of a few brief intervals, the fund has remained actuarially sound as well. Premium variations with LTVs have introduced some element of risk-based pricing, and variations in eligibility limits have kept enough low-risk borrowers in the pool.

For eligible households, the down-payment requirements and underwriting standards employed by the FHA have proven to be attractive when compared with the terms offered by conventional lenders. The Housing and Community Development Act of 1981 established explicit targets for serving low-income borrowers. These goals facilitated a lending environment in which the overwhelming fraction of FHA borrowers

¹² These issues are discussed in detail by Vandell (1995).

Figure 9**FHA and VA Market Share of Originations by Borrower's Race, 1997-2003**

SOURCE: www.ffiec.gov/hmda/online_rpts.htm.

obtained mortgages with LTVs of 95 to 98 percent or more (as compared with 80 to 90 percent for conventional loans). FHA underwriting standards led to the acceptance of borrowers with “non-traditional” credit histories or with imperfect records. The diffusion of methods of credit scoring of borrowers makes it possible to compare the credit worthiness of FHA borrowers with those served by the conventional mortgage market. The availability of low-down-payment FHA mortgages and FHA mortgages for those with less-than-perfect credit scores has meant that the FHA market share of originations has been larger for those traditionally disadvantaged in the homeownership market. Figure 9 presents estimates of the number of FHA and VA mortgage originations in metropolitan areas as a fraction of all originations separately by race.¹³

As reported in the figure, in 1997 the FHA and VA had about a 20 percent share of mortgages issued to white borrowers. For black and hispanic

borrowers, the market shares were 46 percent and 48 percent, respectively. By 2003, the FHA and VA market share for all borrowers had declined. For whites it declined to about 16 percent. For black and hispanic borrowers, it declined to 33 percent and 27 percent, respectively.

Figure 10 reports the FHA and VA market share by the income of the census tract in which the borrower resides. In 1997, they had a 16 percent share of mortgages in upper-income neighborhoods and a 35 percent share of originations in low- and moderate-income neighborhoods. By 2003, the FHA and VA originated 8 percent of mortgages in upper-income neighborhoods and about twice that fraction in low- and moderate-income neighborhoods.

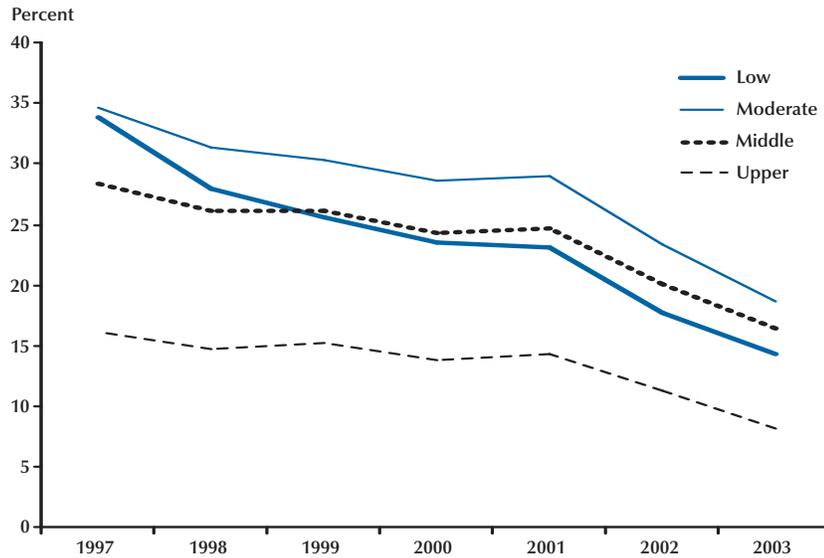
Figure 11 reports analogous FHA and VA market-share information by the fraction of minorities living in the census tract of origination. Here, market shares converged more rapidly during the 1997-2003 period.

Ambrose and Pennington-Cross (2000) have analyzed the market share of FHA mortgages across metropolitan regions in the United States.

¹³ These estimates are based on data reported under the Home Mortgage Disclosure Act, not data reported by the FHA.

Figure 10

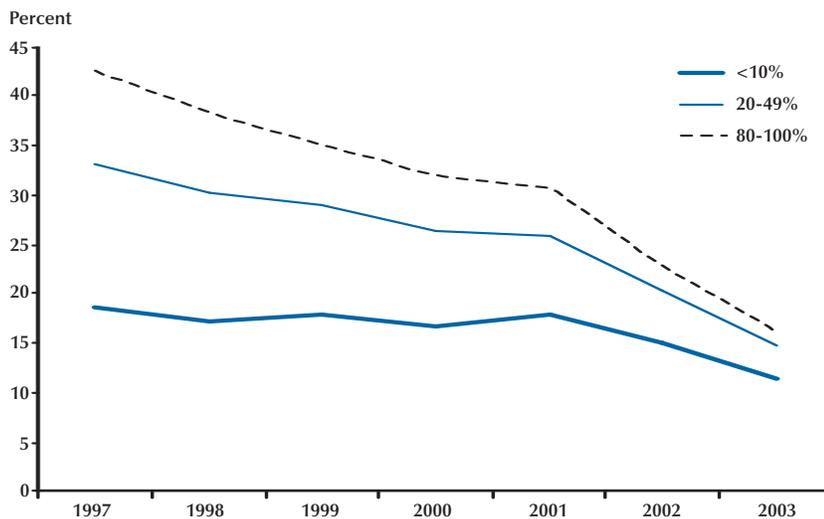
FHA and VA Market Share by Census-Tract Income, 1997-2003



SOURCE: www.ffiec.gov/hmda/online_rpts.htm.

Figure 11

FHA and VA Market Share of Originations by Minority Population as a Percent of the Census Tract, 1997-2003



SOURCE: www.ffiec.gov/hmda/online_rpts.htm.

Table 1**Distribution of New FHA and VA Mortgages by Borrower Race, Income, and Neighborhood, 1997-2003**

	1997	1998	1999	2000	2001	2002	2003
Race							
White	67	67	58	63	65	64	65
Black	13	13	16	14	13	13	13
Hispanic	14	14	18	17	17	17	17
Other	6	6	7	6	6	6	5
Income							
Low to moderate	43	45	46	45	47	50	50
Middle	36	35	35	35	34	32	32
Upper	20	20	19	20	19	18	17
Percentage of Minorities in Census Tract							
<10	39	39	39	39	41	41	25
10-49	48	48	48	48	47	47	55
50-79	8	8	8	8	7	7	12
≥80	6	5	5	5	5	5	8

SOURCE: www.ffiec.gov/hmdadawebreport/nataggwelcome.aspx.

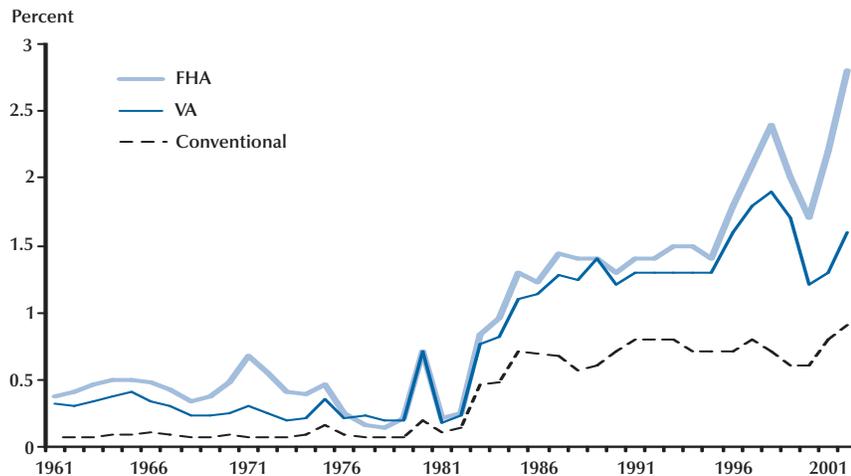
Their analysis suggests that FHA activity is higher in cities and metropolitan areas where economic risks are higher and where the probability of recession is greater. When conventional underwriters reduce lending in local markets, the FHA takes up some of the slack. (See also Ambrose, Pennington-Cross, and Yeazer, 2002.)

Table 1 reports the distribution of FHA and VA new business from 1997 to 2003 along the same three dimensions used in Figures 9 to 11. Although the market share of white borrowers is less than 20 percent, about two-thirds of new mortgages are made to white borrowers. Since 1997, there has been a small increase in the fraction of mortgage originations to minority borrowers and a decline, from 67 percent to 65 percent, in the fraction of white borrowers. There has been a larger increase in the fraction of new mortgage originations in low- and moderate-income census tracts, from 43 percent to 50 percent, and a substantial decline, from 39 to 25 percent, in the fraction of mortgages originated in census tracts whose population was 90 percent or more non-

hispanic white. Low- and moderate-income census tracts have experienced a larger increase in the portfolio of new mortgages, from 43 to 50 percent; and there has been an even more substantial increase in the fraction of FHA and VA mortgage originations in minority neighborhoods.

Given borrower characteristics, lower down payments, and looser underwriting standards, government-insured and -guaranteed mortgages are somewhat riskier than conventional loans. Figure 12 compares foreclosure rates on FHA, VA, and conventional mortgages over the past 30 years. Foreclosure rates on conventional mortgages were very low, increasing after 1981 to about 0.7 percent. In absolute terms, FHA foreclosure rates are low, but they also increased after 1981 and now average between 1 and 3 percent. These rates are about half again as high as the foreclosure rates on VA loans and two-and-one-half times as large as the foreclosure rates on conventional mortgages. There is a slightly increasing trend in foreclosure rates for all mortgages, and the trend is a bit higher for FHA loans.

Figure 12
Mortgage Foreclosure Rates, 1961-2002



NOTE: Data for 1972 are approximate.

SOURCE: Mortgage Bankers of America, National Delinquency Reports (various years).

ECONOMIC EFFECTS

It seems clear that the institution of single-family housing insurance and guarantee programs played a leading role in developing the American mortgage market. After a half century, however, it is also clear that these institutions now play a less central role in expanding homeownership opportunities for U.S. households. There are, however, at least three salutary effects of this public intervention in the mortgage market.

First, these government agencies may be presumed to be less discriminatory than private actors in the mortgage market. Racial discrimination in homeownership markets has been well documented for three decades (e.g., Kain and Quigley, 1975, and Munnell et al., 1986). Although the precise mechanism underlying this discrimination is unclear, and actions may be based on statistical discrimination as well as simple prejudice (see, especially, Ross and Yinger, 2002), there is substantial and continuing discrimination against minority households in the market. Government action in providing insurance is but one tool to

help rectify this inequity and to increase minority access to homeownership.

Figure 9 provides some indirect evidence on this point. The large FHA market share among African Americans and Hispanics reflects the number of these households who are eligible for the program. However, the large uptake of FHA mortgages among minority households also suggests that the institution serves minority borrowers and their lenders.

Second, the continuing demonstration provided by the looser terms for government mortgages may increase homeownership more generally among the eligible population. However, the accumulated experience of private mortgage insurance and the recent technical developments in quantifying potential default risk among borrowers suggest that the private sector may be quite capable of supplying credit at terms comparable to those provided by the FHA. Thus, the current programs provided by the FHA may increase homeownership among the eligible population, but the elimination of the FHA might simply induce private lenders to be more aggressive in this segment of the market.

Third, those eligible homeowners who are “inframarginal”—that is, their homeownership probabilities are unaffected by the existence of the FHA—may be able to buy somewhat more expensive houses in better neighborhoods as a result of the program.

There is considerable research using a variety of national datasets analyzing the effects of the FHA on the homeownership rates of households. The most widely reported of these studies, government reports commissioned by HUD,¹⁴ conclude that a quite substantial number of U.S. households have become homeowners as a result of the FHA. These government-sponsored surveys examine samples of recent home purchasers, noting (i) those who purchased using conventional mortgages with private mortgage insurance, (ii) those veterans who would have been unable to purchase with private insurance but who were able purchase with a VA loan, and (iii) those who could not buy their home with private mortgage insurance or a VA loan but who could afford to buy it with an FHA loan. The studies suggest that the second category measures the effectiveness of the VA in stimulating homeownership and the third category measures the effectiveness of the FHA. But these methods clearly overestimate the effects of these institutions—because the private mortgage industry would certainly expand in these market segments in the absence of government programs. In addition, many households who barely qualify to purchase their homes under government programs would continue to qualify for homeownership by simply purchasing other, less expensive, houses in the absence of government programs.

Other studies have examined micro data sets to estimate the fraction of renters or potential house buyers who would qualify for home purchase under FHA qualification rules but not under conventional underwriting criteria. For example, Savage and Fronczek (1993) analyzed renters in the Survey of Income and Program Participation, concluding that the FHA adds only a narrow segment of the population to the pool of potential home buyers. Using micro data from the American

Housing Survey, Lafayette, Haurin, and Hendershott (1995) calibrated a model of tenure choice for young households and simulated the change in homeownership patterns if the down payment and income rules of the FHA were eliminated. Their results suggested that only a very small increase in homeownership rates among young adults could be attributed to the FHA.

Goodman and Nichols (1997) analyzed two waves each of data collected by the Panel Study of Income Dynamics and by the National Longitudinal Study of Youth, investigating the fraction who would qualify for an “FHA-only” mortgage at the beginning and the end of a five-year interval. The authors found that the overwhelming majority of those who qualified for FHA-only mortgages at the initial period qualified for a conventional mortgage at the end of the interval. From this they conclude that the effect of the FHA on homeownership is to accelerate ownership, not to increase homeownership.¹⁵ (Note John Weicher’s elaboration on the significance of this finding in his commentary on this paper.)

Monroe (2001) analyzed the Public Use Micro Samples (PUMS) generated by the U.S. Census in 1970, 1980, and 1990 for metropolitan households. He exploited metropolitan variation in loan limits and temporal variation in underwriting standards to estimate the fraction of metropolitan dwellings that a given household in the PUMS could afford with an FHA loan but not with a conventional loan. He found that the temporal and spatial variation in this measure is significantly associated with homeownership. In particular, he found that the FHA increased homeownership by 0.6 percentage points, on average, during the 1970-90 period. Among those most affected by the FHA (i.e., those at the 90th percentile of the fraction), homeownership increased by 1.6 percentage points.

Significantly, the estimated effect of the FHA on the homeownership of black households was twice as large on average (1.4 percentage points at the mean) and more than twice as large among those most affected by the FHA (3.7 percentage points at the 90th percentile).

¹⁴ See, for example, Bunce et al. (1995).

¹⁵ This suggests that the FHA will become less effective in accelerating homeownership as the population ages. And it also suggests that the “acceleration” of homeownership may reduce the savings rate in the cohort of those contemplating a first-time home purchase.

Figure 13

Schematic of MBS Industry

Agency MBS			Private-label MBS
Ginnie Mae	Fannie Mae	Freddie Mac	
FHA- and VA-insured mortgages	Privately insured mortgages		
Generally low-balance mortgages	Mortgages conform to balance limits and underwriting rules	Mortgages do not conform to balance limits and/or underwriting rules	
Explicit government guarantee	Implicit government guarantee	Credit enhancement: subordination, overcollateralization	
Amount issued (2004 \$ billions)			
\$126	\$527	\$365	\$865
Amount issued (1995 \$ billions)			
\$72	\$110	\$86	\$49

SOURCE: *Inside MBS and ABS*.

MORTGAGE CREDIT

Federal support for housing credit also began in the aftermath of the Great Depression, with the establishment of the Federal Home Loan Bank (FHLB) System in 1932. FHLBs were chartered by Congress to provide short-term loans to institutions to help stabilize mortgage lending in local credit markets. These loans (“advances”) were made to thrift institutions that specialized in retail mortgage finance. Interest rates on advances were determined by the low rates at which the FHLB System Board could borrow in the credit market. In 1938, the Federal National Mortgage Association (FNMA) was established as a wholly owned government corporation to facilitate a secondary market for the newly established FHA mortgage program. The willingness of the FNMA to buy these mortgages encouraged lenders to make FHA and, later, VA loans (see Haar, 1960, for a historical discussion).

In 1968, the Association was reconstituted as a GSE, Fannie Mae. Much of its portfolio of government-insured mortgages was transferred to the newly established Ginnie Mae, and its common stock was sold and publicly traded.¹⁶ The newly

constituted Fannie Mae continued the practice of issuing debt to buy and hold mortgages, but expanded its operations to include the purchase of conventional mortgages not guaranteed or insured by the federal government.

Freddie Mac was established as a GSE in 1970. Freddie Mac was originally organized to buy mortgages originated by thrift institutions, and its shares were owned by FHLBs. Freddie Mac did not become a publicly traded firm until 1989. Originally, Freddie Mac chose not to hold purchased mortgages in its portfolio. Instead, mortgages were pooled and interests in those pools, mortgage-backed securities (MBS), were sold to investors, with the default risk guaranteed by Freddie Mac.¹⁷

Figure 13 is a schematic of the structure of the secondary mortgage market as it has evolved.

¹⁶ The reorganization was, in large part, a response to changes in government accounting conventions that would otherwise have recorded net additions to the FNMA portfolio as federal expenditures (see Aaron, 1972).

¹⁷ This structure is essentially identical to that which had been adopted by Ginnie Mae in their pass-through securities. Ginnie Mae securities, however, bore an explicit credit guarantee by the federal government.

Mortgages insured by the FHA or guaranteed by the VA are securitized and guaranteed by Ginnie Mae. These securities are guaranteed by the full faith and credit of the U.S. government. Other mortgages, subject to specific balance (“conforming”) limits¹⁸ and underwriting guidelines, are securitized by Freddie Mac and Fannie Mae. These MBS are guaranteed against default risk by the GSEs themselves. Other mortgages, which do not conform to the balance limits or underwriting guidelines imposed by Fannie and Freddie, are routinely securitized by other private entities. These “private label” MBS may be insulated from default risk through overcollateralization, subordination, or other forms of credit enhancement. Private-label MBS are standard finance products in which credit risk may be allocated among different tranches of a security, allowing final investors to tailor their holdings to their risk preferences.

The principal government subsidy provided to the GSEs arises because the debt instruments issued by them and the MBS guaranteed by them are perceived to be more secure than those issued by comparable institutions that do not operate under a federal charter.¹⁹ Although debt and securities issued by the GSEs clearly state otherwise, investors view the guarantees made by the GSEs as if they were made by the federal government itself. Some fraction of this benefit is passed through by the GSEs to mortgage borrowers, in the case of Fannie Mae and Freddie Mac, and to borrowers of FHLB institutions (mostly mortgage borrowers as well, but also to other clients of these institutions). The residual fraction of this benefit is retained by the shareholders of the GSEs. This residual arises from the GSEs competitive advantage, conferred by their federal charter, over other financial institutions that operate without such a charter.

¹⁸ The “conforming loan limit,” the maximum size of a mortgage loan that can be purchased or guaranteed by Fannie Mae and Freddie Mac, changes annually. It is indexed to the national average home price as estimated by the Federal Housing Finance Board. The 2005 limit is \$359,650.

¹⁹ The GSEs benefit from several other subsidies as well. For example, they are exempt from state and local taxation and from certain Securities and Exchange Commission filing requirements as well. See Frame and White (2005) for a discussion and Congressional Budget Office (2001) for an estimate of their magnitude.

The size and growth of Fannie Mae and Freddie Mac are indicated in Figures 14 through 17. Between 1975 and 2000 the total assets of Fannie Mae increased 21-fold and the total assets of Freddie Mac grew 78-fold. As noted in Figure 14, during the past decade alone, Fannie Mae increased its assets by 365 percent and Freddie Mac by 650 percent.

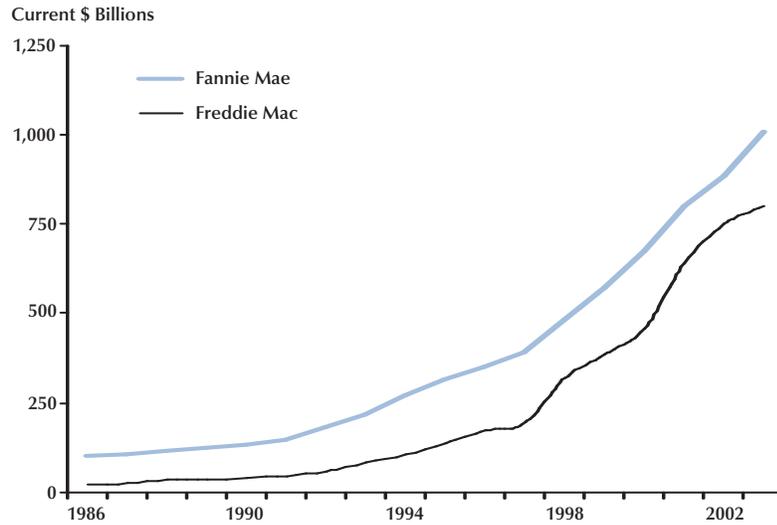
The principal lines of business of these firms, the issuance of MBS and the investment in whole mortgages, increased commensurately. As indicated in Figure 15, during 1993-2003, the volume of outstanding MBS issued by Fannie Mae almost tripled to \$1.3 trillion, while the volume of outstanding MBS issued by Freddie Mac almost doubled to over \$750 billion.

Figure 16 reports the retained portfolios of Fannie Mae and Freddie Mac. These portfolios consist of a mixture of whole loans, individual mortgages, and MBS which are owned by these firms and retained for investment purposes. These portfolios are large, and they have grown quite rapidly in the recent past. Between 1997 and 2003, the retained portfolios of the GSEs have tripled in size. As indicated in Figure 17, Fannie Mae’s debt outstanding in 2003 was \$962 billion, up from \$201 billion a decade before. Freddie Mac’s debt outstanding in 2004 was \$732 billion, up from \$93 billion a decade before. These are very large firms that have grown rapidly, especially in the past decade.

Just as the FHA shaped the primary mortgage market in the United States, so the rapid growth of the GSEs beginning in the 1970s led to fundamental changes in the secondary mortgage market. Until the 1970s, U.S. mortgage finance hardly differed from the caricature of the James Stewart movie of 1946. Banks and thrift institutions mobilized savings and originated mortgages, which were then kept as assets in their portfolios. After origination, these same institutions serviced the mortgages, collecting payments and guarding against delinquencies. Indeed, despite the growth of national pension funds and institutionalized investors, Weicher (1994) reported that this localized structure characterized some 60 percent of the mortgage market as late as 1968.

Figure 14

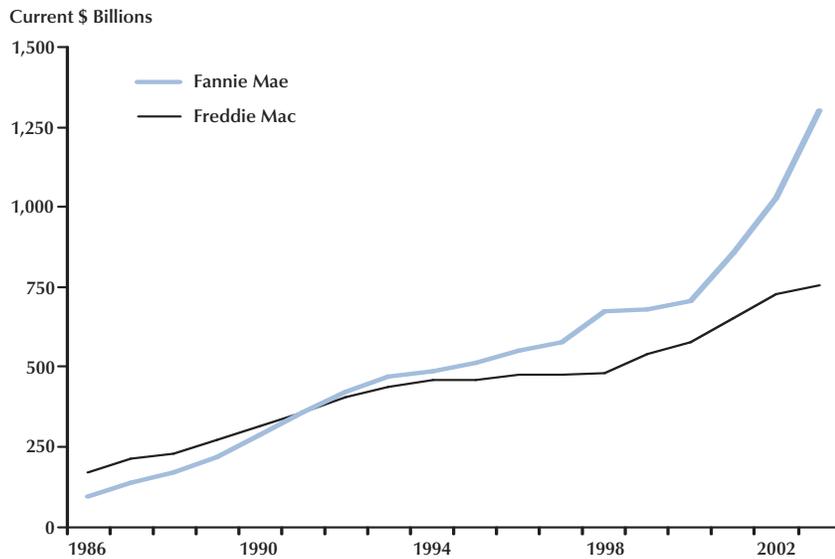
Freddie Mac and Fannie Mae Total Assets, 1986-2003



SOURCE: <http://www.ofheo.gov/media/pdf/2005reporttocongress.pdf>.

Figure 15

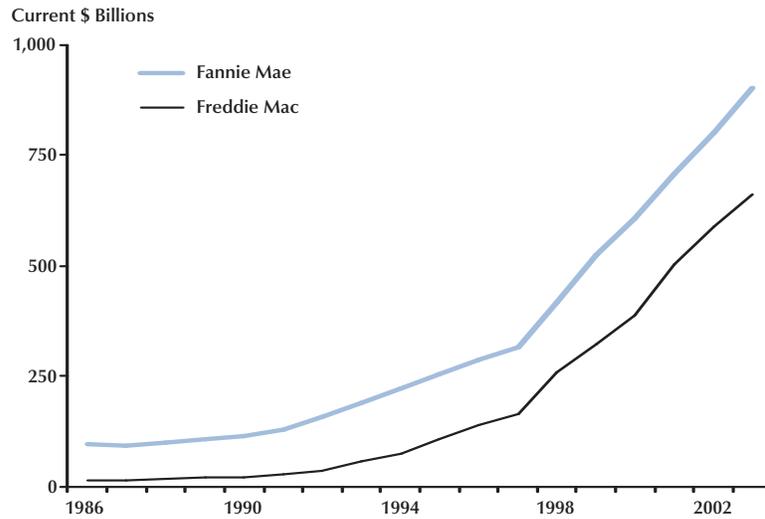
Freddie Mac and Fannie Mae Total MSB Outstanding, 1986-2003



SOURCE: <http://www.ofheo.gov/media/pdf/2005reporttocongress.pdf>.

Figure 16

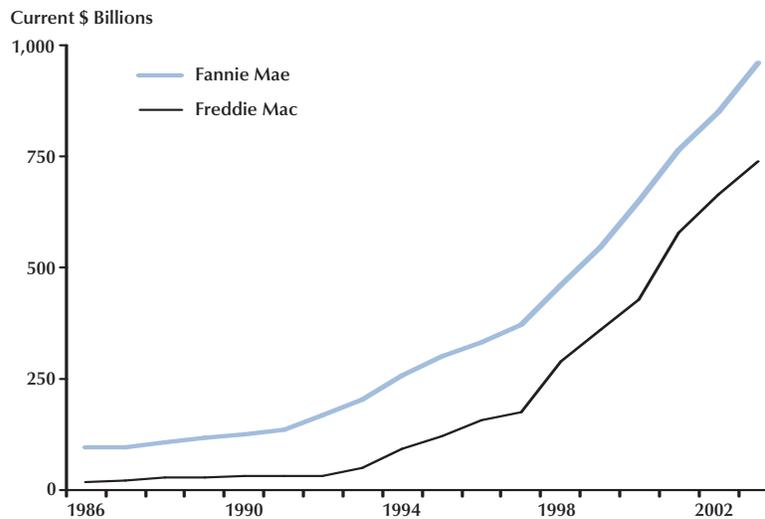
Freddie Mac and Fannie Mae Total Retained Portfolios, 1986-2003



SOURCE: <http://www.ofheo.gov/media/pdf/2005reporttocongress.pdf>.

Figure 17

Freddie Mac and Fannie Mae Total Debt, 1986-2003



SOURCE: <http://www.ofheo.gov/media/pdf/2005reporttocongress.pdf>.

The growth of the GSEs facilitated a completely decentralized process, with a variety of firms specializing in different aspects of the secondary market. Now, thrifts and mortgage banks originate mortgages, or independent mortgage brokers originate mortgages on behalf of banks. After origination, these firms sell the mortgages to Fannie Mae and Freddie Mac and sell the servicing rights to other specialized firms. Fannie and Freddie may hold the mortgages as investments or they may create MBS that are sold to individual investors, institutions, pension funds, or banks.

The two lines of business undertaken by the GSEs are represented in Figures 15 and 16. Both benefit directly from the subsidy provided by the implicit federal guarantee of creditworthiness. In the first line of business—the issuance of MBS—the GSEs buy mortgages from originators and issue MBS, which the agencies guarantee against default risk. Often, mortgage originators repurchase securities formed from the same mortgage pools they sell to Freddie Mac and Fannie Mae.²⁰ Specifically, the GSEs sell off a “package”: the cash flows from an underlying mortgage pool guaranteed against default, minus an annual fee charged on unpaid balances. Fannie Mae and Freddie Mac can sell this package at a lower price than other private firms because their guarantee is implicitly backed up by the full faith and credit of the federal government. As indicated in Figure 15, the total MBS outstanding in 2003 and guaranteed by Fannie Mae and Freddie Mac was \$2,053,330,000.

In the second line of business, the GSEs issue debt and use the proceeds to invest, mostly in mortgages or in MBS. The implicit guarantee enables the firms to pay lower rates on the debt they issue, increasing the profitability of their investment in a portfolio of mortgages. As indicated in Figure 16, the total retained portfolios of whole mortgages and MBS held by Fannie Mae and Freddie Mac in 2003 was \$1,562,411,000.

In principle, the subsidy provided by the implicit guarantee can be calculated. Fannie Mae and Freddie Mac issue debt in the same market in which other participants in the banking and

finance industry participate. The yield difference (“spread”) between the debt of the GSEs and that of other firms can be applied to the newly issued GSE debt to compute the funding advantage in any year arising from the yield difference. Of course, it is not quite straightforward to apply this principle and to produce credible estimates. The relevant benchmark estimate (i.e., the appropriate sector and bond rating) is not without controversy, and a comparison with broad aggregate indices combines bonds containing a variety of embedded options. Pearce and Miller (2001), among others, reported comparisons of the GSEs and AA-rated financial firms, suggesting that the agencies enjoyed a 37-basis-point spread. More sophisticated comparisons by Nothaft, Pearce, and Stevanovic (2002) suggest that this spread is 27 basis points between the GSEs and AA-minus-rated firms. A careful analysis of yields for GSE debt and the option-free debt issued by a selection of finance industry corporations, by Ambrose and Warga (2002), concludes that the GSEs enjoy a 25- to 29-basis-point spread over AA-rated bank bonds and a 37- to 46-basis-point spread over AA-rated firms. Table 2 provides a terse summary of available estimates. These estimates are in the range of the (41-basis-point) spread assumed by the Congressional Budget Office (CBO, 2001) in estimating the annual federal subsidy to the GSEs. This is similar to the (40-basis-point) estimated spread used by Passmore (2005) in a similar exercise.²¹

Estimates of this funding advantage have been used by the CBO (2001) to calculate the net present value of the implicit subsidy embedded in GSE debt issued in any year. The subsidy estimates are large, about \$5.5 billion per year for Fannie Mae’s newly issued debt during 1998, 1999, and 2000 and about \$4.3 billion per year for Freddie Mac’s newly issued debt during 1998, 1999, and 2000.²²

²⁰ In this way, the banks and thrifts benefit from the elimination of credit risk and from the lower capital requirements imposed on guaranteed MBS rather than on an equivalent balance of whole mortgages.

²¹ Many of these estimates have been scrutinized and criticized by the GSEs themselves, and there is still considerable controversy about the magnitudes of the appropriate GSE spread. See Blinder, Flannery, and Kmihachi (2004).

²² The aggregate annual subsidy, including tax and regulation subsidies, was estimated to be \$10.6 billion in 2000 for Fannie Mae and Freddie Mac (and \$13.6 billion with the subsidies to the FHLBs included) (CBO, 2001). For 2003, the subsidy to Freddie Mac and Fannie Mae arising from their federal charters was estimated to be \$19.6 billion (CBO, 2004).

Table 2
Estimates of GSE Funding Advantage

Author	Data	Comparison	Spread in basis points
U.S. Department of the Treasury (1996)	Bloomberg	Agency vs. A financials	53-55
Ambrose and Warga (1996)	Fixed Income Research Program	Fannie Mae vs. AA financials	37-46
		AA corporate	38-39
		A financials	56-72
		A corporate	55-65
Freddie Mac (1996)	Lehman Brothers relative value	Freddie Mac vs. AA and A	39
		AAA	23
Toevs (2000)	Lehman Brothers bond indices	Fannie Mae vs. AA indices	37
Pearce and Miller (2001)	Bloomberg	Agency vs. AA financials	37
Ambrose and Warga (2002)	Fixed Investment Securities Database	Fannie Mae and Freddie Mac vs. AA banks	25-29
Nothaft, Pearce, and Stevanovic (2002)	Fixed Investment Securities Database	Fannie Mae and Freddie Mac vs. AA debentures	30
		A debentures	45
		AA medium-term notes	27
		A medium-term notes	34
Passmore, Sherlund, and Burgess (2005)	Bloomberg and Lehman Brothers	Fannie Mae and Freddie Mac vs. AAA & AA financials:	
		68 firms	41
		44 firms	38
		15 firms	38

SOURCE: Nothaft, Pearce, and Stevanovic (2002); Ambrose and Warga (2002); and Passmore, Sherlund, and Burgess (2005).

Passmore (2005) extended the CBO reasoning, after deriving more precise estimates of spreads, to approximate the capitalized value of all currently outstanding debt issued by the GSEs. He concluded that the gross value of the subsidy is \$122 to \$182 billion.²³

ECONOMIC EFFECTS

The economic effects of the GSEs can be divided into two components: those that are reflected in the housing and mortgage market and within the firms and those that effect the broader

economy. Freddie Mac and Fannie Mae are large corporations, and as such their effects may be much broader than those affecting housing and home mortgage rates.

Housing Market Effects

The substantial subsidies arising from the competitive advantage of the GSEs means that mortgage rates for homeowners can be lower than they otherwise would be; that is, the subsidy can improve the lot of homeowners and home purchasers.

But, of course, in the first instance, the subsidy is provided to private profit-making firms with fiduciary duties to their shareholders. It is thus not obvious that all, or even most, of this public

²³ Passmore's calculations also suggest that the net subsidy to the GSEs is \$53 to \$106 billion and that 44 to 89 percent of the GSEs' current market value is attributable to this subsidy.

subsidy is passed through to homeowners. As documented by Hermalin and Jaffee (1996), the secondary market for mortgage securities (at least for those securities composed of loans conforming to the rules under which Fannie and Freddie operate) is hardly a textbook model of competition. The two GSEs are large, and each has a large market share of the conforming segment of the market. There are high barriers to entry, and the MBS product is more-or-less homogeneous. Moreover, mortgage originators have an inherent first-mover advantage in deciding which newly issued mortgages to sell to Fannie Mae and Freddie Mac. This may force the GSEs to pay a premium for the mortgages they purchase. These factors, imperfect competition and adverse selection, may mean that much of the subsidy accrues to the shareholders of the GSEs or to the owners of other financial institutions and not to homeowners.

In principle, the effects of the GSEs on mortgage rates can be calculated by computing and adjusting the spread between the interest rates on mortgages that conform to the loan limits and underwriting guidelines of the GSEs and the rates on other mortgages. As in the analysis of funding advantages, it is not quite straightforward to apply this principle and to produce credible estimates. (For example, most research compares the rates paid by borrowers with loans one dollar below the conforming limit with rates paid by borrowers with loans one dollar above the limit. But the latter group of borrowers differs from the former group, or else they surely would have made an additional one-dollar down payment and taken a conforming loan.)

Early analyses, e.g., by Hendershott and Shilling (1989), compare rates on jumbo and conforming mortgages and indicate that this spread was 24 to 39 basis points. More recent studies, e.g., Passmore, Sperks, and Ingpen (2002), McKenzie (2002), and CBO (2001), conclude that the spread is 18 to 23 basis points. These more recent studies differ mostly in their application of more-complex screens to ensure comparable data for conforming and nonconforming loans. Table 3, an extension of McKenzie (2002), summarizes these comparisons. More recent work by Passmore, Sherlund, and Burgess (2005) sug-

gests that this spread may be as low as 16 basis points.²⁴

Thus, it appears that the GSEs' funding advantage is about 30 to 40 basis points and the effect of this is to reduce mortgage rates by 16 to 25 basis points. Stated another way, a bit more than half of the subsidy rate to the GSEs is transmitted to homeowners in the form of reduced mortgage interest rates. Presumably, the remainder is transmitted to the shareholders of the enterprises or to the owners of other financial institutions.

In 1992, the Federal Housing Enterprises Financial Safety and Soundness Act established the regulatory structure of the GSEs and provided incentives for the GSEs to increase their services to lower-income households and neighborhoods. The legislation empowered HUD to set goals for "affordable housing," and HUD established three benchmark goals, which were ultimately finalized in December 1995.

The first goal (low-income housing) directs that a specified fraction of new loans purchased by the GSEs be originated by households with incomes below the area median. The second goal (underserved areas) requires that a specified fraction of mortgages be originated in census tracts with median incomes less than 90 percent of the area median, or else in census tracts with a minority population of at least 30 percent and with a tract median income of less than 120 percent of the area median income. The third goal (special affordable housing) targets mortgages originating in tracts with family incomes less than 60 percent of the area median, or else in tracts with incomes less than 80 percent of the area median and also located in specified low-income areas.

The goals originally set for 1996 were modest; for example, that 40 percent of the GSEs' mortgage purchases be loans to households with incomes below the area median. Over time, the HUD goals

²⁴ Of course, other reasons besides the greater liquidity provided by the GSEs could explain some of the spread between jumbo and conforming mortgages. Jumbo mortgages are generally prepaid more aggressively—borrowers have more at stake, if nothing else. This means that investors will require higher rates on jumbos merely to compensate. Borrowers with jumbo mortgages have better credit, and they make larger down payments. Thus the simple spread between jumbos and conforming mortgages, even if precisely measured, would exaggerate the effects of the GSEs in reducing interest rates. See, also, Ambrose, Buttner, and Thibodeau (2001), Heuson, Passmore, and Sparks (2001), or Woodward (2004b).

Table 3**Estimates of Reduction in Mortgage Interest Rates Attributable to GSEs**

Author	Time period	Region	Reduction in basis points
Hendershott and Shilling (1989)	1986	California	24-39
ICF Incorporated (1990)	1987	California	26
		7 States	23
Cotterman and Pearce (1996)	1989-93	California	25-50
		11 States	24-60
Pearce (2000)	1992-99	California	27
		11 States	24
Ambrose, Buttimer, and Thibodeau (2001)	1990-99	Dallas	16-24
Naranjo and Toevs (2002)	1986-98	U.S.	8-43
Passmore, Sparks, and Ingpen (2002)	1992-99	California	18-23
CBO (2001)	1995-2000	U.S.	23
McKenzie (2002)	1986-2000	U.S.	22
	1996-2000	U.S.	19
Ambrose, La Cour-Little, and Saunders (2004)	1995-97	U.S.	6
Woodward (2004b)	1996-2001	U.S.	35-52
Passmore, Sherlund, and Burgess (2005)	1997-2003	U.S.	15-18
Blinder, Flannery, and Lockhart (2006)	1997-2003	U.S.	23-29

SOURCE: McKenzie (2002); Ambrose, LaCour-Little, and Saunders (2004); Blinder, Flannery, and Lockhart (2006); Passmore, Sherlund, and Burgess (2005); and Woodward (2004b).

for new business have been increased; for example, 56 percent is the 2008 goal for the fraction of mortgage loans to lower-income households. Figures 18, 19, and 20 summarize the three goals and the effectiveness of the GSEs in meeting these goals.²⁵

Presumably, the rationale for these three goals is to “demonstrate” the profitability of these kinds of mortgages and ultimately to increase the supply of mortgage credit to the borrower groups and neighborhoods targeted by the regulations.²⁶ There is only minimal evidence on the effectiveness of this mandated GSE activity on mortgage

credit or housing outcomes. Evidence reported by Ambrose and Thibodeau (2004) relates only to geographically targeted lending (and is estimated from statistical analyses at the metropolitan level). This evidence provides very weak support for the effects of targeted GSE purchases on the availability of mortgage credit. Other work by Ambrose and Pennington-Cross (2000) concludes that GSE purchase rates are insensitive to local economic conditions. GSE activity does not help stabilize regional fluctuations. Detailed statistical analysis by Gyourko and Hu (2002) suggests that GSEs target low- and moderate-income borrowers who satisfy the GSEs’ purchase goals but who reside in relatively higher-income tracts.

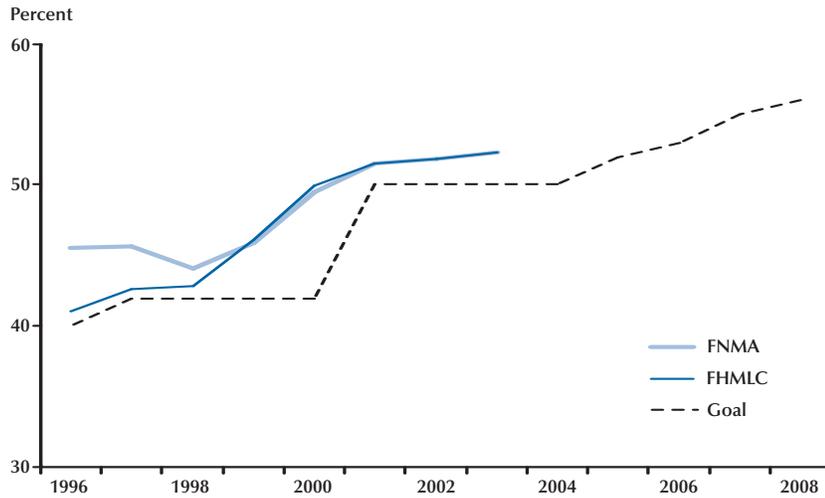
More recent research by Bostic and Gabriel (2005) analyzes census tract averages of GSE purchase activity and housing outcomes for census tracts with median incomes at the boundaries of those specified in the GSE housing goals and those specified in the 1977 Community Reinvestment

²⁵ In addition, beginning in 2005, HUD imposed specific numerical goals in these three areas for mortgages issued for new home purchases, excluding refinances.

²⁶ The demonstrations required to meet these mortgage purchase goals may require alternative mortgage products with different underwriting criteria and risk estimation. To the extent that these demonstrations are successful, they will increase liquidity to target borrowers and neighborhoods.

Figure 18

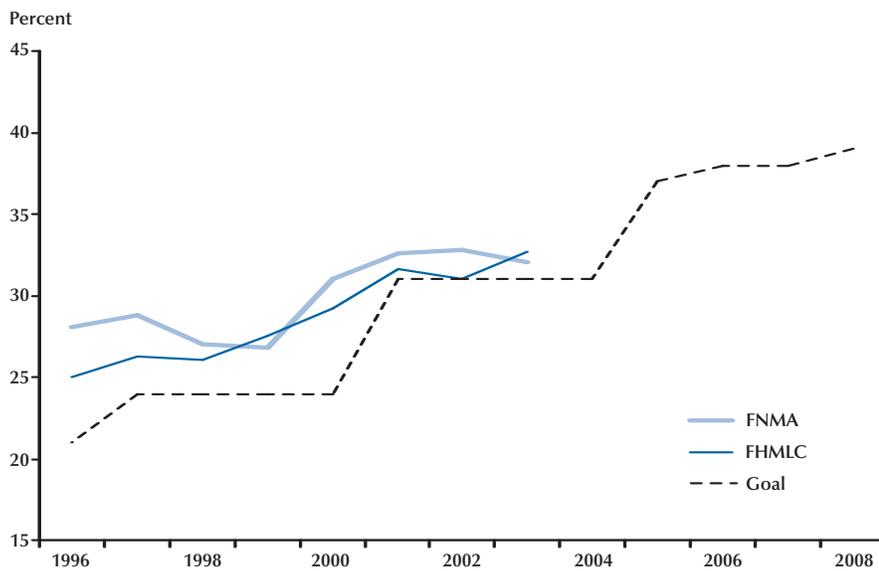
GSE Low- and Moderate-Income Housing Goal, 1996-2008: Percent of New Loans to Households Below Area Median Income



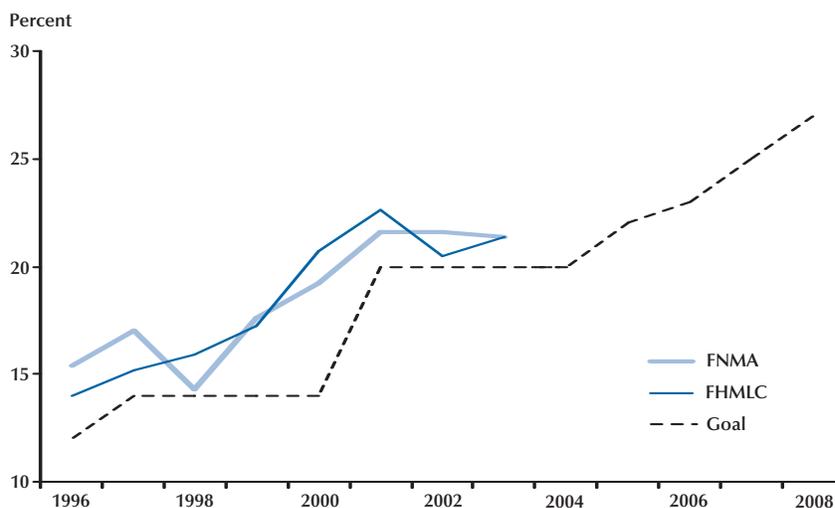
SOURCE: HUD Office of Policy Research and Development.

Figure 19

GSE Underserved-Area Housing Goal, 1996-2008: Percent of New Loans Credited Toward Goal



SOURCE: HUD Office of Policy Research and Development.

Figure 20**GSE Special Affordable Housing Goal, 1996-2008: Percent of New Loans Credited Toward Goal**

SOURCE: HUD Office of Policy Research and Development.

Act. An intensive analysis of California census tracts finds a positive association between GSE activity and housing market conditions, homeownership rates, and vacancies, but the association is generally not statistically meaningful. The authors conclude that “this research suggest[s] limited direct effects of GSE loan purchase activity on local housing markets.” Recent research by An, Bostic, and Deng (2006) suggests good reasons why this outcome might be anticipated. Their analysis is based on standard credit-rationing arguments. As the GSEs increase activity in selected neighborhoods to fulfill HUD mandates, they “cream” consumers with the best credit risks who then receive low-cost conventional mortgages instead of FHA loans. The FHA, which operates under a zero-profit constraint, is thus forced to increase its underwriting standards, thereby reducing credit availability to higher-risk borrowers. Using California data, An, Bostic, and Deng (2006) clearly show that increases in GSE lending activity in a census tract is associated with decreases in FHA activity. This is surely an area of research worthy of more attention.

Broader Effects on the Economy

The size and scale of the GSEs and their restricted lines of business provide the opportunity for them to stabilize residential mortgage markets and to cushion housing from the swings of monetary policy. This potential role was clearly recognized at the time the agencies were established (Aaron, 1972). To what extent can the GSEs offset the procyclical patterns of depository institutions in their holdings of residential mortgages? Increased stabilization of the housing sector could arise from the diversification opportunities provided by the MBS issued by the GSEs or by countercyclical patterns in the purchases of mortgages and MBS by the GSEs themselves. During recessions, MBS may be perceived to be sufficiently less risky than other investments, and this may reduce outflows of investment from the housing sector. The GSEs may also be more willing to act countercyclically than other actors in the capital market because of their “deeper pockets” (Peek and Wilcox, 2004).

There is some indirect evidence on this. Housing starts are no longer predicted by the

indicia of mortgage credit availability but by Treasury rates and mortgage interest rates (McGarvey and Meador, 1991). Mortgage rates themselves have converged greatly over geographic regions (Rudolph and Griffith, 1997), and regional variations in residential investment have diminished (Browne, 2000).

Peek and Wilcox have provided some direct evidence on the stabilization issue, exploring whether the growth of secondary mortgage markets generally and GSE activities specifically have affected the cyclicity of mortgage flows (Peek and Wilcox, 2003) and the cyclicity of housing starts and residential investment (Peek and Wilcox, 2004). Their findings, based on vector autoregressions covering the period 1968-2001, do support the hypothesis that the MBS mortgage origination activities of the GSEs have reduced the procyclicality of housing. Their results also suggest that GSE activities in managing retained portfolios are much less important in mitigating cyclical shocks than are GSE activities in issuing MBS. Recent work by Lehnert, Passmore, and Sherlund (2005) suggests a limited scope for MBS and portfolio purchases in affecting primary mortgage markets. But Lehnert and his collaborators do find that the creation of MBS does reduce mortgage rates.²⁷

Finally, Perli and Sack (2003) suggest that the mortgage-market hedging activities of the GSEs increase interest rate volatility and amplify movements in long-term interest rates.

OBSERVATIONS

The structure of the FHA and the GSEs is a classic example of the path-dependence of many economic activities. These institutions have played a leading role in the development of the primary and secondary mortgage markets and in defining the current structure of housing finance in the United States. Yet no one designing a

housing-finance system anew would configure it much like the current system.

The economic case for creating a mortgage market before it existed was strong, and the results are impressive. But the economic case for subsidizing housing consumption is weak. It is now recognized that there are some externalities from homeownership, and the institutional arrangements surrounding the housing market do facilitate “forced” savings (Boehm and Schlottmann, 2002). Green and White (1997) analyzed three national data sets, finding significant effects of household homeownership in reducing teenage pregnancy and increasing high-school completion rates. DiPasquale and Glaeser (1999) found a strong linkage between homeownership and a variety of measures of “social capital.” More recently, Haurin, Parcel, and Haurin (2002) found clear evidence of a link between homeownership and a variety of cognitive and behavioral outcomes for young children, suggesting that homeownership by younger adults increases the stock of human as well as social capital.

But no one suggests that there are external benefits to the *amount* of housing consumed. The FHA and the GSEs appear to have some small effects on homeownership, but most of their housing market effects are on quantities consumed.

The FHA may increase homeownership by a percent or so and may have stronger effects on minority homeownership rates. The operations of Fannie Mae and Freddie Mac may reduce mortgage interest rates by a quarter of a percent, and this in turn has some positive effect on homeownership. But most of the housing market effects are inframarginal, and much of the economic effects of the GSEs accrue to shareholders in the enterprises. It is currently possible to purchase a house valued at up to \$170,000 using an FHA loan, and the GSEs can buy and securitize mortgages on owner-occupied houses sold for up to about \$350,000. There is no conceivable externality that would justify public programs for the high-income purchasers of these dwellings. So, the first and perhaps the most practical policy prescription is to target these programs much more tightly.

Further increases in the goals set by HUD for the GSEs are one step in this direction. Increased

²⁷ More specifically, Lehnert, Passmore, and Sherlund (2005) find that large swings in GSE portfolio purchases do not affect interest rates. They also find that large swings in GSE-backed MBS issuance have very small effects on interest rates, but these effects are larger than the effects of portfolio purchases on interest rates.

targeting could also be promoted by lowering the conforming limits or, more realistically, by freezing the current limits for a good long time. But the best and simplest device to increase targeting would be simply to limit FHA and GSE mortgage activity to first-time home buyers. Less than one-third of home purchasers in any year are first-time buyers.²⁸ These buyers tend to be younger and of lower incomes—precisely the group for whom the putative externalities to individuals and families are largest.

These changes would, over time, substantially reduce the magnitude of the federal presence in the mortgage market.

There seems little public rationale for the extensive portfolio holdings of the GSEs. As noted in Figure 16, portfolio investment has quite recently become a major line of business for Fannie Mae and Freddie Mac, and their private profits are facilitated by their federal charters. But there is little or no evidence that these investments stabilize cyclical swings in home purchases or reduce interest rates to home purchasers. These large portfolios have real costs. Because the agencies bear the interest rate risk as well as the credit risk for these portfolios, it is crucial that these investments be hedged in derivative markets and in the capital market more generally. As noted above, there is some evidence (Perli and Sack, 2003) that the dynamic hedging activities of the GSEs increase the volatility of long-term interest rates. (See Jaffee, 2003, for a detailed review of the hedging programs undertaken by Fannie and Freddie.) It is equally important that the Office of Federal Housing Enterprise Oversight regulators monitor these hedging activities closely so they can ensure the safety and soundness of the agencies.²⁹ This has high monitoring and transactions costs, and the risks of inadequate regulation are quite large. Without these extensive portfolios,

which serve basically private interests, these transactions costs and risks are eliminated. It would seem prudent to limit substantially the size of the retained mortgage portfolio managed by the GSEs. This could easily be achieved by the natural liquidation of some existing positions. (See Jaffee, 2005, for one specific suggestion.)

The finding that MBS issuance has about the same effect on primary mortgage market interest rates as retained portfolio purchases (Lehnert, Passmore, and Sherlund, 2005) also suggests that reducing retained portfolios and increasing the issuance of MBS would have no adverse effects on housing consumers.

Of course, the mortgages and MBS liquidated by the GSEs would show up in the portfolios of some other investors. But there are many banks, institutional investors, and hedge funds, and there are only two GSEs. Moreover, these other institutions also invest elsewhere in the economy, not narrowly in housing, and diversification across a broader number of investors and a broader spectrum of investor classes can only reduce portfolio risk.

As noted previously, it is estimated that 44 to 89 percent of the GSEs' current market value is attributable to the federal subsidy to these institutions (Passmore, 2005). By focusing GSE activities on first-time buyers over time and by liquidating large fractions of the GSEs' retained portfolios, slowly, the institutions could be reshaped without calamitous effects on share values in the short run.

Finally, there is the skunk in the middle of the road. The implicit federal guarantee that GSE assets are insured is an enormous contingent liability for the federal government. Frame and White (2005) estimate, by a "back of the envelope calculation," that the contingent liability is currently about \$288 billion. Lucas and McDonald (2005) use an options-based approach to estimate the insurance value of the implicit government guarantee to the GSEs. Their base-case calculation indicates a guarantee value of \$7.9 billion over a 10-year period. There are two ways to limit this public exposure. One is to repudiate the implied guarantee by some form of explicit non-guarantee. This would probably be hard to do politically, at

²⁸ Indeed, in 2000 it was estimated that 27 percent of the mortgages bought by the GSEs were originated by first-time homebuyers (see www.huduser.org/Datasets/GSE/Profiles19_00.pdf).

²⁹ Of course, Freddie Mac and Fannie Mae could adopt financial strategies to mitigate this interest rate risk completely, by issuing long-term callable notes to finance their portfolios of long-term mortgage assets (See Poole, 2005, for example). But, as noted by Woodward (2004a), the GSEs have incentives *not* to hedge their investments fully.

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least in a convincing fashion.³⁰ The alternative is to begin charging the GSEs for their disaster insurance, which currently is provided free and which they can sell profitably to investors. Of course, we do not know the right price for this disaster insurance and it would take a major effort to produce a credible estimate.³¹

But we certainly know that the right price for this service is not zero, and this provides a clear basis for a guarantee fee imposed by the taxpayers on loans insured by Fannie Mae and Freddie Mac.

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³⁰ And if it were done in a convincing fashion, the GSEs would lose much of their market values overnight.

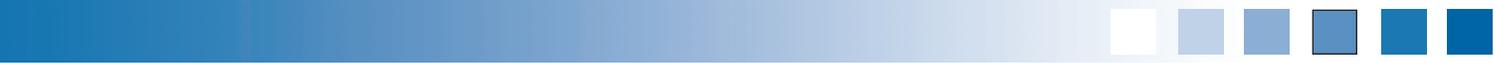
³¹ In taking this proposal seriously, it is worth recalling the experience of Sallie Mae, the Student Loan Marketing Corporation, a GSE that was successfully privatized in an orderly manner between 1996 and 2004. The imperative for privatization arose in response to congressional imposition of an offset fee of 30 basis points per annum on all loans held or guaranteed by Sallie Mae. The guarantee fee provided enough of an incentive to make privatization more attractive than operation under a federal charter. (See Lea, 2005, for a highly illuminating exposition.)

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Commentary

John C. Weicher

Let me start by explaining my perspective on federal housing credit programs. During 2001-05, I served as Federal Housing Administration (FHA) Commissioner at the Department of Housing and Urban Development (HUD) and also Assistant Secretary for Housing. I managed the FHA programs and was, therefore, responsible for half a trillion dollars of mortgage insurance exposure backed by the full faith and credit of the government of the United States. I was also the “mission regulator” for Fannie Mae and Freddie Mac—not the safety and soundness regulator (I need to make that very clear)—responsible for the housing goals, new program approval, and a few other matters.

I was also at HUD during the administration of the first President Bush, running the Office of Policy Development and Research. In that capacity, I was responsible for developing an FHA reform proposal that was enacted in 1990, and also was the regulator for the government-sponsored enterprises (GSEs), regulating both their safety and soundness and public purpose. Earlier, I was chief economist at HUD in the mid-1970s. So, I have a fairly long historical perspective.

Quigley’s (2006) paper is well worth reading as an introduction to federal housing credit activities. He has a good sense of what is important. I follow his order in my comments: the FHA’s business, the FHA’s public purposes, and then similarly for the GSEs. I begin with a general point: Quigley is absolutely right about the path-dependency of housing policy. I’ve felt that way for years: “pres-

ent programs can be understood only from a historical perspective” (Weicher, 1980, p. 3). This is even truer now than it was 25 years ago.

THE BUSINESS OF THE FHA

The FHA is a business and a government agency. It is supposed to help people buy homes. It is also expected to operate at a profit. It has competitors in the private sector: the private mortgage insurers (PMIs) on the low-risk side, since the late 1950s; and the subprime lenders on the high-risk side, since the early 1990s. It also competes with the GSEs. The FHA has no protection from this competition. The FHA mortgage ceiling keeps the FHA out of the market for high-balance mortgages; it doesn’t keep anybody out of the FHA market. If the subprime lenders or the GSEs can take away the FHA’s business, it’s theirs.

The FHA has an obvious advantage over PMIs and subprime lenders. FHA insurance carries the full faith and credit of the government of the United States. Conversely, it has the disadvantage of being a government agency—being less flexible and having to obtain congressional approval for major changes in its activities. The net result is that the FHA does serve a market segment that its competitors apparently can’t, and it serves that market without losing money.

Quigley states that the FHA’s market share has declined systematically since the late 1950s. It is infuriatingly difficult to construct a consistent time series on FHA activity, or the home-mortgage

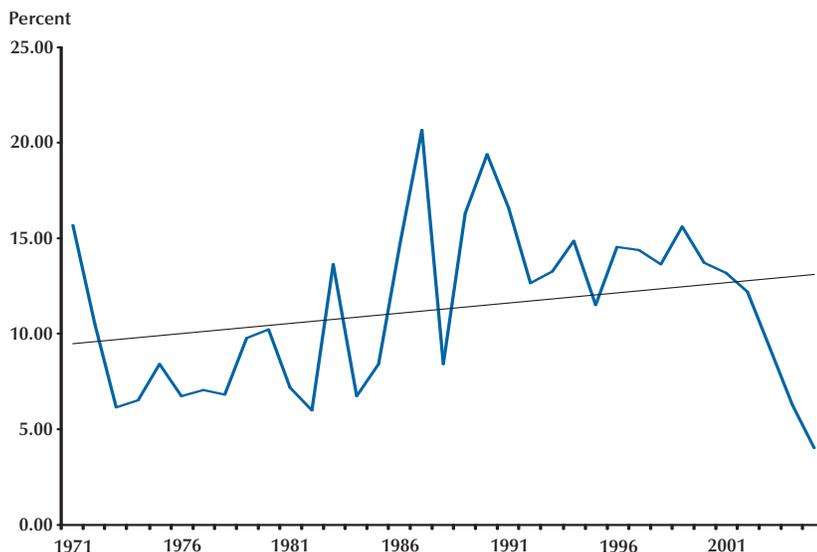
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Figure 1

FHA Share of the Home-Purchase Market, 1971-2005



NOTE: FHA purchases during the 1970s exclude homes for low-income families with subsidized mortgages insured under Section 235 of the National Housing Act and include refinances as well as home purchases. Variables are constructed as described in the text.

market for that matter, but Quigley's strenuous effort to overcome the limitations (his Figure 3) misinterprets the trend. FHA's modern period began in the early 1970s, when the Government National Mortgage Association (Ginnie Mae) began issuing securities backed by pools of FHA-insured mortgages; these mortgage-backed securities (MBS) increased investor demand for FHA loans and gave the FHA a new importance in the mortgage market. This is masked in Figure 3 by the peak around 1970 that was caused by the Section 235 subsidized-homeownership program, in which about 500,000 low-income families bought homes with interest rate subsidies on FHA-insured mortgages between 1969 and 1974. In addition, Figure 3 includes refinances as well as home-purchase loans. The FHA's overall market share has a strong negative correlation with the share of refinances in the mortgage market. FHA homeowners take advantage of low rates by refinancing, like other homeowners; but about half of them refinance out of the FHA.

The most appropriate way to measure the FHA's market share is to look at home-purchase loans as a share of the home-purchase market, excluding the Section 235 program. Consistent data for FHA home-purchase loans are available since 1980; consistent data on total FHA endorsements are available since 1971. Figure 1 reports the FHA's share of the unsubsidized home-purchase market since 1971, measured by the number of homes rather than the dollar volume of mortgage originations.¹ For 1971-79, refinances are included and, thus, the FHA's market share in the early years is overstated. Very recently, anecdotal evidence suggests that investors have been active buyers of homes, intending to profit by resale. The FHA

¹ There are two HUD data sources for FHA home mortgages insured from 1971 through 1979: the *1979 Statistical Yearbook* (HUD, 1980) and the quarterly report on *U.S. Housing Market Conditions* (HUD, 2001). Typically the *Statistical Yearbook* reports about 10,000 to 15,000 fewer homes insured. Figure 1 uses the data from *U.S. Housing Market Conditions*, for consistency with later years. New-home sales are estimated by the Census Bureau, and existing-home sales by the National Association of Realtors; both are reported in *U.S. Housing Market Conditions*.

allows mortgage insurance only for owner-occupants. Investor purchases cannot be identified in any data series to my knowledge, so it is likely that the FHA's share in the past two or three years is understated. Throughout the period, homes bought for cash are included in the home-purchase market; such purchases seem to account typically for about 20 percent of all homes, and there does not appear to be a trend.

Since 1971, the FHA's share of the home-purchase market has been rising, not falling—the FHA's share has risen by 0.11 percent of the market annually. This trend is not statistically significant (t-ratio of 1.5), but it exists even though the inclusion of refinances in the numerator during the 1970s and investor purchases in the denominator during the 2000s both bias the trend in a downward direction. A similar but weaker trend exists for the period since 1980.

The FHA's market share has dropped in the past three years; it is premature to say whether this is a trend or a blip or the consequence of investor activity.² The FHA's demise has been predicted at regular intervals since at least 1973. I first came to HUD that year and was promptly told that the FHA was on its last legs because of competition from the private mortgage insurers. Since then, the FHA has insured 19 million home mortgages.

Quigley briefly mentions the FHA's multi-family business. He is correct that the subsidized-production programs greatly increased the FHA's role in this sector; even though the last of these was terminated in 1983, subsidized projects still account for about half of the FHA's total current multi-family portfolio. He is not correct, however, in saying that the relative importance of multi-family lending has systematically declined. The FHA's unsubsidized multi-family activity has been growing since 1992. Moreover, the FHA now is able to operate the programs without losing

money. This is primarily due to the Credit Reform Act of 1990. Before then, the FHA lost money on its multi-family programs and required an annual appropriation. The Act forced the FHA to operate on a more businesslike basis. It provided the impetus for an effort that began in 1991 and culminated in 2002, when the FHA was able first to break even and then to lower insurance premiums as its revenues continued to exceed losses. By 2004, the premium had been cut to 45 basis points, the lowest in FHA history, and volume was about four times as much as in 1991.

Nonetheless, FHA multi-family insurance is a difficult business. It is complicated—each deal is unique; it is staff-intensive—it constitutes 15 percent of the FHA's portfolio but requires two-thirds of the FHA's staff; it is political—each project is large, and both the project and the developer are locally important; and it is where the HUD scandals most often occur. Twice I've come to HUD in the aftermath of multi-family scandals—the first time knowing that's what I was doing and the second time finding out when I got there.

THE FHA'S PUBLIC PURPOSES

Quigley's main recommendation for the FHA is that it be limited to serving the first-time home-buyer. That's not a new idea; the original public purpose of the FHA was to promote homeownership, especially for young families buying their first home. That still is the purpose and the basic business.³ The overwhelming majority of FHA home-purchase loans are for first-time home-buyers—for the past seven to eight years they have accounted for 75 to 80 percent of all FHA-insured home-purchase loans. (For the VA, the share is just over 70 percent.) Also, about 35 to 40 percent of these first-time buyers are members of minority groups.

So, the FHA already is largely doing what Quigley recommends. But not entirely, and I don't think it needs to. Quigley seems to be saying that the FHA shouldn't insure refinances. I think

² The decline in FHA's business between 2003 and 2005 is paralleled by similar declines for the Department of Veterans Affairs (VA) mortgage guarantee program and for the PMIs. The FHA's total endorsements, including refinances, declined by 62 percent; VA guaranties by 69 percent; and PMI certificates by 37 percent. (Refinances are included for the FHA because home-purchase data are not available for the VA or PMIs.) This may suggest a general decline in the market for mortgage insurance, but such a conclusion is certainly premature; 2003 was the highest year in the past 35 for both the FHA and PMIs and the second highest for the VA.

³ The VA has gone the other way. Originally a veteran could use his VA entitlement only once; since 1974 it has been extended to homeowning veterans who are trading up.

they should. Most FHA refinances are “streamline” refinances, with no cash out; the homeowner is simply lowering the monthly mortgage payment. That helps the owner and reduces the FHA’s risk exposure. The FHA should be available for those FHA borrowers who want to refinance with the FHA.

It is less important, but I don’t see any reason to exclude current homeowners from “trading up”—or down, for that matter—through the FHA. Not many do. They generally are owners who don’t have a lot of equity in their current home; otherwise they would borrow through the conventional market. They may have a credit problem, which excludes them from the conventional conforming market. But if they meet the FHA’s more liberal underwriting standards and are willing to pay for the insurance, I think they should have the opportunity to use the FHA. It is probably better than they can do in the subprime market. Using the FHA makes it more likely that they will continue to be homeowners.

Quigley concludes that the FHA doesn’t increase homeownership very much—“by a percent or so,” and more for minority groups—and may accelerate it somewhat. I think he may be undervaluing these achievements, particularly the latter. Goodman and Nichols (1997) estimate that most families that qualify only for an FHA mortgage in year one qualify for a conventional loan by year six. They would not be permanently barred from homeownership in the absence of the FHA, they would just buy homes later. I think that accelerating home ownership is an important and valuable accomplishment, for several reasons:

1. We are starting to accumulate evidence that homeownership does have external benefits, particularly for children. If their parents become homeowners five years earlier, the children have five more years to benefit.
2. Homeownership creates wealth. The sooner you own a home, the better off you are likely to be, down the road. Buying a home has been as good an investment as buying stocks—not just during the inflationary 1970s or the past few

years, but also at the beginning of the stock market booms of the 1980s and 1990s, even though those were not boom periods for house values. A typical FHA first-time homebuyer probably puts about 3 percent down and pays another 3 percent in closing costs. Such a typical FHA first-time homebuyer in 1982, when the stock market started to rise, would have over the next five years paid off about 1.2 percent of the mortgage—not much, but enough to have raised his or her equity from 3 percent to 4.2 percent, almost by half. In addition, the value of the home would have risen by over one-quarter. That whole increase would have become part of the homeowner’s wealth. All told, the equity in the home would have risen more than fivefold. Even after paying a 6 percent commission to sell the house, the investment in the home would have outperformed the Standard and Poor’s (S&P) 500. During the 1990s boom, starting in 1992, homes and stocks performed about equally well over the next five years, and from the sixth year on, homes were a better investment. Comparisons using other broad indices are consistently more favorable to homeownership. (See Appendix A for details of the calculations.)

3. From a national perspective, homeownership is a significant factor toward a more equal distribution of wealth. In 1992, the Gini coefficient for the distribution of wealth was about 0.9 if home equity is omitted and about 0.8 if it is included. Similarly, the richest 1 percent of American households owned about 43 percent of all household wealth if home equity is omitted and about 34 percent if it is included (Weicher, 1997, p. 10). Those are large differences.

These seem to me to be valid reasons for a policy and program that accelerates homeownership.

I also differ with Quigley’s judgment that most FHA loans are inframarginal with respect to pro-

moting homeownership. The vast majority of FHA borrowers are stretching to buy a home. They make the minimum downpayment, and they have few assets above the amount needed for that downpayment and the closing costs. Further, they do not buy very expensive homes; the typical purchase price for an FHA homebuyer is still only about \$130,000. It is certainly possible that these homebuyers might buy a slightly smaller home for \$100,000 or so, but I think the FHA's impact is substantially on the margin.

The FHA has also had a public purpose of mortgage-market innovation. As Quigley mentions, the FHA pioneered what is now the standard mortgage—a long-term, self-amortizing loan, with a low down payment and level monthly payments. It also pioneered mortgage securitization, through Ginnie Mae, in the 1970s. These are major changes. The FHA has been less innovative recently. It did not pioneer the adjustable rate mortgage (ARM) or the hybrid ARM. For the past three years, the president's budget has included a proposal for a zero-down-payment mortgage for first-time homebuyers. As FHA commissioner, I believed that we knew how to price such an instrument and how to underwrite it and manage it. Congress has not approved it, at least at this writing. That is the reason for the FHA's less-innovative recent history. It requires an act of Congress to insure a new type of home mortgage. That takes time, often years, for good reasons and less-good reasons. The FHA has some history of getting bitten by its innovations, although that is mostly in its multi-family programs. With the full faith and credit of the government at risk, it is prudent to be cautious. People are always ready to sell you their new perpetual-motion machine. (On the other hand, if someone sells a new perpetual-motion machine to a powerful member of Congress, the FHA could find itself in the perpetual-motion machine business, willy-nilly.) Also, the FHA is required by law to have a certain net worth, as a protection against having to call on the U.S. Treasury. One consequence of this prudence is that the FHA's market share may drop when the market adopts a new instrument and the FHA cannot insure it. Hybrid ARMs are the

most recent example. It took two acts of Congress in the past four years for the FHA to be able to insure the most popular type of hybrid ARM.

THE BUSINESS OF THE GSEs

Fannie Mae and Freddie Mac have two lines of business: They buy conventional mortgages to hold in their own portfolios and they securitize mortgages, selling the securities to investors. For both GSEs, the dollar volume of their MBS is larger than their portfolios, but the portfolios are growing more rapidly. Also, for both, their portfolios account for the lion's share of their profits and the lion's share of the risk to the taxpayer. They are apparently also the source of most of their recent financial reporting problems.

The history of the GSEs suggests that they have long recognized the profitability of portfolio lending. Neither was originally expected to be in that business. Fannie Mae was expected to buy FHA mortgages when there was a "shortage" of mortgage credit and sell them when there was a "surplus." But almost since its creation in 1938 as a government agency, it was a net investor in mortgages, except when politically forced to sell, as in 1954. It did not become a securities issuer until 1981, more than a decade after Ginnie Mae and Freddie Mac (U.S. Department of Housing and Urban Development, 1987, Chap. 2). By the early 1990s, Fannie Mae's income from its portfolio accounted for almost three-quarters of its net income (U.S. Department of Housing and Urban Development, 1992, p. 22). That has continued; in 2003, its portfolio accounted for 85 percent of its net income (U.S. Office of Federal Housing Enterprise Oversight, 2005, Table 3).

Similarly, Freddie Mac was expected to help the savings and loan industry (its owners) in the same way, and it did so by issuing MBS. Freddie Mac was created in 1970 and issued its first MBS a year later. It held only a small portfolio; in 1990, the volume of its MBS was about 10 times the size of its portfolio and income from MBS guarantee fees was about three times the income from its portfolio (U.S. Department of Housing and Urban Development, 1991, p. 17). But once it became a

publicly owned corporation as a result of the Federal Institutions Reform, Recovery, and Enforcement Act of 1989, it went whole-heartedly into portfolio lending; at present its portfolio and MBS are almost equal. As with Fannie Mae, Freddie Mac's portfolio accounted for 85 percent of its net income in 2003 (U.S. Office of Federal Housing Enterprise Oversight, 2005, Table 13). Thus, there is good reason why the current policy discussion about GSE regulation is substantially focused on their portfolios.

In discussing the subsidy to the GSEs, Quigley suggests that this benefit might go in part to mortgage originators, because they can decide which mortgages to sell to the GSEs and perhaps force the GSEs to pay a premium for the better mortgages. I think any originator that followed such a strategy would face retribution from the GSEs. Differences in loan performance would be observable. The GSEs could charge higher guarantee fees, reduce the price for portfolio mortgages, or refuse to do business with any such originator. Thus, I believe the subsidy goes either to the borrower or to the GSE, mostly the latter.

One of the biggest issues in the current legislation is the House bill provision setting aside 5 percent of GSE profits in an affordable-housing fund. I do not favor this provision, but it is interesting to put it in the context of the subsidy. The Congressional Budget Office calculates that the retained subsidy over the five years from 1996 to 2000 totals about \$16.7 billion. The GSEs' profits over those five years total \$25.7 billion. The subsidy accounts for 65 percent of the GSEs' profits; the affordable-housing fund would require them to give 5 percent back. That does not seem like an efficient affordable-housing program.

One further point about the advantages of agency status, which Quigley briefly touches on: As a longtime resident of Washington, D.C., I cannot help noting that the local income tax that Fannie Mae has not had to pay would have been enough to balance the D.C. budget, year by year, in the early 1990s, and perhaps the city could have avoided the ignominy of a control board and the loss of some home-rule privileges.

THE GSEs' PUBLIC-POLICY PURPOSES

The congressional acts that chartered the GSEs require the GSEs to "provide ongoing assistance to the secondary market for residential mortgages (including activities relating to mortgages on housing for low- and moderate-income families involving a reasonable economic return that may be less than the return earned on other activities)" and to "promote access to mortgage credit throughout the Nation (including central cities, rural areas, and underserved areas)" (Federal National Mortgage Association Charter Act, Sections 301 (3) and (4); Federal Home Loan Mortgage Corporation Act, Sections 301 (b) (3) and (4)).

In 1992, the Federal Housing Enterprises Financial Safety and Soundness Act (FHEFSSA) quantified these purposes by establishing three affordable-housing goals. For two of these goals (low- and moderate-income housing and special affordable housing), the statute defined the goals and empowered HUD to determine the share of GSE mortgage purchases to be devoted to those goals; for the third (underserved areas), HUD was required to both define the goal and establish the numerical target. FHEFSSA also required HUD to consider "the ability of the enterprises to lead the industry in making mortgage credit available for low- and moderate-income families" in establishing the targets (FHEFSSA, Sections 1332 (b) (5), 1333 (a) (2) (D), and 1334 (b) (5)).

After a dozen years of experience, it is clear that the GSEs do not provide market leadership in the goal categories. Instead, the GSEs have generally underperformed the market. (See, for example, Bunce, 2002, and U.S. National Archives and Records Administration, 2004.) That is, the share of GSE purchases that falls into each of the goal categories is typically less than the share of the overall market that falls into those categories. This comparison is limited to mortgages to first-time homebuyers. It excludes refinances because the GSEs' public purpose is to promote homeownership and excludes rental housing because the market calculations are based on Home Mortgage Disclosure Act (HMDA) data. Less-

Table 1**GSE Housing Goal Performance Relative to the Conventional Conforming Market: Share of Single-Family Mortgages within Goal Categories (percent)**

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low- and moderate-income housing												
Fannie Mae	29.2	35.0	40.1	37.1	38.5	37.9	39.7	41.0	41.4	42.5	45.5	47.0
Freddie Mac	28.7	32.3	35.6	33.9	34.5	35.7	38.8	42.3	41.3	40.7	44.7	43.5
Conventional conforming market	34.4	38.9	41.8	41.4	42.2	42.1	42.8	44.8	43.9	42.9	44.6	44.6
Underserved areas												
Fannie Mae	18.3	18.2	22.5	22.8	23.3	21.8	21.3	21.3	23.4	24.0	26.0	26.3
Freddie Mac	18.6	17.6	19.2	19.1	19.6	19.7	20.0	21.5	22.2	22.4	25.3	23.4
Conventional conforming market	22.2	21.9	24.3	25.4	24.9	24.8	24.2	25.2	26.2	25.2	26.3	27.6
Special affordable housing												
Fannie Mae	6.3	8.8	11.4	10.5	11.6	11.3	12.4	13.2	13.7	14.6	16.1	16.8
Freddie Mac	6.5	7.8	9.2	8.9	9.4	10.0	12.2	14.0	14.0	13.5	16.0	15.3
Conventional conforming market	10.4	12.6	14.1	14.4	15.0	15.1	15.4	17.0	16.6	15.6	16.1	15.9

NOTE: Boldface numbers indicate that the GSE matched or led the conventional conforming market in that category for that year. GSE data for 1992-95 are calculated by the purchase year of the mortgage; GSE data for 1996-2003 and market data for all years are calculated by the origination year of the mortgage.

SOURCE: 1992-1995: Bunce (2002, Table A.1); 1996-2003: U.S. National Archives and Records Administration (2004, Table A.16).

precise calculations that include reasonable estimates of the multi-family housing market show the same pattern.

Table 1 compares GSE purchases in each goal category to the conventional conforming market through 2003, the latest available comparison. The market is defined to include manufactured home loans and the top half of the subprime market ("alt-A" and "A-minus" loans), both of which are purchased by the GSEs; it excludes FHA and VA loans and refinances. Data for the market come from HMDA data compiled by the Federal Reserve Board and are limited to metropolitan areas. The table shows that until very recently the GSEs have regularly lagged the market; loans in each goal category constitute a smaller share of each GSE's purchases than they do of the overall conventional conforming market. In 1992, for example, loans to low- and moderate-income borrowers constituted 29.2 percent of Fannie Mae's purchases and 28.7 percent of Freddie

Mac's, while they constituted 34.4 percent of the overall conventional conforming market. Other lenders, without the GSEs' agency status, devoted more of their purchases to mortgages for low- and moderate-income borrowers. The same is true for the other categories.

The table also shows that the GSEs have improved their performance over time. Indeed, Fannie Mae led or matched the market in two of the three goal categories in both 2002 and 2003 and Freddie Mac led the market once in 2002. (These are shown in boldface in the table.) Fannie Mae has typically performed somewhat better than Freddie Mac, except during 1999-2000. The GSE data are calculated on the basis of the year the mortgage was originated since 1996 because that is the basis on which HMDA data are reported. Unlike HMDA data, however, the GSE data include mortgages that are purchased after the origination year; thus they may overstate GSE performance relative to the market. (GSE data for 1992-95 are

Table 2**GSE Loans to First-Time Homebuyers: 1999-2003 Average (percent)**

	Fannie Mae	Freddie Mac	Conventional conforming market
All races/ethnic groups	26.0	26.2	38.5
All minority households	7.0	5.8	11.8
African-American and Hispanic households	4.3	3.4	8.2

SOURCE: Bunce and Gardner (2004).

reported on the basis of the year the GSE purchased the loan, regardless of origination year. This difference does not affect the trends or conclusions.)

It is important to distinguish “meeting the goals” from “leading the market.” With very few exceptions, Fannie Mae and Freddie Mac have met each goal in each year. But they have equally rarely led the market. The explanation is that the goals have always been set “below the market.” This dates back to 1992, when FHEFSSA established specific numerical targets for each goal, pending HUD rulemaking. The initial statutory targets turned out to be below the market. The goals have been raised every few years, by regulation; but, at the same time, the market has moved toward more extensively serving borrowers in the goal categories. The latest HUD regulation, promulgated in 2004 for the years 2005-08, does set the goals at the projected market levels, or more precisely within the projected market ranges, rising to the upper end of the projected range by 2008.

That housing goals have been set below the market is the simplest explanation for research findings that the GSEs have minimal impact on mortgage credit or housing outcomes. Quigley offers a different explanation. He cites a very recent unpublished paper by An and Bostic (2006), which argues that the housing goals are ineffective because they merely push the GSEs into competing with the FHA and taking part of the FHA’s market. I disagree with this interpretation. An and Bostic look at only one of the three goals (underserved areas) and, in fact, find no

impact from the increase in this goal between 1996 and 2000 in the census tracts that are targeted by the goal. Also, An and Bostic argue on theoretical grounds that the FHA would tighten its underwriting standards in response to greater GSE activity in the FHA’s market. In fact, the FHA relaxed its standards in 1995, as shown by higher default rates in the early policy years for post-1995 cohorts.⁴ More generally, the goals are set on the basis of a definition of “market” that excludes FHA and VA loans, and they include both multi-family and single-family housing. A far larger share of the multi-family market falls within each of the goal categories. The GSEs and conventional lenders have both argued that the impact of increasing the goals for 2005 would be largely felt in the multi-family market.⁵

The GSEs have done a poor job of serving first-time homebuyers, particularly minority first-time homebuyers. Table 2 compares GSE purchases of loans to first-time homebuyers with the share of first-time homebuyers in the conventional conforming markets. The comparison is not limited to metropolitan areas but covers the entire country; the data are derived from both the HMDA and the American Housing Survey. The comparison period ends in 2003 because the American Housing Survey is a biennial survey and the data

⁴ Specifics of the relaxation are stated in FHA Mortgagee Letter 95-7, issued January 27, 1995. Year-by-year claim and prepayment data for each cohort are reported in the annual actuarial studies of the Mutual Mortgage Insurance Fund; for example, Deloitte & Touche (2003, Appendix H).

⁵ Quigley (2006) actually cites a slightly later version of the paper than I have referenced, but Raphael Bostic informs me that the findings are not substantively different.

at present are available only through that year. While first-time homebuyers constituted just under 40 percent of all conventional conforming home-purchase loans during 1999-2003, they constituted just over 25 percent of each GSE's purchases. In the conventional conforming market, 8 percent of all loans went to African-American and Hispanic households, but less than 5 percent of each GSE's loans went to these households. These comparisons are somewhat biased in favor of the GSEs because their definition of "first-time homebuyer" is more liberal: The GSE definition is that a family did not own a home in the previous three years, whereas the market definition is that a family has never owned a home.

The GSE performance can also be measured through the Residential Finance Survey (RFS), conducted by the Census Bureau in conjunction with each decennial census. This survey includes interviews with both the borrower and the lender about each mortgage in the sample. Data for 2001 are very similar to those reported in Table 2 (Bunce and Gardner, 2004).

The GSEs also generally lag the market in home-purchase mortgages to all minority households, though to a much lesser extent. This means that they do a much better job of serving minority homeowners who are trading up. Fannie Mae at least may lead the market in this category. Once you own a home, the GSEs are more likely to buy the mortgage on your next house than they were to buy the mortgage on your first house. This perhaps gives point to Quigley's recommendation that the GSEs be limited to buying first-time homebuyer mortgages.

The weak performance of the GSEs in serving first-time homebuyers caused HUD to establish home-purchase subgoals in each category for 2005-08. For example, in 2005, the home-purchase subgoal for low- and moderate-income housing is set at 45 percent. This means that, whatever number of home-purchase loans the GSEs buy, 45 percent needs to be for low- and moderate-income families. There is no requirement for the GSEs to buy any particular number of home-purchase loans. If a GSE buys one million home-purchase loans in 2005, then 450,000 would need to be for low- and moderate-income families; if it

buys 100,000 home-purchase loans, then 45,000 would need to be for low- and moderate-income families. This subgoal is intended to ensure that the GSEs do focus on financing home purchases for families in the goal categories. It is as close as HUD could come, under FHEFSSA, to establishing a home-purchase goal. More systematic home-purchase or first-time homebuyer goals have been discussed as part of regulatory reform legislation. The value of these home-purchase subgoals is perhaps indicated by a statement from Fannie Mae that it did not quite meet the subgoals for low- and moderate-income homebuyers and underserved areas in 2005 (Greener, 2006). (This is not necessarily definitive; official goal performance is measured by HUD, using the data provided by the GSEs. HUD invariably calculates slightly different numbers than the GSEs.)

I want to conclude with an often-ignored issue. Through their agency status, the GSEs have an advantage not only over private mortgage lenders but also over private firms in other industries. They have used this advantage to move into markets for ancillary services, such as mortgage origination software and automated underwriting systems, and they have tried to move into mortgage insurance, title insurance, and creditor life and disability insurance (U.S. Department of Housing and Urban Development, 1987, pp. 46-50; and Weicher, 2001). Some of these new activities are a far cry from the secondary mortgage market. Most persistently, the GSEs have tried to move closer to originating mortgages, taking advantage of technological change. HUD's current authority to deny approval for new activities is sharply limited by FHEFSSA. This issue is fundamental and needs to be addressed in any regulatory reform legislation, but it is in danger of being overlooked.

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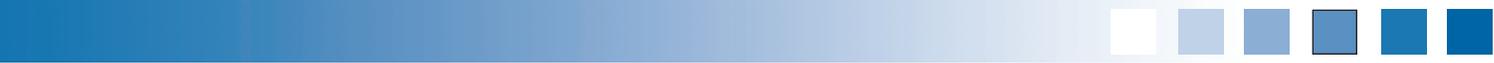
APPENDIX A

Comparative Rates of Return on Homeownership and the Stock Market

Starting date	July 1982	October 1992
Mortgage rate	15.25%	8.50%
Mortgage principal	\$48,500	\$48,500
Monthly payment	\$623	\$373
Outstanding principal balance after 5 years	\$47,911	\$46,313
Addition to home equity	\$589	\$2,187
House-price appreciation over 5 years	\$14,045	\$7,042
Home equity after 5 years	\$16,134	\$10,729
Equity/initial cost	5.378	3.576
Annual rate of return	40.0%	29.0%
Annual return net of 6 percent sales commission	32.6%	19.5%
<hr/>		
S&P 500 at starting date	185.834	1,067.052
S&P 500 after 5 years	680.134	2,640.585
Ratio	3.660	2.475
Annual return on S&P 500	29.6%	19.9%

NOTE: The comparison is based on a \$50,000 home-purchase price, with a 3 percent down payment and 3 percent closing costs.

SOURCES: Housing data: U.S. Department of Housing and Urban Development (2005, Historical Data tables); S&P 500 Index Total Returns monthly data: www.neatideas.com/data/index.htm.



On Asset-Liability Matching and Federal Deposit and Pension Insurance

Zvi Bodie

Asset-liability mismatch was a principal cause of the Savings and Loan Crisis of the 1980s. The federal government's failure to recognize the mismatch risk early on and manage it properly led to huge losses by the Federal Savings and Loan Insurance Corporation, which had to be covered by taxpayers. In dealing with the problems now facing the defined-benefit pension system and the Pension Benefit Guaranty Corporation (PBGC), the government seems to be making some of the same mistakes it made then. Among the causes is the fallacious belief that because pension funds have a long time horizon the risk of investing in equities is negligible. In fact, the opposite is true. Moreover, for the PBGC, the mismatch risk is magnified by moral hazard and adverse selection. Distressed companies facing the prospect of bankruptcy have an incentive to underfund their pension plans and adopt risky investment strategies; healthy companies have an incentive to terminate their plans and exit the system. The paper explores some ways to limit the costs of a potential PBGC bailout.

Federal Reserve Bank of St. Louis *Review*, July/August 2006, 88(4), pp. 323-29.

INTRODUCTION

Financial crises have a nasty habit of recurring, but never in precisely the same way. The differences can obscure the similarities, which makes it difficult—but not impossible—to learn from our mistakes. In the 1980s we had a long and costly learning experience with deposit insurance—the Savings and Loan (S&L) Crisis. It finally ended with a large taxpayer bailout and the dismantling of the Federal Saving and Loan Insurance Corporation (FSLIC).

Now we face a crisis with the federal corporation that guarantees private pensions—the Pension Benefit Guaranty Corporation (PBGC). The current crisis did not follow from some perfect storm of unforeseeable factors. It was largely caused by the same factor that led to the S&L Crisis and the demise of the FSLIC: a mismatch between assets and liabilities.

Perhaps the reason I was invited to speak at this conference is that long ago, in 1991, I explicitly

warned that such a crisis might occur.¹ So I want to express my deep gratitude to the organizers of this conference for giving me the opportunity to say, “I told you so.”

A BRIEF DIGRESSION ON THE COST OF FINANCIAL GUARANTEES

Before discussing how and why the PBGC got into this mess, there is a fundamental point

¹ The occasion was a conference held by the Federal Reserve Bank of Cleveland in May 1991. The proceedings are published in Sniderman (1993). Commenting on a paper delivered by Kathleen Utgoff, who had just left the job of executive director of the PBGC, I said this: “[Kathleen] seems reasonably confident that almost all of the major perverse incentive problems facing the [PBGC] have been fixed, while I do not. In particular, I am concerned that unless the PBGC can impose some restrictions on the pension fund investment practices of financially weak plan sponsors, it may well face a FSLIC-type crisis. Indeed, failure to understand the important role of investment policy in determining the exposure of the government guarantee fund was the critical factor in the severity of the FSLIC crisis. I believe that similar factors are at work in the pension arena, and understanding them may help to avert a crisis for the PBGC” (Bodie, 1993, p. 161).

Zvi Bodie is a professor of finance and economics at the Boston University School of Management.

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Bodie

that I need to establish about the cost of providing financial guarantees.² Guarantees such as deposit or pension insurance oblige the guarantor to make the promised payment if the bank or pension fund fails to do so. The economic loss to the guarantor is equal to the difference between the promised payment on the guaranteed contract and the price received from the sale of the assets that are available from the issuer as collateral for this obligation. This difference is called the “shortfall.” All assets of the liability issuer that the guarantor has recourse to seize are called “collateral.”

To sustain itself, *the guarantor must charge a premium large enough to cover both actuarial loss experience and operating costs.* Viability is achieved by a mixture of adequate premiums, control of operating costs, and control of the frequency and the severity of shortfall losses.

For example, let us set the premium equal to the cost of a single guarantee. For simplicity, assume that there are no operating costs. If the value of collateral assets, V , exceeds the promised payments, B , the guarantor keeps the premium and pays nothing. But if the value of assets is less than the promised payments, the guarantor must pay the difference, $B - V$. The guarantor’s maximum profit is equal to the premium plus interest earned from investing the premium prior to payment of losses or expiration of the guarantee. This maximum profit is diminished by the shortfall or loss experience from issuer defaults. The guarantor’s profit function is thus given by

$$P(1+r) - \max[0, B - V],$$

where P is the premium and r is the interest rate.

The guarantor bears the full downside risk of the collateral assets. It does not, however, participate in the upside gains that an owner of those assets would receive. Because of this asymmetry, the guarantor’s expected loss is an increasing function of the volatility (i.e., standard deviation) of the difference between the promised payment B and the asset value V . Therefore, to sustain themselves as viable economic entities without cross-subsidies from other insured institutions or from taxpayer funds, *the guarantor must charge a*

premium that is directly related to the volatility of the difference between the market value of the guaranteed payment and the market value of the assets serving as collateral.

THE CURRENT PENSION INSURANCE MESS

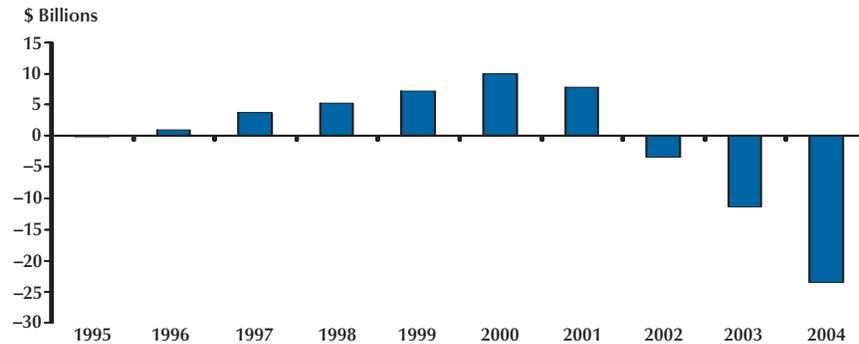
The PBGC insures the pension benefits of the 44 million Americans covered by private defined-benefit pension plans. Traditional pension plans of the defined-benefit type have been declining in relative importance in recent years. Companies are (legally) terminating them and replacing them with “defined contribution” plans such as 401(k) plans that amount to tax-deferred private savings plans. The number of private defined-benefit plans peaked in the mid-1980s at 112,000. At that time, about 40 percent of American workers were covered by them. Over the past two decades, the number of plans has fallen to just over 31,000 plans, which cover only one worker in five. No large companies have started defined-benefit plans in recent years.

When a PBGC-insured pension plan is terminated with insufficient assets to pay the benefits promised to employees—typically, after an employer bankruptcy—the PBGC takes it over and makes up the shortfall. There is a cap on the insured benefit, however, which is currently \$45,000 per employee per year.

The expressed purpose of establishing the PBGC was to insure a minimum level of promised defined-benefit pensions against default risk of the plan sponsor. However, if firms can transfer their pension obligations to the PBGC, then the government effectively pays a portion of the workers’ total compensation because these obligations are linked to workers’ pay. The size of this government subsidy can be large. Similarly, PBGC insurance has served as a less visible way to guarantee the debt of financially troubled firms than guaranteeing the bonds issued by these firms.

By law, the PBGC is supposed to finance all of its operations from three sources: (i) the premiums it collects from companies that still sponsor defined-benefit plans, (ii) the assets it recovers from terminated underfunded plans, and (iii) the

² This section is based on Merton and Bodie (1992).

Figure 1**PBGC's Net Financial Position****Table 1****PBGC's Net Financial Position (billions of dollars)**

Program	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Single-employer	-0.315	0.869	3.481	5.012	7.038	9.704	7.732	-3.638	-11.238	-23.305
Multi-employer	0.192	0.124	0.219	0.341	0.199	0.267	0.116	0.158	-0.261	-0.236
Both combined	-0.123	0.993	3.700	5.353	7.237	9.971	7.848	-3.48	-11.499	-23.541

interest, dividends, and capital gains it earns on its accumulated reserves. Premiums come from a charge to plan sponsors of \$19 dollars per single-employer plan participant and \$2.60 for multi-employer participants.³ There is also a variable premium charged to single-employer sponsors with significant underfunding. The charge is \$9 per \$1,000 of unfunded vested benefits.

Significantly, the funding requirements and premiums charged by the PBGC are completely unrelated to the way pension assets are invested. *A plan sponsor with 100 percent invested in equities has the same funding requirement and pays the same premium as a sponsor with 100 percent in fixed-income securities.*

The PBGC now has a big deficit to cover. In its annual report, the PBGC presents a balance-sheet measure called “net position,” which amounts to

its assets minus its liabilities evaluated at current market prices. The liability figure is the present value of the future benefits that have already become or are about to become an obligation of the PBGC as a result of bankrupt underfunded plans. If this net position is negative, it is a rough estimate of the extra money the PBGC would have to set aside today in the form of income-producing assets to satisfy all claims.

On November 15, 2004, the PBGC released its annual report for fiscal year 2004, which ended on September 30. It contains a financial summary showing the net positions for single-employer and multi-employer programs going back to 1995 (see Figure 1 and Table 1).

The trend is negative in both the single-employer and multi-employer programs, but the magnitude of the problem is much larger in the former. In 1996, the single-employer program's net position was positive—that is, in surplus—and it stayed positive until 2001, when it reached

³ Since this paper was written, the premium was raised from \$19 to \$30 per insured person. For the most recent annual report, see www.pbtc.gov/workers-retirees/about-pbtc/content/page13176.html.

Bodie

\$7.7 billion. But in the past three years, the ink has turned decidedly red: The deficit now stands at \$23.3 billion.

This deficit could get much bigger. As of the end of the 2004 fiscal year, the PBGC's estimate of the underfunding in plans sponsored by companies with credit ratings below "investment grade"—that is, at significant risk of default—was \$96 billion. But even the \$96 billion figure for struggling companies is not the upper limit on the possible deficit. The PBGC estimates that the total underfunding in single-employer plans exceeded \$450 billion, while multi-employer plans were under water to the tune of \$150 billion.⁴

Those who created the present mess are blaming a perfect storm of stagnant stock prices, low interest rates, and industrial restructuring for the PBGC's problems, as if nothing could have been done to prepare. But the current crisis did not follow from some unforeseeable perfect storm. I know this from personal experience: In the early 1990s, I was hired by the Department of Labor to analyze the financial health of defined-benefit pension plans. I concluded that there was a fundamental mismatch between the liabilities of these plans—future pension payouts—and the assets in which they were investing their reserves. This mismatch meant that even plans that were fully funded at the time could quickly become underfunded as a result of changes in interest rates or stock prices.

I submitted my report to the Department of Labor's Pension and Welfare Benefits Administration and briefed the executive director of the PBGC on my findings. I also made my conclusions known in the professional community. In an article published in the *Journal of Financial Services Research* in 1996—a time when the PBGC and most of the plans it insures had comfortable surpluses—I made this warning:

The possible "doomsday" scenario for the defined-benefit pension system would be an event such as a sharp and prolonged drop in stock prices that causes a sharp decline in the market value of pension asset portfolios.

⁴ The U.S. Congressional Budget Office (2005) estimates that the cost exposure of the government for federal pension insurance provided through the PBGC is currently about \$135 billion.

Underfunding becomes much more prevalent. Several major defaults of underfunded pension plans lead the PBGC to significantly raise premiums on the remaining plans in the system. Expectations of even higher premiums in the future lead sponsors of the well-funded plans to terminate their defined-benefit plans to avoid the PBGC "tax." They buy annuities to settle all benefits accrued under the terminated plans and replace them with generous defined-contribution plans, thus avoiding criticism from their employees or from the public. Ultimately, the United States could be left only with bankrupt defined-benefit plans with the benefits financed directly by taxpayers. (Bodie, 1996, p. 85)

It is worth noting that many of the pension plans that are weak today were fully funded in the late 1990s. Had they hedged their exposure to a decline in interest rates at that time, they would have easily survived the subsequent storm intact.

There are important similarities between the PBGC's current situation and the situation faced by the FSLIC in the 1980s. The FSLIC's problems began in the 1970s when interest rates became high and volatile. Even S&Ls that held well-diversified portfolios of mortgages became insolvent in the environment of rising interest rates of the 1970s because the mortgages were long term with fixed rates, while their deposit liabilities were short term and rolled over at increasingly higher market rates.

Still more S&Ls became insolvent in the late 1980s because the real estate market collapsed. Thus *both* of the market risks to which S&Ls were exposed—interest rate risk and real estate risk—took their toll. The biggest losses to the FSLIC were incurred not as a result of fraud or even of poorly diversified asset portfolios, but rather as a result of failure on the part of regulators to act quickly to stem the losses resulting from the asset-liability mismatch.

In the case of the PBGC, the nature of the liabilities of private defined-benefit pension plans is very different from the short-term deposit liabilities that were insured by the FSLIC. Therefore, the type of assets that match those liabilities is different. The similarity is that in both cases there is a mismatch between the market-risk of the assets

and liabilities that exposes the government guarantor to substantial shortfall risk.

Today, the PBGC appears to have been sucked into that doomsday scenario. Why was my warning, which was solicited by the government itself, completely ignored then, and why is it still being ignored by Congress in its proposed pension reform legislation?

The answer has its roots in a fundamentally flawed belief about the nature of stock market risk and reward, a belief that still guides the thinking and the practices of the vast majority of professional pension actuaries and investment advisors. It is the proposition that, although stocks are a risky investment in the short run, they are a safe bet in the long run.⁵

This mistaken proposition leads financial professionals to advise their corporate clients that they can significantly reduce the cost of funding their long-term obligations to defined-benefit plans by investing in diversified portfolios of stocks instead of matching the liabilities with a portfolio of bonds that delivers specified sums of cash at specified times.

The accounting profession has codified this fallacy in the way it treats pension expenses in company statements of profit and loss. Indeed, under current rules, if a company should choose to invest pension assets in bonds whose future cash inflows exactly match the pension benefits, the company would have to report higher pension expenses and lower profits than would an identical company that invests in stocks.

So what exactly is the fallacy? Consider a very simple example. Assume that ABC company has a defined-benefit plan for a single employee, Jane Jones. Jane has worked for the firm for a year and as a result has earned the right to a pension payment of \$1,000 when she retires 20 years from now. If the interest rate on bonds maturing in 20 years is 5 percent per year, the company would have to invest \$376.89 in such bonds today in order to be certain to have \$1,000 in 20 years to pay to Jane. Under U.S. pension law, the bonds would be held by a pension trust, so that even if ABC were to go bankrupt Jane would still receive her promised benefit.

The \$376.89 is the “present value” of the promised future pension benefit, and accounting logic dictates that it is the amount of ABC’s pension expense in the current year. In each subsequent year, no matter what happens to interest rates or stock prices, the value of the bond will exactly match the pension liability. Underfunding is impossible in these circumstances (as long as the ability of the bond issuer to pay its debts was in no doubt), and the PBGC will never have to pay a dime to Jane.

But ABC’s pension consultant insists that ABC consider an alternative. Because the pension payment is not due for another 20 years, ABC has the option of investing in stocks to earn an expected rate of return of 10 percent per year—a plausible figure based on past stock market returns. Sure, from year to year stock prices will fluctuate, but over two decades the ups and downs will cancel out. If it sets aside \$376.89 for Jane’s pension, ABC could—in fact, should—record a profit on the difference between the 10 percent long-run expected rate of return on stocks and the 5 percent interest rate on the accruing pension benefit.

What is wrong with this reasoning? Fluctuations in stock prices do not necessarily cancel out over time, no matter how long the time period. And contrary to the conventional actuarial reasoning, the risk of falling short of the target is actually *greater* in the long run than in the short run.

To see why, one need only check how much it would cost for ABC to buy insurance against such a shortfall. (The policy would make up the difference between \$1,000 and the value of the stocks in the pension portfolio.) Both in finance theory and in practice, the price of such insurance (called a put option) increases with the length of the time horizon.⁶

In our example, the cost of insuring against a shortfall if the stock portfolio is worth less than \$1,000 in 20 years would be about \$125. So to keep the upside potential of the stock portfolio and still be certain that at least \$1,000 would be available to pay Jane, ABC would have to lay out \$125 in addition to the \$376.89 invested in stocks. And

⁵ In fact, the opposite is true. This is shown in Bodie (1995).

⁶ See Bodie (1995) for a more complete explanation.

Bodie

this is assuming that all dividends from the stocks are reinvested. So investing in stocks instead of bonds does not lower the cost of the promised pension benefit unless Jane is obliged to bear the risk of not receiving it—or unless the PBGC is there to pick up the extra cost of guaranteeing the pension payout.

WHAT TO DO

Since the creation of the PBGC, many companies have terminated their defined-benefit plans and replaced them with less expensive defined-contribution plans, thereby shifting to retirees the risk of retirement portfolios that produce disappointing returns. Ironically, one incentive for doing this is the existence of PBGC insurance in its current form. The current system overcharges sponsors of healthy plans to subsidize the ailing ones. Thus we have a classic case of the law of unintended consequences: Insurance designed to strengthen the traditional pension system winds up accelerating its demise.

Congress is now wrestling with these issues as several pension reform bills are making their way through the Senate and House of Representatives. All of them include raising premiums, tightening the pension funding rules, improving the measurement and reporting of pension liabilities, and attempting to increase the discipline of private sponsors' funding decisions. Higher premiums—in particular, ones linked to the PBGC's risk exposure—would offset losses on future claims. More accurate measurement of plans' liabilities would make the existing funding rules and premium schedule more effective.

But none of the pension reform bills has a provision to take account of the asset-liability mismatch in setting PBGC premiums or to restrict the exposure of the PBGC by requiring closer matching. There are two basic ways to achieve this end. The first is for pension funds to invest directly in fixed-income instruments that match their pension liabilities. The second is by means of swap contracts, which are less intrusive and often less costly.

Swaps are used to either hedge risks, as in the case of interest rate swaps, or to insure against risks, as in the case of credit default swaps. A swap contract consists of two parties exchanging (or “swapping”) a series of payments at specified intervals (say, every six months) over a specified period of time (say, ten years). The payments are based on an agreed principal amount (called the “notional” amount), and there is no immediate payment of money between the parties. Thus, the swap contract itself provides no new funds to either party.

Around the world today banks and investment companies use swaps extensively to manage their exposures to currency, interest rate, credit default, and equity market risks and to lower their transaction costs. Pension funds have so far made relatively little use of swaps.⁷ The advantage of a swap contract is that it is noninvasive. Company pension plans can continue to hold their equity portfolios but eliminate the mismatch with their liabilities with a debt-for-equity swap.

Consider a company with large pension liabilities, which are fixed in nominal terms and have long durations. The company could enter in a swap that exchanged returns on a stock market index for a fixed interest rate. If the company (or its designated fund managers) is particularly good at managing the equity portfolio, the swap would allow the firm to retain that value added. In this way, it could eliminate the market risk of the portfolio but retain the value-adding risk of the superior fund-management performance.

There is no shortage of potential counterparties for such a transaction; any professional investor seeking to increase its exposure to equity returns would be interested.

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Deborah J. Lucas

The recent failures of several very large corporations with severely underfunded pension plans (e.g., United Airlines, U.S. Airways, and Bethlehem Steel) have made the risk exposure of the Pension Benefit Guaranty Corporation (PBGC), the government agency that insures defined-benefit plans, front page news. Further, the prospect that other large corporations are likely to follow has motivated legislators to introduce several new proposals aimed at limiting the PBGC's risk exposure. In his paper, Bodie (2006) reminds us of the straightforward but often ignored fact that much of the risk to the PBGC could be avoided if limits were imposed on the share of pension assets invested in stocks and other risky assets. Presumably, the lack of interest by Congress in imposing such restrictions is due to very strong resistance from the business community. The fundamental question, then, is why do managers believe that it is imperative to invest pension assets predominantly in stocks, despite the volatility in funding requirements that they have experienced following this strategy?

In these comments I will focus on two broad questions raised by Bodie's analysis: First, what are the main drivers of the PBGC's risk exposure? Second, why do pension managers choose to invest pension assets the way they do and when should the optimal hedge portfolio contain some stocks?

THE PBGC'S RISK EXPOSURE

The PBGC assumes responsibility for a plan's defined-benefit pension obligations when two conditions are simultaneously met: the sponsoring firm is financially distressed and the pension plan is sufficiently underfunded. As such, PBGC insurance is a compound put option held by defined-benefit plan sponsors, and PBGC liabilities can be valued using options pricing methods. Recently, Wendy Kiska and Marvin Phaup of the Congressional Budget Office (CBO) and I have developed an options-pricing model to quantify the PBGC's prospective net costs and to serve as a tool to evaluate the effect of various policy alternatives. The results described here are drawn from that CBO (2005) analysis.

To briefly describe the model, it employs a Monte Carlo simulation that takes into account the evolution of firm assets, firm liabilities, pension assets, and pension liabilities and their interaction with program rules. For simplicity, firm and pension assets are assumed to be stochastic, whereas firm and pension liabilities are taken to be deterministic. Both firm and pension assets are affected by correlated market risk, and taking into account this risk adds significantly to the estimated value of the put option. The model is calibrated using 2004 data covering the top 1,179 companies with defined-benefit pension plans.

Although reported underfunding in 2004 totaled \$450 billion, the forward-looking estimate of the PBGC's net cost is only a fraction of this. Over a 10-year horizon, we project a net cost of

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about \$63 billion; and this increases to \$119 billion over a 20-year horizon. The forward-looking cost is much lower than the amount of contemporaneous underfunding because, for any company, the probability of the joint occurrence of bankruptcy and underfunding is much lower than the probability that the pension plan is underfunded at a point in time. That is, as long as a firm remains solvent, it gradually must close any funding gap that arises, although shocks to pension assets and liabilities will continue to generate new episodes of underfunding.

The model is useful for quantifying the savings that might be realized from Bodie's suggestion of limiting the share of pension fund assets invested in stocks. In the base-case analysis, stocks are set to the typical 70 percent share of each company's asset portfolio. Limiting the stock share to 30 percent saves \$9.9 billion of the \$63 billion in forward-looking net costs. There are several reasons why this cap on stock holdings reduces but does not eliminate the forward-looking cost.

One reason that the PBGC remains at risk in this experiment is that stocks still comprise 30 percent of pension investments, so there is still an assumed mismatch between the risk of assets and liabilities. More importantly, however, when the PBGC takes over a pension plan, there is typically a jump-up in pension liabilities that averages 20 percent. For example, U.S. Air reported that it was 90 percent funded in the year prior to termination but was found to be only 45 percent funded at termination. "Termination liabilities" are systematically higher than "current liabilities" (the basis for funding requirements) because of factors such as the triggering of early-retirement benefits and the propensity of distressed companies to stop making contributions to their pension plans. This implies that even a fully funded plan can generate substantial costs if the sponsor becomes distressed. How regulation should deal with this phenomenon is not obvious. Forcing all firms to fund to the level of termination liabilities instead of current liabilities would result in systematic overfunding and would further discourage healthy firms from staying in the system.

Basing funding requirements on current liabilities rather than on the systematically higher

termination liabilities is one example of how underestimating liabilities increases costs to the PBGC. Liabilities also will be systematically underestimated if regulators allow firms to use too high a discount rate. This puts the PBGC at risk because it makes the target for full funding too low and reduces average funding levels. For example, the model implies that making permanent the higher discount rate that has been in effect for the past few years would add \$8.1 billion to net costs over a 10-year horizon, under the assumption that the original, risk-free discount rate is the correct rate. Again, though, forcing firms to value liabilities too conservatively can place an unfair burden on pension providers.

As Bodie mentions, there is considerably more interest in raising premiums or making them more sensitive to risk than in limiting investment risk. However, the premium increases being contemplated are far below the level the model suggests are actuarially fair. Abstracting from behavioral responses, the model generates a fair premium multiple of 6.5 times the current premium rate, whereas the leading proposal calls for an increase that is only 2.1 times the current rate. Potentially, plan managers' incentives for controlling risk could be improved by implementing risk-based premiums; but again it is unlikely that it is politically feasible to create fair differentials between low- and high-risk firms. For example, the model implies that a fair premium for below-investment-grade firms would have to be 18.5 times higher than it is at present to match the current cost to the PBGC for investment-grade firms. These kinds of estimates, both because of their magnitude and because they impose very high costs on firms that are the most distressed, suggest that, although incremental improvements could be made through premium reform, controlling the risk of the system through the premium structure is not feasible.

Bodie draws an analogy to the Savings and Loan (S&L) Crisis, where the mismatch in the market sensitivity of assets and liabilities created predictably huge losses when interest rates moved sharply higher. Also, as for the S&Ls, it is likely that regulatory forbearance will exacerbate the problems of the PBGC, this time because of the reluctance of Congress to force struggling com-

panies to devote scarce capital to funding their pension plans.

The propensity of S&Ls to take on excessive risk is often attributed to the incentives created by deposit insurance—the “down-side risk” is partially absorbed by the government. An important and unresolved question is whether PBGC insurance is an important reason why plan sponsors prefer to invest in stocks. Although many observers assume this to be the case, the CBO’s analysis suggests that, at least for healthy companies, the value of the insurance put option is very small and that those companies’ plan managers should largely internalize the investment risk. Consistent with this view, Rauh (2006) finds no evidence that higher-risk companies gamble more with pension plan assets than do lower-risk companies.

Why, then, do even healthy companies choose to invest such a high proportion of pension assets in stocks? Bodie argues that managers are misled by the fallacy that stocks always outperform bonds in the long run and so mistakenly believe that their strategy is less risky than it is. Although this is quite possibly a contributing factor for many managers, in the remainder of this discussion I will consider a rational alternative—that there is a role for stocks in hedging future pension liabilities because some liabilities behave more like stocks than like bonds.

WHAT SHOULD THE HEDGE PORTFOLIO LOOK LIKE?

Under Bodie’s assumption that future pension obligations are fixed nominal quantities, it is clear that nominal bonds provide a perfect hedge. In the example of a pension liability of \$1,000 that comes due in 10 years, putting away the present value of $\$1000/(1+r)^{10}$ in risk-free bonds ensures that the payoff will match the liability.

In practice, defined-benefit pensions typically link the level of the retirement annuity to a worker’s years of service and to wage earnings in the final year (or years) of service. This means that the future benefit is a random variable and that the best hedge portfolio is maximally correlated

with what wage earnings, and hence the benefit, will turn out to be. For example, the benefit for a worker expected to retire in 10 years might be 40 percent of wage earnings in 10 years. If the correct object to hedge is this broadly defined liability (i.e., the broadly defined PBO [pension benefit obligation] rather than the ABO [accrued benefit obligation]), then the best hedge is to invest an amount equal to the present value of the liability in a portfolio maximally correlated with earnings in 10 years.

This line of reasoning implies that if wage earnings and stock returns are correlated and if the broadly defined pension obligation is the right measure of the liability to hedge, then the optimal hedge portfolio will contain stocks as well as bonds. Intuitively, it seems likely that wages and stock returns should be correlated over long horizons. Black (1989) suggested this as a reason for pension funds to hold stocks, but he did not quantify the effect.

When wage earnings and stocks are correlated, the value of the pension liability can be modeled as a derivative on the stock market. Such a model can also be solved for the time-varying share of stock in the optimal hedge portfolio. An illustrative example of this is given here (see Lucas and Zeldes, 2006, for a much more complete analysis).

The model proposed for the joint process for stocks, human capital, and wage earnings is consistent with the near-zero correlation between wage earnings growth and stock returns observed at a 1-year horizon and also with the hypothesis that there is a higher correlation over longer periods. The model, as parameterized in Table A1, produces a correlation of 0.11 between wage earnings growth and stock returns over three years and 0.36 over five years.

Specifically, I assume that the aggregate value of stock, S , evolves according to

$$S_{t+h} = S_t \exp\left((r_s - \text{div} - 0.5\sigma_s^2)h + \sigma_s \sqrt{h}(dz_s)\right),$$

where dz_s is a draw from a standard normal distribution, the expected return on stocks is r_s , the dividend yield is div , and the standard deviation of stock returns is σ_s . The time step is h , taken in the calibrations to be one year.

Table 1**Simulation Results**

Initial wage replacement rate	0.6	0.5	0.3	0
Years to retirement	5	10	20	35
Present value using correct risk adjustment	0.218	0.179	0.109	0.040
Present value discounting at the risk-free rate	0.220	0.189	0.138	0.074
Present value discounting at the average stock return	0.189	0.140	0.076	0.026
Initial share in stocks to get the average discount rate	0.063	0.195	0.389	0.589
Share of cohort making it to 65 with the firm	0.766	0.5948	0.371	0.1694

The aggregate value of human capital, H , evolves according to

$$H_{t+h} = H_t \exp\left((\alpha - 0.5\sigma_w^2)h + \sigma_w \sqrt{h}(dz_w)\right) + \gamma h \left(T^* - \frac{H_t}{S_t}\right) S_t - W_t,$$

where dz_w is (idiosyncratic) risk and α is the average drift. Human capital slowly adjusts toward the long-run human capital to stock ratio, T^* , at an annual rate of γ . The stock of human capital is reduced by earnings at time t , W_t , which is analogous to a dividend. Finally, wage earnings evolve according to

$$W_{t+h} = W_t + \beta(hr_w H_t - W_t),$$

where next-period earnings equals current earnings plus a term that pulls earnings toward a target fraction of current human capital, r_w , at an annual rate of β .

With regard to pension benefits, the benefit is assumed to increase with service years at a rate of 2 percent per year. The lifetime annuity at retirement is based on wage earnings in the year of separation or retirement, times service years, times the 2 percent. Separation is stochastic, as is mortality. All parameters are reported in Table A1.

The results of the analysis are reported in Table 1. The table shows the implied present value of pension liabilities as a function of remaining years to retirement, under various assumptions about the discount rate for liabilities. Specifically, liabilities are discounted at the risk-free rate, the average assumed stock return, and using the deriv-

ative pricing implied by the model (and, hence, at the correct rate). The assumption that the correlation between wage earnings and stock returns increases over time suggests that for young workers the liability is more like a stock than a bond. For instance, for a worker with 20 years to retirement, the correct discount rate would have a 39 percent weighting on stocks and a 61 percent weighting on bonds. Wrongly assuming that the liability is like a bond and discounting at the risk-free rate overstates its value by more than 30 percent. Lucas and Zeldes (2006) show that the corresponding optimal hedge portfolio is more heavily skewed toward stocks for active workers than suggested by the discount-factor weights because of the dynamic nature of the portfolio.

CONCLUSIONS

The bottom line of this analysis is that there is a role for stocks in the investment portfolios of defined-benefit pension plans. The optimal share of pension assets invested in stocks increases with employment horizon and changes over time with the demographics of a firm's workforce. When workers separate from the firm, their benefits become bond-like and any stocks invested on their behalf should be reallocated to bonds. Bonds also are the natural hedge for firms whose obligations are predominantly to retired workers and their dependents. Firms with mostly young workers, however, have a legitimate reason to prefer to hold at least a portion of their investments in the stock market.

I conclude from this analysis that a blanket prohibition on stock investments in defined-benefit pension plans would be inappropriate and for some firms it could actually increase risk. Nevertheless, further analysis (Lucas and Zeldes, 2006) suggests that the typical firm holds far more in stocks than can be justified by this hedging demand. We argue there that Financial Accounting Standards Board rules for how pensions are accounted for in earnings may provide a strong incentive to overinvest in stocks, a point Bodie briefly alludes to also in his paper.

Finally, any policy that seriously addresses the PBGC funding gap will likely accelerate the switch from defined-benefit to defined-contribution pensions. Hence, the costs of PBGC insurance must be considered in the broader context of the goals of an employer-based retirement savings system.

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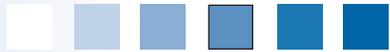
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APPENDIX

Table A1

Parameter Values for Simulations

Dividend yield	0.02
Standard deviation of stock return	0.18
Standard deviation of idiosyncratic wage return	0.02
Standard deviation of idiosyncratic own-firm return	0.2
Mean growth of human capital	0.02
Speed of reversion to target	0.1
Speed of reversion in wages	0.5
Target human to physical capital	2
Risk-free rate	0.02
Inputs to defined-benefit pension	
Initial replacement rate	Various
Years of earnings	Various
Separation and mortality	
Mortality rate \leq age 65	0.003
Mortality rate $>$ age 65	0.05
Separation rate $x <$ age 35	0.06
Separation rate age $34 < x <$ age 46	0.045
Separation rate age $45 < x <$ age 56	0.04



Should the Government Provide Insurance for Catastrophes?

J. David Cummins

This paper evaluates the need for a government role in insuring natural and man-made catastrophes in the United States. Although insurance markets have been stressed by major natural catastrophes, such as Hurricane Katrina, government involvement in the market for natural catastrophe insurance should be minimized to avoid crowding-out more efficient private market solutions, such as catastrophe bonds. Instead, government should facilitate the development of the private market by reducing regulatory barriers. The National Flood Insurance Program has failed to cover most property owners exposed to floods and is facing severe financial difficulties. The program needs to be drastically revised or replaced by private market alternatives, such as federal “make available” requirements with a federal reinsurance backstop. A federal role may be appropriate to insure against mega-terrorist events. However, any program should be minimally intrusive and carry a positive premium to avoid crowding-out private market alternatives.

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The frequency and severity of natural and man-made catastrophes have increased significantly in recent years. Natural catastrophes include events such as hurricanes, earthquakes, floods, and tsunamis; and man-made disasters include oil platform explosions, aviation disasters, and terrorism. As shown in more detail below, prior to 1986, the number of catastrophes rarely reached 150 per year; but since 1993, there have been at least 270 catastrophes per year.¹ Of the 40 most costly disasters since 1970, 34 have occurred since 1990 and 15 have occurred since 2000.

Hurricane Katrina, which made landfall on September 8, 2005, is the most costly catastrophic event in history, with projected insured losses in the range of \$40 to \$60 billion. The most costly prior natural catastrophe was Hurricane Andrew in 1992, which cost insurers \$22.3 billion. The most costly man-made disaster was the September 11, 2001, terrorist attack on the World Trade Center (WTC) in New York, which resulted in about \$40 billion in insured losses.

The increasing costs of catastrophes have significantly stressed insurance markets. Insurance works best for high-frequency, low-severity events, which are statistically independent and have probability distributions that are reasonably stationary over time. Catastrophic events, and particularly mega-catastrophes such as Katrina and the WTC terrorist attack, violate to some degree nearly all of the standard conditions for insurability. These are low-frequency, high-

¹ These figures are from Swiss Re (2006). Swiss Re defines a catastrophe as an event that causes a specified amount of monetary loss or loss of life above a certain threshold: In 2005, the monetary threshold for an event to be defined as a catastrophe is \$77.5 million and the fatality threshold is 20. The monetary threshold is adjusted over time so that the catastrophe count is consistent across years. Loss statistics are in terms of insured losses. Total losses, including uninsured losses and infrastructure, would be much larger.

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severity events that violate statistical independence by affecting many insured exposures at one time. Although considerable progress has been made in modeling natural catastrophes, conventional methods are much less effective in evaluating losses from terrorism, given that terrorists are continually modifying their strategies and tactics.

Insurance markets tend to respond adversely to mega-catastrophes. They respond to large events, particularly those that cause them to re-evaluate their estimates of the probability and severity of loss, by restricting the supply of insurance and raising the price of the limited coverage that is made available. This occurred, for example, following Hurricane Andrew in 1992 and the Northridge earthquake in 1994 and occurred again following the WTC terrorist attack. Because insurance plays an important role in the economy, instability in the availability and price of coverage generally leads to pressure for government intervention in insurance markets. State governments intervened in Florida and California following Andrew and Northridge, and the widespread availability of windstorm coverage in Florida and earthquake coverage in California seems to be largely attributable to government intervention. The federal government has provided subsidized flood insurance since 1968 and entered the market for terrorism insurance as reinsurer of last resort through the Terrorism Risk Insurance Act of 2002 (TRIA). Governments in several other industrialized nations, including France, Germany, Spain, and the United Kingdom, also have intervened in catastrophe insurance markets.

The objective of this paper is to evaluate the appropriateness of government intervention in catastrophe insurance markets with a particular focus on mega-catastrophes, both natural and man-made. The paper begins with a statistical overview of the recent history of catastrophes and then turns to a discussion of the insurability of such events through the private sector, considering the theoretical criteria usually associated with insurable events. The resources of the U.S. insurance industry and the global reinsurance industry are then evaluated to provide perspective on the insurability of large catastrophes. The last major section

of the paper evaluates potential public and private sector solutions to the catastrophe insurance problem, considering alternative risk financing mechanisms such as catastrophe (CAT) bonds as well as the most promising models for government involvement. The discussion includes an evaluation of the effectiveness of TRIA and the likely effect of sun-setting TRIA on the market for terrorism insurance.

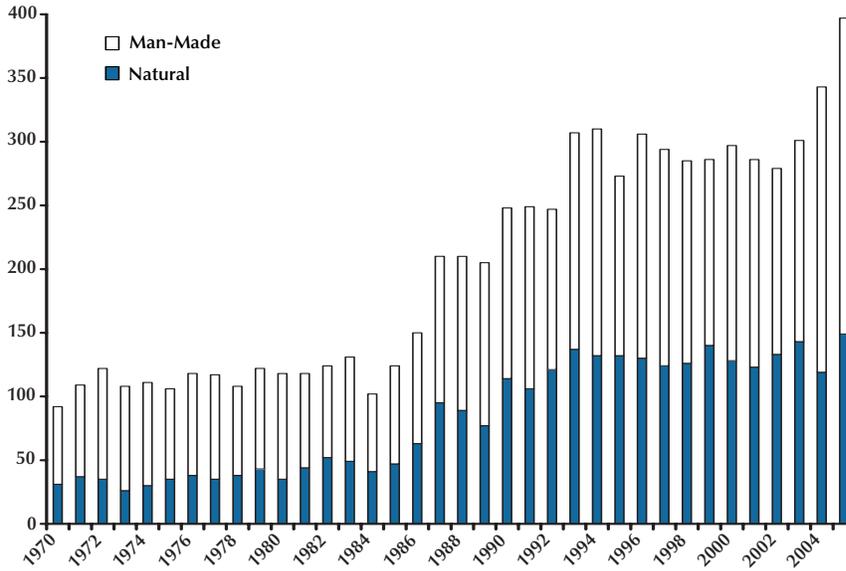
CATASTROPHES: THE RECENT HISTORY

The number of natural and man-made catastrophes since 1970 are shown in Figure 1. The figure indicates a clear upward trend in the number of catastrophes; and a linear trend line fitted to the total number of catastrophes has an adjusted R^2 of 0.87. There seems to be a pronounced shift in the data approximately in 1988 and another shift in 1994. Although scientists have not reached consensus on whether the frequency of natural catastrophes such as hurricanes has been increasing, the major reason for the increasing number of catastrophes is the accumulation of property values in disaster-prone areas such as California, Florida, the Gulf Coast, and, increasingly, Asia.

The value of insured catastrophe losses from natural and man-made events, adjusted to 2005 price levels, is shown in Figure 2. Because catastrophic events also cause significant losses to uninsured property, such as highways, sewer systems, and other infrastructure components, the total value of losses from such events is higher than Figure 2 suggests. However, the insured losses are relevant in evaluating the insurability of such events. Figure 2 shows that, except for the WTC event in 2001, natural disasters cause more insured losses than man-made events. However, the WTC event illustrates that terrorism has added a significant source of volatility that was not previously present. The severity data also show a shift in the late 1980s/early 1990s. Prior to 1987, total insured catastrophe losses never exceeded \$10 billion per year; but beginning in 1987, losses have exceeded \$10 billion in every year and have exceeded \$20 billion in 11 of 19 years. Following

Figure 1

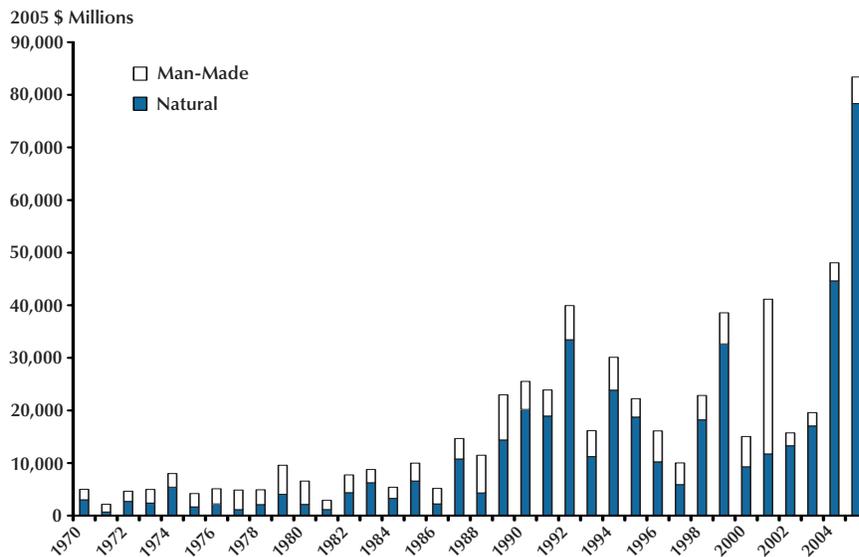
Number of Catastrophes, 1970-2005



SOURCE: Swiss Re (2006).

Figure 2

Worldwide Insured Catastrophe Losses, 1970-2005



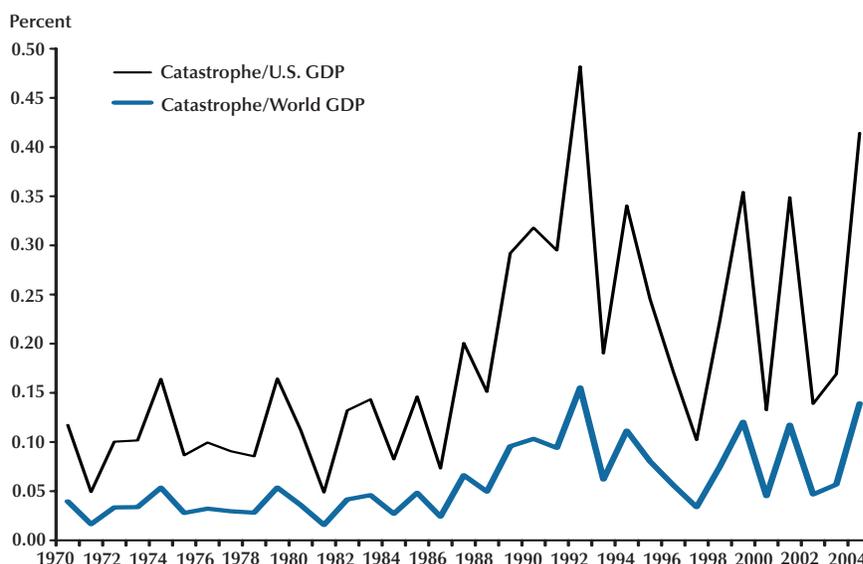
SOURCE: Swiss Re (2006).

Table 1**Top 40 Insured Catastrophe Losses: 1970-2005**

Insured loss ¹ (2005 \$ millions)	Victims ²	Date (start)	Event	Country/Area
45,000	1,326	8/24/2005	Hurricane Katrina	U.S. Gulf of Mexico, Bahamas
22,274	43	8/23/1992	Hurricane Andrew	U.S., Bahamas
20,716	2,982	9/11/2001	Terrorist attacks on WTC, Pentagon	U.S.
18,450	61	1/17/1994	Northridge earthquake (M 6.6)	U.S.
11,684	124	9/2/2004	Hurricane Ivan: damage to oil rigs	U.S., Caribbean
10,000	34	9/20/2005	Hurricane Rita: floods, damage to oil rigs	U.S., Gulf of Mexico, Cuba
10,000	35	10/16/2005	Hurricane Wilma	U.S., Caribbean
8,272	24	8/11/2004	Hurricane Charley	U.S., Caribbean
8,097	51	9/27/1991	Typhoon Mireille/No 19	Japan
6,864	95	1/25/1990	Winterstorm Daria	France, U.K. et al.
6,802	110	12/25/1999	Winterstorm Lothar	France, Switzerland et al.
6,610	71	9/15/1989	Hurricane Hugo	Puerto Rico, U.S.
5,170	38	8/26/2004	Hurricane Frances	U.S., Bahamas
5,157	22	10/15/1987	Storm and floods	France, U.K. et al.
4,770	64	2/25/1990	Winterstorm Vivian	Europe
4,737	26	9/22/1999	Typhoon Bart/No 18	Japan
4,230	600	9/20/1998	Hurricane Georges	U.S., Caribbean
4,136	3,034	9/13/2004	Hurricane Jeanne: floods, landslides	U.S., Haiti
3,707	45	9/6/2004	Typhoon Songda/No 18	Japan, South Korea
3,475	41	6/5/2001	Tropical Storm Allison	U.S.
3,403	45	5/2/2003	Thunderstorms, tornados, hail	U.S.
3,304	167	7/6/1988	Explosion on platform Piper Alpha	U.K.
3,169	6,425	1/17/1995	Great Hanshin earthquake (M 7.2), Kobe	Japan
2,814	45	12/27/1999	Winterstorm Martin	Spain, France, Switzerland
2,768	70	9/10/1999	Hurricane Floyd: floods	U.S., Bahamas et al.
2,692	59	10/1/1995	Hurricane Opal	U.S., Mexico
2,621	38	8/6/2002	Severe floods	Europe
2,438	26	10/20/1991	Forest fires affecting urban areas, drought	U.S.
2,427	0	4/6/2001	Hail, floods, and tornados	U.S.
2,366	246	3/10/1993	Blizzard and tornados	U.S., Mexico, Canada
2,233	20	12/3/1999	Winterstorm Anatol	Denmark, Sweden, U.K.
2,227	4	9/11/1992	Hurricane Iniki	U.S., N. Pacific Ocean
2,088	23	10/23/1989	Explosion in a petrochemical plant	U.S.
2,068	220,000	12/26/2004	Seaquake (MW 9.0): tsunamis	Indonesia, Thailand
2,024	0	8/29/1979	Hurricane Frederic	U.S.
1,993	39	9/5/1996	Hurricane Fran	U.S.
1,981	2,000	9/18/1974	Tropical Cyclone Fifi	Honduras
1,947	100	7/4/1997	Floods after heavy rain	Poland, Czech Republic et al.
1,923	116	9/3/1995	Hurricane Luis	Caribbean
1,887	18	8/1/2005	Winterstorm Erwin	Denmark, Sweden, U.K.

NOTE: ¹ Property and business interruption, excluding liability and life insurance losses. ² Dead and missing: Figures are approximate and from various sources.

SOURCE: Swiss Re (2006).

Figure 3**Catastrophe Losses Relative to World and U.S. GDP**

SOURCE: Catastrophe losses: Swiss Re (2005a); World GDP: The World Bank; U.S. GDP: U.S. Department of Commerce.

a record-year in 2004, when losses totaled \$48 billion, losses nearly doubled to \$80 billion in 2005 with the devastation of hurricanes Katrina, Rita, and Wilma. Katrina in particular not only was an unprecedented natural disaster from an insurance perspective but also raised significant questions about the U.S. system for assessing, mitigating, and financing disasters and disaster relief.²

The top 40 insured catastrophe losses since 1970 are shown in Table 1: 34 of the top 40 have occurred since 1990 and 15 have occurred since 2000; 7 of the 10 most costly hurricanes in U.S. history occurred during the 17-month period of August 2004 through October 2005 (Hartwig, 2005). All but 3 of the top 40 losses are from natural catastrophes, and the losses from the WTC terrorist attack are roughly six times the previous largest man-made catastrophe, which was the explosion and fire on the Piper Alpha oil platform in 1988.

² For an excellent analysis of the lessons to be learned from Katrina in terms of disaster assessment, prevention, mitigation, and financing, see Daniels, Kettl, and Kunreuther (2006).

The table also shows that the United States is the primary source of large catastrophe losses worldwide. In 2004, for example, 67.7 percent of worldwide insured catastrophe losses were North American (primarily U.S.) events (Swiss Re, 2005a); and in 2005, the North American total reached 87.1 percent of worldwide losses (Swiss Re, 2006).

Figure 3 places the catastrophe losses in a broader perspective by showing total insured catastrophe losses as percentages of world and U.S. gross domestic product (GDP). In relation to world GDP, catastrophe losses were less than 0.05 of 1 percent until the late 1980s and have fluctuated around 0.10 of 1 percent in more recent years. In relation to U.S. GDP, catastrophe losses were less than 0.20 of 1 percent until the late 1980s and have been above 0.30 of 1 percent in several years since 1990. There is a significant upward trend in both series, with adjusted R^2 values of around 0.35 in linear time trend regressions. Figure 3 suggests that catastrophe losses are large and volatile from the perspective of the insurance

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industry but are more manageable from an economywide or societal perspective.

THE INSURABILITY OF CATASTROPHE LOSSES

This section evaluates the insurability of catastrophe losses. The section begins with a discussion of the theoretical criteria for insurability and an analysis of the differences between natural and unintentional man-made catastrophes on the one hand and intentional events such as terrorism on the other. The section concludes with an evaluation of the resources of the insurance and global reinsurance industries and an economic evaluation of the insurance crises and cycles.

Criteria for Insurability

Individuals are averse to pure risk and are willing to pay amounts greater than the expected value of losses in return for transferring risk to an insurer.³ Most businesses also have a demand for risk transfer and, like consumers, are willing to pay more than the expected loss to transfer risk to another party. The amounts greater than expected losses that individuals and businesses are willing to pay for risk transfer give rise to gains from trade that have motivated the development of the insurance and reinsurance industries.

The role of the insurer is to assume risk from individuals and businesses and to diversify risk by pooling the losses of many policyholders. The statistical foundation of insurance is *the law of large numbers*. The role of insurers can be elucidated by specifying a simple statistical model of a risk pool. Let X_1, \dots, X_N be a random sample from a probability distribution with finite means μ_i and variances σ_i^2 , where X_i represents the loss suffered by the i th policyholder in a risk pool. It is helpful to assume that the X_i are normally distributed, although they are not necessarily independent.⁴ The law of large numbers then states that

$$(1) \quad \lim_{N \rightarrow \infty} \Pr \left[\left| \bar{X} - \bar{\mu} \right| < \varepsilon \right] = 1,$$

where

$$\bar{X} = \sum_i \frac{X_i}{N}$$

is the sample mean based on a realization of losses from the N policies,

$$\bar{\mu} = \sum_i \frac{\mu_i}{N}$$

is the average mean loss, and ε is an arbitrarily small number. Intuitively, the law of large numbers says that the sample mean becomes arbitrarily close to the population mean as the sample size increases. Thus, the expected loss is highly predictable in a sufficiently large sample.

With the normality assumption, we can use the central limit theorem to specify the amount of equity capital needed by the insurer. We assume that insurers hold equity capital to achieve a specified insolvency probability, ε . Insolvency probabilities are not driven to zero because holding capital in an insurance company is costly due to corporate income taxation, agency costs, regulatory costs, accounting rules, and other factors (Jaffee and Russell, 1997). The central limit theorem specifies that the following variable approaches normality as the sample size increases:

$$(2) \quad z = \frac{\sum_{i=1}^N X_i - N\bar{\mu}}{\sigma_N}$$

The parameter σ_N^2 , the insurer's loss portfolio variance, is defined as

$$(3) \quad \sigma_N^2 = \sum_{i=1}^N \sigma_i^2 + 2 \sum_{j=2}^N \sum_{i=1}^{j-1} \sigma_{ij},$$

where $\sigma_{ij} = \text{Cov}(X_i, X_j)$. The normal distribution implies that

$$(4) \quad \Pr \left[\frac{\sum_{i=1}^N X_i - N\bar{\mu}}{\sigma_N} < z_\varepsilon \right] = 1 - \varepsilon,$$

where z is the standard normal variate and z_ε is the value from the standard normal distribution

³ This discussion is based in part on analysis in Cummins and Weiss (2000).

⁴ The law of large numbers does not require normality. Normality is assumed here because it provides a convenient explanation of the role of equity capital in the insurance market.

such that $\Pr[z < z_\varepsilon] = 1 - \varepsilon$. The amount of equity capital needed to achieve a target insolvency probability of ε is $z_\varepsilon \sigma_N$, assuming that policyholder premiums cover the expected loss, $N\bar{\mu}$.

The standard normal result for equity capital can be used to illustrate the effects of pooling. Assume that the N risks in the portfolio are statistically independent, so that all of the covariances in equation (3) are zero. Then equity capital per policy is

$$(5) \quad \frac{z_\varepsilon \sigma_N}{N} = \frac{z_\varepsilon \sqrt{\bar{\sigma}^2}}{\sqrt{N}},$$

where

$$\bar{\sigma}^2 = \sum_{i=1}^N \sigma_i^2 / N$$

is the average variance. Thus, equity capital per policy goes to zero as N goes to infinity, implying that large insurers insuring independent risks with reasonably small variances can charge a premium very close to the expected value of loss.⁵ I call insurance markets with independent risks, moderate standard deviations per risk, and large N *locally insurable*. The U.S. market for personal automobile insurance is an example of a locally insurable market.

The motivation for reinsurance becomes apparent when we relax the assumptions under which risks are locally insurable. For example, reinsurance markets are likely to be required for risks with large variances and small N , even if we maintain for the moment the assumption that risks are statistically independent. Further motivation for the development of reinsurance markets is provided by relaxing the assumption that risks are independent. If risks are dependent, the amount of equity capital needed per risk to achieve a given insolvency target becomes

$$(6) \quad \frac{z_\varepsilon \sigma_N}{N} = \frac{\sqrt{N\bar{\sigma}^2 + N(N-1)\bar{\sigma}_{ij}}}{N},$$

⁵ Notice, however, that this does not imply that large insurers need no equity capital. The equity capital needed to achieve a target ruin probability of ε with independent risks is

$$z_\varepsilon \sqrt{N\bar{\sigma}^2},$$

which approaches infinity as N goes to infinity.

where $\bar{\sigma}_{ij}$ is the the average covariance among the N risks. It is easy to see that the amount of equity capital needed per policy approaches

$$z_\varepsilon \sqrt{\bar{\sigma}_{ij}} \text{ as } N \rightarrow \infty.$$

If the average covariance is small, the risks may still be locally insurable, but the market outcome is inefficient in that the risk charge per policy has not been reduced to approximately zero.

However, risks that are *locally dependent* may be *globally independent*, for example, the risk of tornadoes in the American Midwest versus Australia. This provides an economic motivation for reinsurance markets because insurers can reduce their prices relative to competitors by ceding the covariance risk to a reinsurer who can pool the risk with independent risks from other regions of the world. We call risks that are globally diversifiable through reinsurance *globally insurable*.

Implicit in this discussion are some additional criteria for insurability. One important criterion is that N be sufficiently large for the law of large numbers to operate such that the insurer achieves effective diversification either locally or globally. Also important is that $\bar{\sigma}^2$ and $\bar{\sigma}_{ij}$ (if the latter is non-zero) be sufficiently “small”—again to ensure that effective diversification takes place. If N is too small or $\bar{\sigma}^2$ and $\bar{\sigma}_{ij}$ too large, then the amount of capital the insurer must hold to achieve a sufficiently small insolvency probability may be too large for insurance to be feasible. Essentially, the cost of capital may push the price of insurance above the level that buyers are willing to pay for coverage, eliminating the gains from trade.

Another important implicit assumption is that sufficient data are available to enable the insurer to estimate the parameters of the loss distribution, μ_i and σ_i^2 , and the covariances among risks, σ_{ij} , if the risks are not independent. This is a non-trivial requirement, given that real-world risks are not identically distributed such that applicants for insurance have heterogeneous parameters. It is well-known that insurance markets can break down as a result of adverse selection if the insurer is not able to discriminate among risks (Rothschild and Stiglitz, 1976). A final requirement is that the

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loss distribution should be reasonably stationary so that parameters estimated from past data are reasonably good predictors of future loss distributions. If the loss distribution shifts significantly during short periods of time, such as one or two years, the insurer will be unable to estimate premiums or the required amount of equity capital and insurability will break down.

The violation of any of the principal insurability conditions may create situations where risks are neither locally nor globally insurable. However, if other conditions are satisfied, such risks may be *globally diversifiable* through capital markets. Consider the example of events with low frequency and very high severity, where the covariances among the individual risks making up a portfolio are also relatively high. Examples of such risks are unusually severe hurricanes and earthquakes striking geographical regions with high concentrations of property values. For example, modelers have estimated that a \$100 billion event in Florida or California has a probability of occurrence in the range of 1 in 100 (i.e., a “return period” of 100 years). The capacity of the insurance and reinsurance industries may be inadequate to insure such events.

However, events of this magnitude are small relative to the market capitalization of securities markets. Thus, by introducing securitized financial instruments representing insurance risk, catastrophic events in the \$100 billion range are diversifiable across the financial markets, even though they may not be diversifiable in global insurance and reinsurance markets. Such events also have relatively low correlations with securities returns, effectively providing an attractive source of diversification for investors. Securitization extends the scope of diversification from insurance and reinsurance markets to the entire securities market, thus breaking down the problem of small N , large σ 's, and intra-insurance market correlations, in much the same way as reinsurance can reduce or eliminate the problem of non-insurability on the local level. Diversifying insurance-linked risk across the securities market provides the motivation for CAT bonds, which are discussed in more detail below.

The final category of risks consists of events that are so severe that they may not be globally diversifiable even through securities markets. It has been estimated that a severe earthquake in Tokyo could cause losses in the range of \$2.1 to \$3.3 trillion, constituting from 44 to 70 percent of the GDP of Japan (Risk Management Solutions, 1995). Although it is possible that global securities markets could absorb a significant fraction of such a loss, the full loss is unlikely to be fully diversifiable. I call such events *cataclysmic*, or *globally undiversifiable*.

Losses from mega-terrorism events may also fall into the globally undiversifiable category. Such losses are similar in many ways to losses arising from war, which are generally not amenable to private market insurance or diversification solutions. In addition to sharing the problems of small N and large μ and σ with mega-losses from natural hazards, terrorism losses also pose the problem of being very difficult to estimate. Modelers have made significant progress in estimating losses from natural hazards. Modeling firms such as Applied Insurance Research, Equicat, and Risk Management Solutions have developed highly sophisticated models of natural hazard losses based on both statistical data and scientific models of hurricanes and earthquakes. The models have been parameterized using detailed mappings of exposures across the United States and in other major countries. The hurricane and earthquake perils are sufficiently stable in a statistical sense to give modelers confidence in their ability to predict the frequency and severity of future events and to enable insurers to use the models to manage their exposure to catastrophe risk.

Terrorism events are inherently much more difficult to estimate than natural catastrophes. Few statistical data exist that can be used to estimate the parameters of loss distributions. Data on terrorism activities obtained by the government are confidential for national security reasons and hence not available to insurers to assist in estimating premiums and loss exposure. Moreover, terrorists constantly change strategies and tactics, making any predictions from past data inherently unreliable. Terrorists are likely to engage in “target substitution,” shifting their attention to targets that

receive the least amount of security. Although some progress has been made in modeling the severity of mega-terrorism events, based on scientific knowledge about the effects of nuclear and conventional explosions and biological and radiation hazards, little information exists that can assist insurers in estimating the probability of terrorism losses. The possibility that terrorists could use weapons of mass destruction raises potential losses from mega-terrorism to levels far exceeding the potential losses from even the largest natural catastrophes.

Another major difference between terrorism and other types of catastrophes is that the frequency and severity of terrorist attacks are significantly affected by U.S. governmental policy. U.S. foreign policy directly impacts the motivation and likelihood of terrorist attacks from different militant factions. U.S. domestic policy and the success of government homeland security programs also affect the mitigation of terrorist attacks—both in preventing such attacks and mitigating the magnitude of any attack that does occur. Moreover, much of the information required to predict terrorist events is likely to remain highly classified and unavailable to those outside of agencies such as the FBI and CIA. In fact, one of the arguments proffered in support of a federal role in the provision of terrorism insurance was that terrorism events represent a negative externality of the national security policies of the sovereign government. Thus, there are significant reasons to believe that government may have to be the insurer of last resort, at least for mega-terrorism events.

Insurance Industry Resources, Cycles, and Crises

As mentioned, insurance works best for high-frequency, low-severity, relatively stationary, relatively independent events with good data and moderate loss volatilities.⁶ For such events, insurers can accurately estimate premiums and the equity capital needed to reduce insolvency probabilities to acceptable levels, and the amount of

required equity does not lead to excessive prices. Even for larger, less-frequent, more-risky events such as commercial liability lawsuits, insurance can also be effective most of the time. However, there are significant questions about the ability of the insurance industry to deal with the largest catastrophic events. For various reasons, it is infeasible and inefficient for the industry to hold sufficient capital to finance losses arising from very-high-severity, low-frequency events (Jaffee and Russell, 1997). This section provides an overview of the resources of the U.S. property-casualty insurance industry and the global reinsurance industry to gauge the industry's capability to sustain losses from mega-catastrophes.

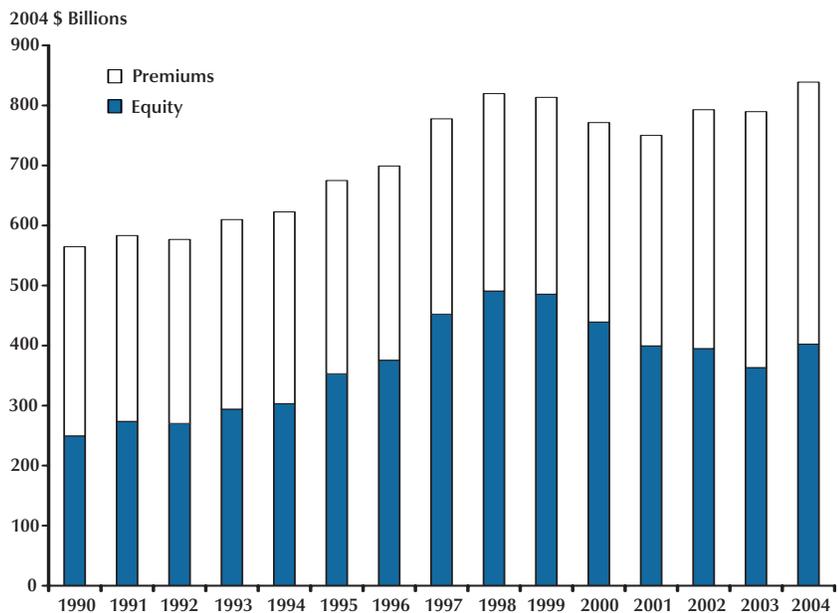
The total resources of the U.S. property-casualty insurance industry are shown in Figure 4. In 2004, the industry held about \$400 billion in equity capital and collected premiums of about \$440 billion. Although this might seem to be more than enough to withstand a catastrophic loss of \$100 billion, in fact, most of the premiums represent expected loss payments for high-frequency lines such as automobile insurance and workers compensation insurance. The premiums for homeowners insurance, the line most exposed to natural disasters, are only about 12 percent of the total. Moreover, the \$400 billion in equity capital represents the total amount held by insurers writing all lines of business in all states. Only a fraction of the total would be available to pay catastrophe losses in high-exposure states such as California and Florida because insurers not writing policies with catastrophe exposure in those states could not be called upon to pay claims.

Cummins, Doherty, and Lo (2002) investigated the capacity of the U.S. property-casualty insurance industry to respond to large catastrophic events during the late 1990s. They considered the aggregate resources of the industry nationwide and also the resources of insurers writing policies in the catastrophe-prone state of Florida as well as the correlation of losses among companies, another factor in determining the capacity to respond to catastrophic events. The results indicated that the industry could pay more than 90 percent of the losses from a \$100 billion-loss event. However, a loss of this magnitude would have caused the failure of approximate 140 insur-

⁶ Some additional criteria for insurability are discussed in Swiss Re (2005b).

Figure 4

U.S. Property-Casualty Insurance Industry: Total Resources



SOURCE: A.M. Best Company, *Best's Aggregate and Averages* (various years). Resources expressed in real 2004 U.S. dollars using the consumer price index.

ance companies. This would be by far the largest failure rate in the post-1900 history of the U.S. property-casualty industry and would significantly destabilize insurance markets.

The aggregate equity capital of the global reinsurance industry is shown in Figure 5. The figure indicates that equity capital increased significantly from 1990 to 2003, from about \$250 billion to about \$340 billion, and increased more modestly in 2004 to \$377 billion.⁷ The premiums of global reinsurers were about \$167 billion in 2004 (Standard and Poor's, 2005).⁸ However, most

of the premiums are for high-frequency lines of business. To put the equity capital totals in perspective, Figure 5 also shows the worldwide catastrophe losses from Swiss Re (2005a) as a ratio to the equity capital of global reinsurers. Catastrophe losses can amount to a significant proportion of equity, exceeding 15 percent in 1999 and 2001 and reaching 13 percent in 2004.

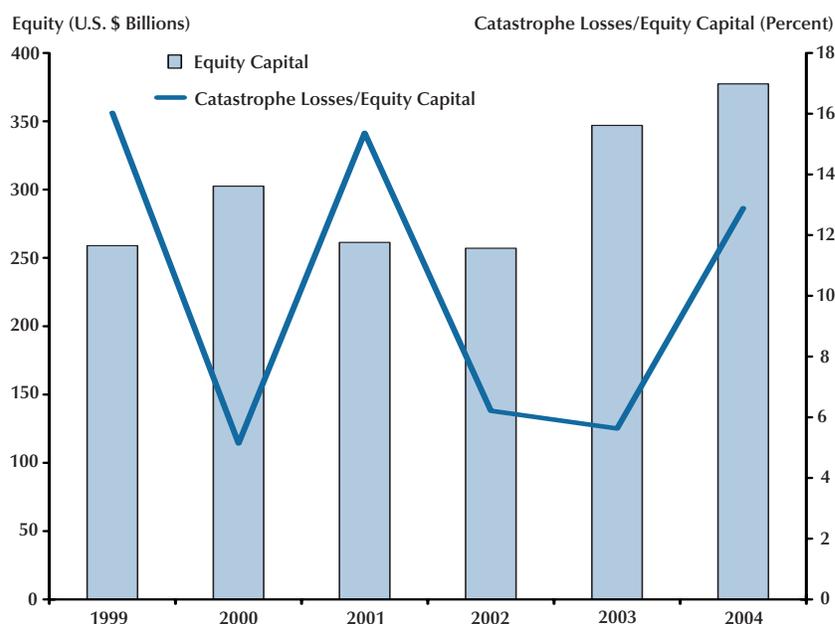
Insurance markets are subject to cycles and crises, which can be triggered by shifts in the frequency and severity of losses as well as investment losses. The underwriting cycle refers to the tendency of property-casualty insurance markets to go through alternating phases of "hard" and "soft" markets. In a hard market, the supply of coverage is restricted and prices rise; whereas, in a soft market, coverage supply is plentiful and prices decline. The consensus in the economics literature is that hard and soft markets are driven by capital market and insurance market imperfections such that capital does not flow freely into and out of

⁷ The capital numbers somewhat overstate the capacity of global reinsurers, however, because they represent the total equity capital of companies writing reinsurance. There are several large companies participating in this market, such as ING, AIG, and AXA, that also write significant amounts of coverage in the primary insurance market. Hence, their equity capital supports both their primary insurance and reinsurance obligations. In addition, as in the U.S. insurance market, most of the equity capital is committed to support coverage in high-frequency lines of business.

⁸ Unlike the equity capital figures, the premium numbers are indicative of business written in the reinsurance market.

Figure 5

Global Reinsurers: Aggregate Equity Capital and Catastrophe Losses



NOTE: Equity is expressed in real 2004 U.S. dollars using the consumer price index.

SOURCE: Standard and Poor's, *Global Reinsurance Highlights* (various years).

the industry in response to unusual loss events (Winter, 1994; Cummins and Danzon, 1997; and Cummins and Doherty, 2002). Informational asymmetries between capital providers and insurer management about exposure levels and reserve adequacy result in high costs of capital during hard markets, such that capital shortages can develop. Insurers are reluctant to pay out retained earnings during soft markets because of the difficulty of raising capital again when the market enters the next hard-market phase, leading to excess capacity and downward pressure on prices.

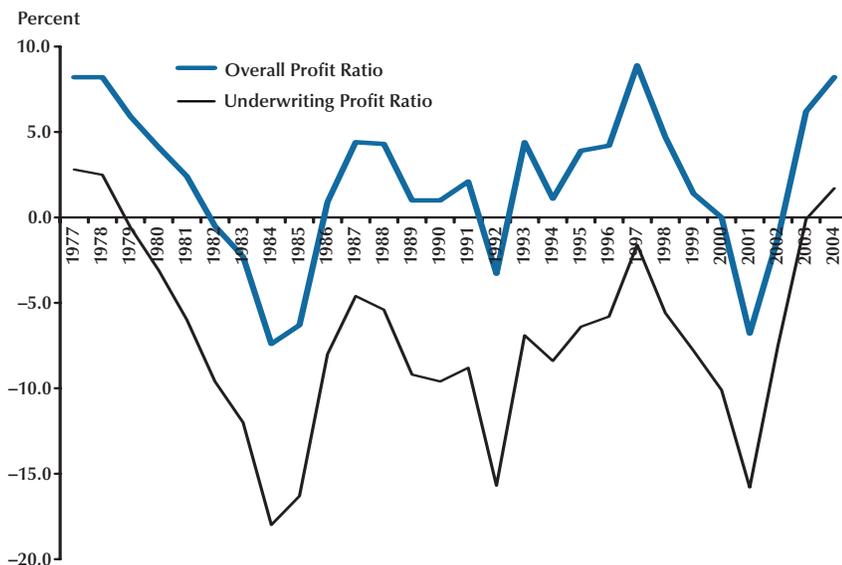
Hard markets are usually triggered by capital depletions that result from underwriting or investment losses. The three most prominent hard-market periods since 1980 resulted from the commercial liability insurance crisis of the 1980s, catastrophe losses from Hurricane Andrew in 1992 and the Northridge earthquake in 1994, and the WTC terrorist attack in 2001. The 1980s liability

crisis was triggered by an unexpected increase in the frequency and severity of commercial liability claims, accompanied by a sharp decline in interest rates in the early 1980s, and the catastrophe and terrorist crises were driven by catastrophe losses of unexpected magnitude. Each crisis not only depleted insurer capital but caused insurers to re-evaluate probability of loss distributions and reassess their exposure management and pricing practices.

The U.S. property-casualty insurance underwriting cycle is illustrated in Figure 6. The figure plots two important operating ratios for the industry—the *underwriting profit ratio* and the *overall profit ratio*. The underwriting profit ratio is the difference between 100 and the industry combined ratio, which is the sum of the loss ratio (losses incurred divided by premiums) and the expense ratio (operating expenses divided by premiums), expressed as percentages. If the underwriting profit ratio is positive, the industry is collecting

Figure 6

U.S. Property-Casualty Insurance Industry Underwriting Profit and Overall Profit Ratios



SOURCE: A.M. Best Company, *Best's Aggregates and Averages* (various years).

more in premiums than it is paying out in losses and expenses—it is incurring an underwriting profit; and if the ratio is negative, the industry is incurring an underwriting loss. The underwriting profit ratio is a useful indicator of underwriting performance, but it is not a very good indicator of overall profitability because it does not consider investment income. The overall profit ratio corrects for investment income by adding the ratio of investment income to premiums to the underwriting profit ratio. If the overall profit ratio is positive, the implication is that insurers are making profits when both underwriting and investment results are considered; and if the overall profit ratio is negative, insurers are realizing overall losses.

Figure 6 reveals the impact of the liability crisis of the mid-1980s and the catastrophe crises of 1992-94 and 2001. The underwriting loss in 1984 was about 18 percent of premiums, and the overall profit ratio indicated a net loss of about 7 percent of premiums in that year after considering investment income. In 1992, the underwriting

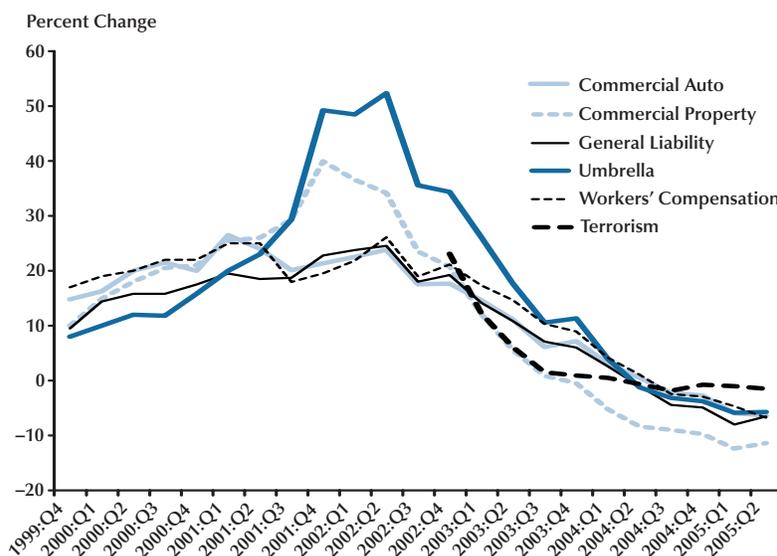
loss, mainly due to Andrew, was 15 percent and the overall profit ratio showed a loss of about 4 percent of premiums. The underwriting loss due to the WTC attack was also about 15 percent of premiums, and the overall loss was about 6.5 percent. With losses of this magnitude and volatility, it is not surprising that insurers restricted supply and raised prices following these events.⁹

Another indicator of recent underwriting cycle activity in the United States is provided by survey data collected by the Council of Insurance Agents and Brokers. The Council conducts a quarterly survey of its members to determine the changes in commercial lines insurance prices, based on policies renewing in each quarter. The average rate changes from 1999 through 2005 are shown in Figure 7. The figure shows that prices had been increasing significantly even before September

⁹ It is also noteworthy that the underwriting profit ratio is negative most of the time. This is an expected result in terms of insurance financial pricing theory. Premiums reflect the expected discounted value of claims and operating expenses, whereas losses and expense are reported at undiscounted values. Hence, even under normal circumstances, an underwriting loss is the expected outcome.

Figure 7

Commercial Property-Casualty Premium Rate Changes by Line



SOURCE: Council of Insurance Agents and Brokers.

of 2001, and the prices in umbrella liability and commercial property insurance spiked after 9/11. However, beginning in early 2002, commercial insurance prices began to decline sharply, reflecting a softening of the market caused by inflows of new capital and improved underwriting profitability.

The underwriting cycle interacts with the level of capitalization in the industry. A relative measure of capitalization is provided by the premiums-to-surplus ratio, the most widely used measure of leverage for this industry.¹⁰ The premiums-to-surplus ratio since 1980 is graphed in Figure 8. The ratio was about 1.5 in the early 1980s and then declined steadily to less than 0.7 in 1999, before increasing again as a result of the hard market and 9/11 claims in the early 2000s. The sharp decline during the 1990s has been attributed to over-capitalization in the industry as well as the need for additional capital brought about by higher loss volatility, particularly in liability and

property catastrophe insurance (Cummins and Nini, 2002). Deterioration in the premiums-to-surplus ratio is often associated with the onset of a hard-market phase of the cycle.

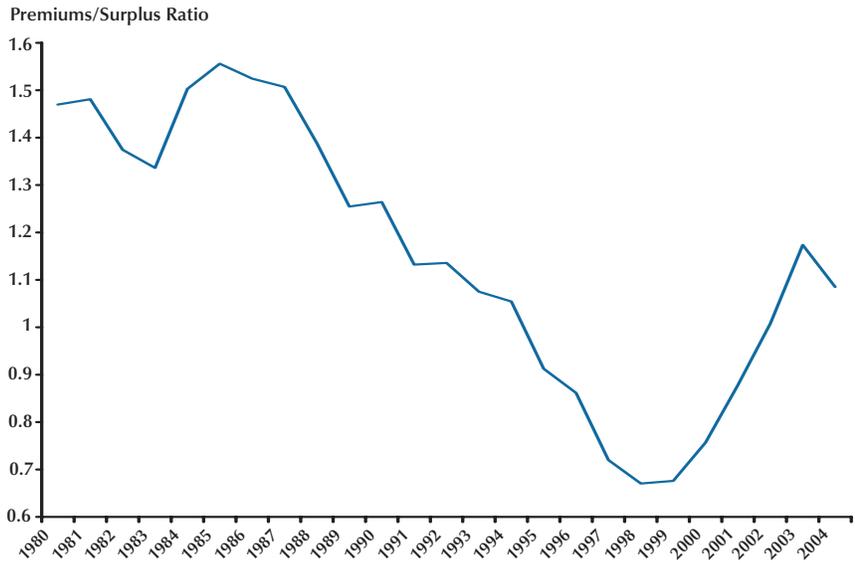
Because profitability in reinsurance markets mirrors the results in primary insurance markets and because underwriting cycles also exist in most other industrialized countries, the global reinsurance market is also subject to underwriting cycles.¹¹ The cycle in the worldwide catastrophe reinsurance market is shown in Figure 9, which plots the *rate-on-line* index in this market. The rate-on-line is a price measure defined as the premium for a reinsurance policy divided by the maximum possible payout under the policy. The index increased from 100 in 1990 to approximately 375 in 1993, primarily due to Hurricane Andrew. The index then declined steadily until 1999 and increased sharply following the WTC attack and a general hardening of insurance markets into the early 2000s. The decline after

¹⁰ Surplus or policyholders' surplus is the industry's terminology for equity capital.

¹¹ For further discussion of the role of reinsurance in cycles and crises, see Berger, Cummins, and Tennyson (1992).

Figure 8

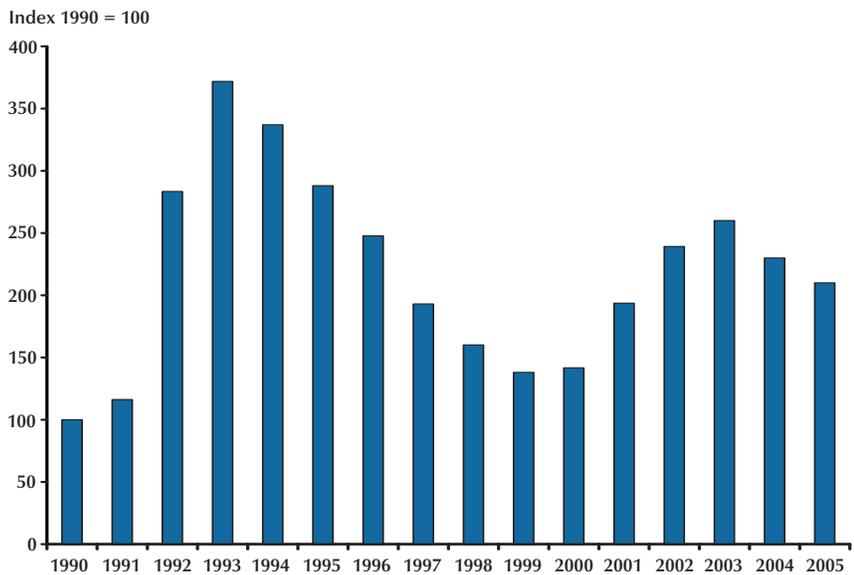
Property-Casualty Insurance Industry: Premiums-to-Surplus Ratio



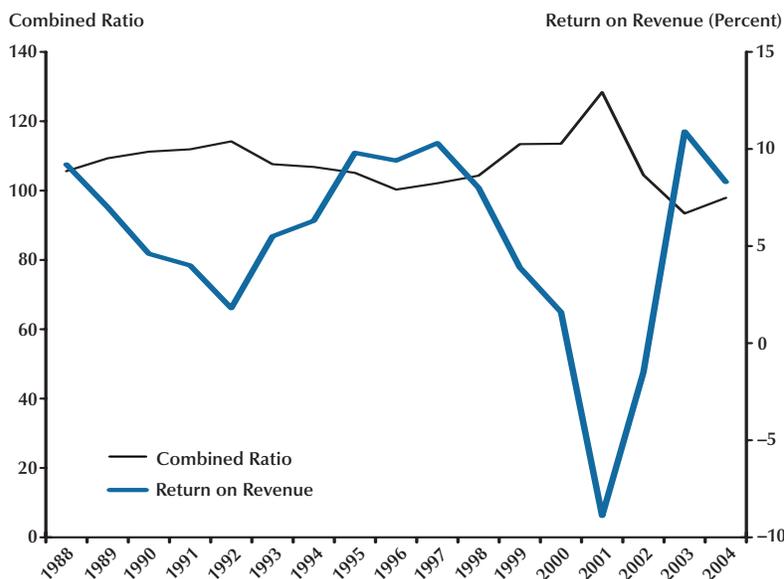
SOURCE: A.M. Best Company, *Best's Aggregates and Averages* (various years).

Figure 9

World Rate-On-Line Index: Catastrophe Reinsurance



SOURCE: Guy Carpenter (2005).

Figure 10**Global Non-Life Reinsurance Industry: Financial Performance**

SOURCE: Standard and Poor's, *Global Reinsurance Highlights* (2005).

Andrew reflected improvements in catastrophe modeling and exposure management in the industry as well as significant inflows of new equity capital, particularly into new and pre-existing insurers located in Bermuda.

Further evidence of the reinsurance underwriting cycle is shown in Figure 10, which plots the combined ratio and return-on-revenue ratio for the global non-life reinsurance industry.¹² The combined ratio spiked at about 115 in 1992 and again at nearly 130 in 2001; and the return on revenue, which also reflects investment earnings, tends to be the reverse mirror image of the combined ratio. The losses incurred during crisis

periods lead reinsurers to raise prices and restrict supply while they recapitalize and reevaluate pricing and exposure management strategies.

The existence of cycles and crises implies that the insurance industry goes through periods when risk-bearing capacity is limited. Although usually triggered by high-volatility lines of business, the effects of a hard market extend to all lines of business including generally predictable lines such as automobile insurance and workers compensation. Thus, capacity shortages can occur even in high-frequency, low-severity lines of insurance, emphasizing the difficulty faced by the industry in consistently providing capacity for low-frequency, high-severity losses.

PUBLIC AND PRIVATE SECTOR SOLUTIONS TO FINANCING CATASTROPHIC RISK

This section discusses public and private sector solutions to financing the risks of natural

¹² The combined ratio is the sum of the loss ratio (losses and loss-adjustment expenses incurred/premiums earned) and the expense ratio (underwriting expenses incurred/premiums written). The ratio is a commonly used measure of underwriting profitability. Return on revenue is analogous but not identical to the overall profit ratio. Return on revenue is defined as pretax operating income/total revenue. Pretax operating income is underwriting profit (or loss) + net investment income + other income. Net realized gains or losses are excluded from pretax income. Total revenue is equal to net premiums earned + net investment income + other income. See Standard and Poor's (2005, p. 47).

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catastrophes and terrorism, beginning with the securitization of catastrophic risk. Public sector solutions to the catastrophic-risk problem are then discussed, including a review of public sector mechanisms currently in place in the United States and other industrialized nations. The section concludes with an evaluation of TRIA and recommendations regarding the need for governmental involvement in the future.

CAT Bonds

Following Hurricane Andrew in 1992, efforts began to access securities markets directly as a mechanism for financing future catastrophic events. The first contracts were launched by the Chicago Board of Trade, which introduced catastrophe futures in 1992 and later introduced catastrophe put and call options. The options were based on aggregate catastrophe-loss indices compiled by Property Claims Services, an insurance industry statistical agent.¹³ The contracts were later withdrawn because of lack of trading volume. Insurers had little interest in the contracts for various reasons, including the thinness of the market, possible counterparty risk on the occurrence of a major catastrophe, and the potential for disrupting long-term relationships with reinsurers. Another concern was that the contracts were subject to excessive basis risk; that is, the risk that payoffs under the contracts would be insufficiently correlated with insurer losses. A study by Cummins, Lalonde, and Phillips (2004) confirms that basis risk was a legitimate concern. They found that most insurers could not hedge their exposure to Florida hurricane risk very effectively using a statewide index but that all but the smallest insurers could hedge effectively using four intra-Florida regional indices.

Another early attempt at securitization involved contingent notes known as “Act of God” bonds. In 1995, Nationwide issued \$400 million in contingent notes through a special trust, Nationwide Contingent Surplus Note Trust. Proceeds from the sale of the bonds were invested in 10-year Treasury securities, and investors were

provided with a coupon payment equal to 220 basis points over that of Treasuries. Embedded in these contingent capital notes was a “substitutability” option for Nationwide. Given a prespecified event that depleted Nationwide’s equity capital, Nationwide could substitute up to \$400 million of surplus notes for the Treasuries in the trust at any time during a 10-year period for any “business reason,” with the surplus notes carrying a coupon of 9.22 percent.¹⁴ Although two other insurers issued similar notes, this type of structure did not achieve a significant segregation of Nationwide’s liabilities, leaving investors exposed to the general business risk of the insurer and to the risk that Nationwide might default on the notes.

The structure that has achieved a greater degree of success is the CAT bond. CAT bonds were modeled on asset-backed-security transactions that have been executed for a wide variety of financial assets including mortgage loans, automobile loans, aircraft leases, and student loans. The first successful CAT bond was an \$85 million issue by Hannover Re in 1994 (Swiss Re, 2001). The first CAT bond issued by a nonfinancial firm, occurring in 1999, covered earthquake losses in the Tokyo region for Oriental Land Company, the owner of Tokyo Disneyland.

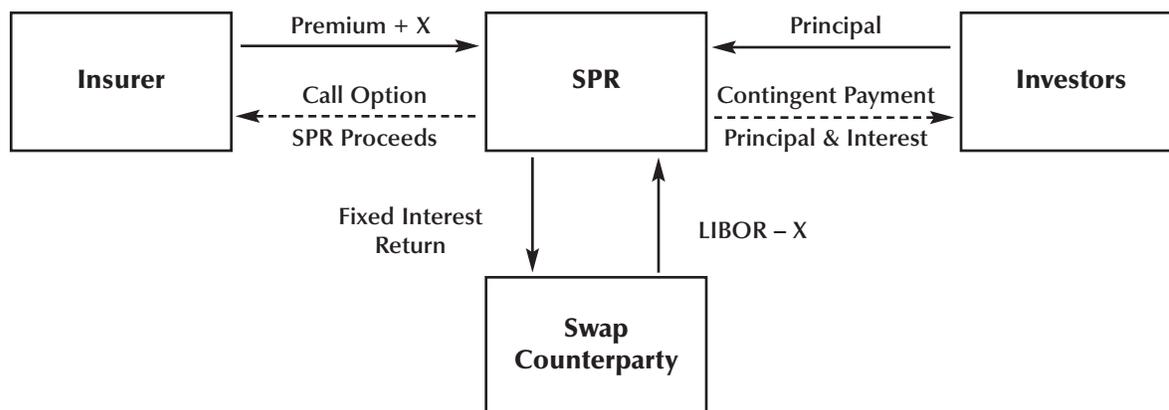
A CAT bond structure is shown in Figure 11. The transaction begins with the formation of a single purpose reinsurer (SPR). The SPR issues bonds to investors and invests the proceeds in safe securities such as Treasury bonds. Embedded in the bonds is a call option that is triggered by a defined catastrophic event. On the occurrence of the event, proceeds are released from the SPV to help the insurer pay claims arising from the event. In most bonds issued to date, the principal is fully at risk; that is, if the contingent event is sufficiently large, the investors could lose the entire principal in the SPV. In return for the option, the insurer pays a premium to the investors. The fixed returns on the Treasuries are usually swapped for floating returns based on LIBOR or some other widely accepted index. Consequently, the

¹³ Contracts were available based on a national index, five regional indices, and three state indices for California, Florida, and Texas.

¹⁴ Surplus notes are debt securities issued by mutual insurance companies that regulators treat as equity capital for statutory accounting purposes. The issuance of such notes requires regulatory approval.

Figure 11

CAT Bond with a Single Purpose Reinsurer



investors receive LIBOR plus the risk premium in return for providing capital to the trust. If no contingent event occurs during the term of the bonds, the principal is returned to the investors upon the expiration of the bonds.

Insurers prefer to use an SPR to capture the tax and accounting benefits associated with traditional reinsurance.¹⁵ Investors prefer SPRs to isolate the risk of their investment from the general business and insolvency risks of the insurer, thus creating an investment that is a “pure play” in catastrophic risk. As a result, the issuer of the securitization can realize lower financing costs through segregation. The transaction also is more transparent than a debt issue by the insurer, because the funds are held in trust and are released according to carefully defined criteria. The bonds also are attractive to investors because catastrophic events have low correlations with returns from securities markets and hence are valuable for diversification purposes (Litzenberger, Beaglehole, and Reynolds, 1996). Although the \$100-billion-

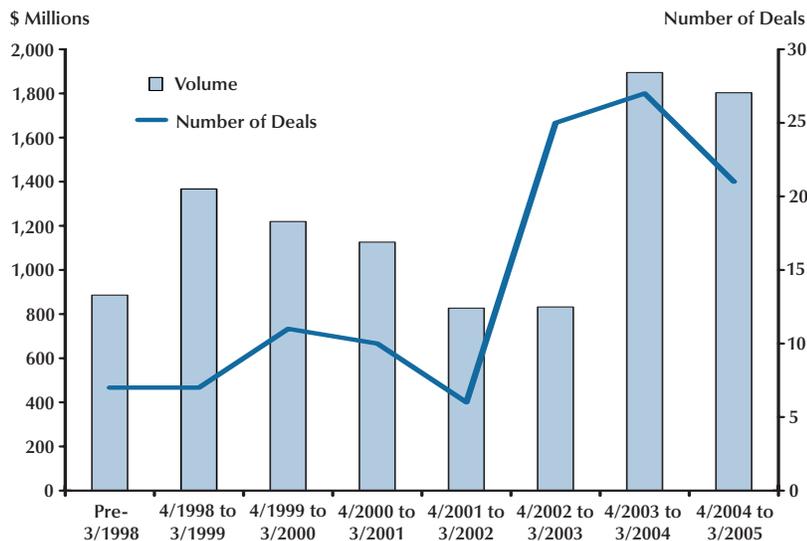
plus “Big One” hurricane or earthquake could drive down securities prices, creating systematic risk for CAT securities, this systematic risk is considerably lower than for most other types of assets, especially during more normal periods.

In the absence of a traded underlying asset, insurance-linked securities have been structured to pay-off on three types of variables: insurance-industry catastrophe loss indices, insurer-specific catastrophe losses, and parametric indices based on the physical characteristics of catastrophic events. The choice of a triggering variable involves a trade-off between moral hazard and basis risk. Securities based on insurer-specific (or hedger-specific) losses, often called indemnity CAT bonds, have no basis risk but expose investors to moral hazard; whereas securities based on industry loss indices or *parametric* triggers greatly reduce moral hazard but expose hedgers to basis risk.

CAT bonds are an innovative financing solution.¹⁶ However, although there have been approximately 120 bonds issued to date, the amount of risk capital that has been raised remains small

¹⁵ Harrington and Niehaus (2003) argue that an important advantage of CAT bonds as a financing mechanism is that corporate tax costs are lower for CAT bonds than for financing through equity; also, CAT bonds pose less risk in terms of potential future degradations of insurer financial ratings and capital structure than financing through subordinated debt.

¹⁶ However, the concept is actually not a new one. It is similar to the practice of bottomry, which dates at least to classical Greek and Roman times. In a bottomry contract, the lender extended a loan to finance a voyage. If the ship returned to port, the loan was repaid with interest, but if the ship sank, the loan was forgiven.

Figure 12**CAT Bonds: New-Issue Volume and Number of Deals, 1998-2005**

SOURCE: Lane Financial (2005).

relative to the global reinsurance market. The number of issues and risk capital raised are shown in Figure 12, which shows a total of about \$10 billion raised by March 2005. In comparison, the equity capital of the global reinsurance industry and the U.S. property-casualty insurance industry are approximately \$350 billion and \$400 billion, respectively. However, the potential for the use of securities markets to finance catastrophic risk is significant. The amount of asset-backed securities outstanding is nearly \$2 trillion (Bond Market Association, 2006).

Because of the as-yet unrealized potential of the CAT bond market, it is of interest to explore the possible reasons for the limited amount of risk capital raised to date. One possible explanation is that the bonds appear expensive relative to conventional reinsurance. Structuring a CAT bond deal requires significant expenditures on professional expertise from investment bankers, accountants, actuaries, and lawyers. In addition, the spreads on the bonds have tended to be high—often several times the expected losses on the bonds.¹⁷

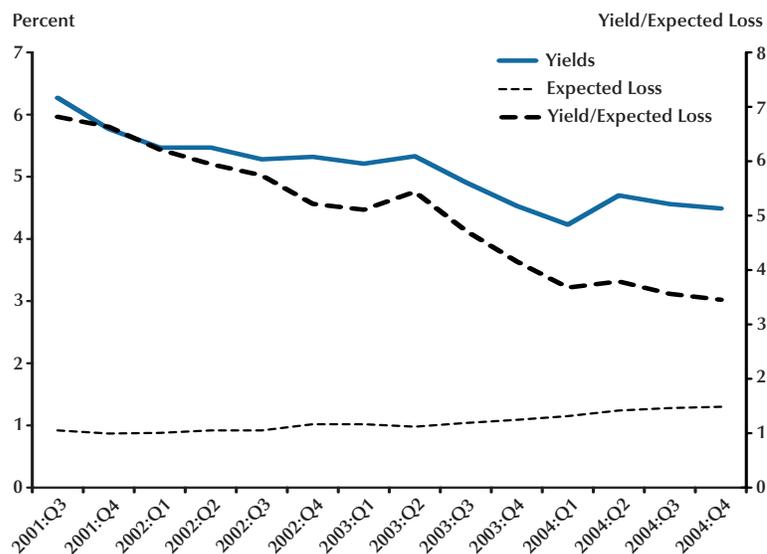
Possible explanations for the high-risk premia on the bonds include investor unfamiliarity with the contracts (a “novelty” premium), the low liquidity of the contracts issued to date (a liquidity premium), and investor uncertainty about the accuracy of the models used to estimate expected losses of the reinsurance (a “model risk” premium).¹⁸ In addition, although the catastrophic events observed in the United States before the mid-1990s have been uncorrelated with returns in securities markets, this may not be true of a mega-earthquake in California or even a hurricane of the magnitude of Katrina. Thus, the spreads may also reflect a “stealth beta” premium.

¹⁷ Cummins, Lalonde, and Phillips (2004) tabulate spreads on CAT bonds issued from 1997 through March of 2000 and find that the median ratio of bond spread to expected loss is 6.77.

¹⁸ The expected losses under CAT bonds are estimated by catastrophe modeling firms such as Applied Insurance Research and Risk Management Solutions. These firms have developed elaborate and highly sophisticated simulation models that simulate catastrophic events using meteorological and seismological models along with actuarial and other modeling approaches. They have constructed extensive data bases on the value of property exposed to loss in the United States and other major countries.

Figure 13

CAT Bonds Absolute and Relative Yields



SOURCE: Lane Financial (2005).

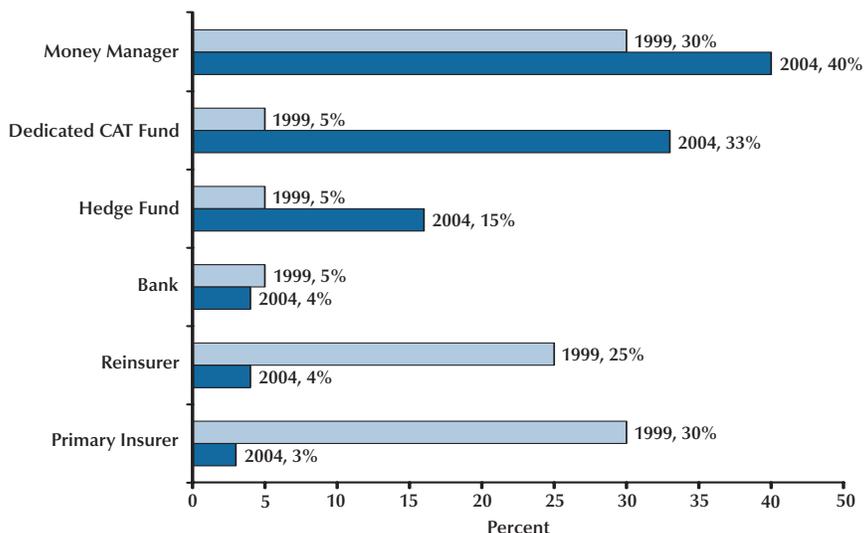
Although CAT bonds seem to sell at high premiums over expected losses, in fact, prices of conventional excess-of-loss reinsurance also tend to have high spreads. Froot (2001) documents spreads up to seven times expected losses during the period 1989-98 in the catastrophe reinsurance market. Thus, it is more likely that the high spreads are due to the fact that catastrophe risk is expensive to hedge rather than due to a peculiarity of CAT bonds per se. Moreover, the costs of financing catastrophe risk through CAT bonds have been declining. Investment banks have succeeded in reducing transactions costs as they have gained experience with insurance-linked securitizations, and the spreads on the bonds have fallen over time. This is shown in Figure 13, which plots the average spread on CAT bonds and the average expected loss on the left axis and the ratio of the spread to the expected loss on the right axis, from the third quarter of 2001 through the fourth quarter of 2004. Spreads were averaging 600 basis points at the beginning of the period shown but had declined to about 450 basis points by the end

of 2004. In addition, the ratio of the spread to the expected loss declined from around 7 in 2001:Q3 to about 3.5 in 2004:Q4.

Another rationale sometimes given for the limited size of the CAT bond market is lack of investor interest. Although that may have been true at one time, recent data suggest that there is broad market interest in CAT bonds among institutional investors. Figure 14 shows the percentage of new issue volume by investor type in 1999 and 2004. In 1999, insurers and reinsurers were among the leading investors in the bonds, accounting for more than 50 percent of the market; that is, insurers were very prominent on both the supply and demand sides of the market. However, in 2004, insurers and reinsurers accounted for only 7 percent of demand. Money managers and hedge funds bought 56 percent of the 2004 bond issues, and dedicated CAT bond mutual funds accounted for 33 percent. The declining spreads and increasingly broad market interest in the bonds provide some indication that the bonds may begin to play a more important role relative to conventional reinsurance.

Figure 14

CAT Bonds: Percentage of New-Issue Volume Purchased by Investor Type



SOURCE: Swiss Re, Economic Research and Consulting.

There are also regulatory and accounting issues that may be impeding the more widespread usage of CAT bonds. U.S. insurance regulators have two concerns about CAT bonds: (i) non-indemnity CAT bonds may expose insurers to excessive basis risk and (ii) insurers may use securitized risk instruments as speculative investments. As a result, some regulators may deny reinsurance accounting treatment for non-indemnity CAT bonds. Fortunately, however, it is relatively straightforward to satisfy both concerns and avoid regulatory problems. Contracts can be structured to pay-off on narrowly defined geographical indices or combinations of indices that are highly correlated with the insurer’s losses. Concerns about speculative investing can be addressed through dual-trigger contracts, where two triggers have to be satisfied for the insurer to collect, one based on an industry loss index and the second based on the insurer’s own losses from the event. The insurer’s payoff is based on its *ultimate net loss*, a familiar reinsurance concept equal to the insurer’s total loss from an event less collections under reinsurance contracts.¹⁹

A second potential issue mentioned in some discussions is uncertainty about whether SPRs need to be consolidated on insurers’ GAAP (generally accepted accounting principles) financial statements under new rules regarding “variable interest entities” (VIEs) that were adopted post-Enron. However, based on conversations with industry experts, it appears that properly structured CAT bonds do not encounter problems from VIE rules. With the usual CAT bond structure shown in Figure 11, the SPR is a VIE, but the variability (uncertainty about the payoff from the structure to investors) is entirely passed through to the bond holders. The insurer has no variable (equity ownership) interest but merely pays periodic premiums to the SPR and receives a contingent payout if the defined event occurs. Finally, although CAT bonds have not been granted the tax-free conduit status that is available in the mortgage-backed and asset-backed securities markets, off-shore CAT bonds do not create tax-

¹⁹ This dual-trigger approach was developed in the market for industry loss warranties, which is a segment of the reinsurance market offering this type of contract (McDonnell, 2002).

able events for the issuing insurer. The insurer deducts the premium payments to the SPR, and the bond investors pay taxes on the income received from the SPR in the appropriate jurisdiction. Hence, although it would facilitate development of the market to have the regulatory and accounting rules simplified and clarified, these rules currently do not constitute insurmountable obstacles to risk-linked securitizations.

Besides the Chicago Board of Trade options and CAT bonds, other capital market solutions to the problem of financing catastrophic loss have been introduced, including catastrophe equity puts (Cat-E-Puts). Unlike CAT bonds, Cat-E-Puts are not asset-backed securities but options. In return for a premium paid to the writer of the option, the insurer obtains the option to issue preferred stock at a pre-agreed price on the occurrence of a contingent event. This enables the insurer to raise equity capital at a favorable price after a catastrophe, when its stock price is likely to be depressed. Cat-E-Puts tend to have lower transactions costs than CAT bonds because there is no need to set up an SPR. However, because they are not asset-backed, these securities expose the insurer to counterparty performance risk. In addition, issuing the preferred stock can dilute the value of the firm's existing shares.²⁰

Government Involvement in Catastrophe Insurance Markets

The difficulties faced by insurance markets in financing catastrophic risk have given rise to pressures for government to become involved in the market. Government involvement usually occurs when there has been a major failure in private insurance markets. In the United States, the federal government provides subsidized flood insurance; and the current markets for hurricane coverage in Florida and earthquake insurance in California exist largely due to state government intervention.²¹ By adopting TRIA, the U.S. govern-

ment intervened to create a market for terrorism insurance. Governments of several other industrialized countries have also intervened in the markets for catastrophe insurance. This section provides a review of the principal government programs for catastrophe insurance. Because these programs are subject to book-length treatment elsewhere (e.g., Organisation for Economic Co-operation and Development [OECD], 2005a,b), the discussion of program characteristics is brief. The discussion also emphasizes the programs adopted in the United States.

Federal Flood Insurance. In the United States, the federal government provides flood insurance through the National Flood Insurance Program (NFIP), administered by the Federal Emergency Management Agency (FEMA). The flood program was enacted in 1968 in response to a market failure in the private flood insurance market, where floods were generally viewed as uninsurable because of the concentration of risk in specific areas and the resulting potential for catastrophes (Moss, 1999). Flood insurance was viewed from a policy perspective as a way to pre-fund disaster relief and provide incentives for risk mitigation. This type of insurance is important because homeowners insurance and other types of property insurance policies exclude coverage for floods.

NFIP flood insurance policies are offered at prices that are subsidized for many buyers and are sold through private insurers, although the federal government bears the risk. The program was designed to be self-supporting and has the ability to borrow from the government to pay claims. The stated objectives of the program are (i) to provide flood insurance coverage to a high proportion of property owners who would benefit from such coverage, (ii) to reduce taxpayer-funded disaster assistance resulting from floods, and (iii) to reduce flood damage through flood-plain management and enforcement of building standards

²⁰ For further discussion of capital market approaches to financing catastrophic risk, see Anderson (2005), Pollner (2001), and Swiss Re (2001). Other innovative solutions, involving hybrids of traditional reinsurance and newer approaches, are discussed in Cummins (2005).

²¹ Other states, such as Alabama and Louisiana, have also established

residual market property insurance facilities analogous to the one in Florida; and many other states have Fair Access to Insurance Requirements (FAIR) residual market plans to provide insurance to buyers who cannot find coverage in the voluntary insurance market. I focus here on the California and Florida plans because of their prominence and exposure to large catastrophes.

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(Jenkins, 2006). By August 2005, Jenkins (2006) estimated that the NFIP had approximately 4.6 million policyholders in 20,000 communities. From 1968 through August of 2005, the NFIP had paid \$14.6 billion in insurance claims, primarily funded by policyholder premium payments.

Although the program might seem to be a success (in terms of the amount of coverage provided and claims that have been paid), in fact, the NFIP is badly in need of reform. The program is not actuarially sound, with some policyholders paying premiums representing only 35 to 40 percent of expected costs (Jenkins, 2006). Following the record losses from hurricanes in 2004 and 2005, the program is currently bankrupt and could not continue to exist in its present state if it were a private insurer. Moreover, the program pays significant amounts of money to repair or replace “repetitive-loss properties;” that is, properties that receive loss payments of \$1,000 or more at least twice over a 10-year period. It is estimated that such properties, which represent only 1 percent of covered properties, account for 25 to 30 percent of all loss payments (Jenkins, 2006). Insurance penetration rates are low, even in the most flood-prone areas, with as little as 50 percent of exposed properties covered by insurance. In Orleans Parish, which includes New Orleans, only about 40 percent of properties were covered by flood insurance at the time Katrina struck (Bayot, 2005) and coverage rates were even lower in parts of Mississippi. The NFIP also has been criticized for not providing effective oversight of the approximately 100 insurance companies and thousands of insurance agents and claims adjusters who participate in the flood program (Jenkins, 2006).

Reforming the NFIP should become a top priority for federal disaster planning. Having high rates of flood insurance coverage can significantly reduce taxpayer-funded disaster-relief payments following catastrophes, and charging actuarially sound premiums would provide proper incentives for flood-plain management.²² There are two approaches that could be taken to reforming the program: (i) Continue providing federal flood

insurance but fix the problems with the current program. This would entail charging premiums sufficient to cover both claims and program expenses and providing a safety cushion to build up reserves during low-loss years to reduce the need for federal borrowing during years when catastrophes occur. Further, other problems identified by the GAO would also need to be rectified. (ii) Adopt a solution with a higher degree of private sector involvement. This could be done following the pattern of the federal terrorism program by requiring private insurers to “make available” private flood insurance policies at actuarially determined prices in flood-prone areas. Although it is probable that private insurers could provide such coverage without federal support, by issuing disaster bonds (similar to CAT bonds) and through conventional reinsurance solutions, consideration should be given to providing federal reinsurance at prices that would be self-supporting in the long run. The private sector solution is attractive for a number of reasons, including the relative efficiency of insurers in settling insurance claims in comparison with the often chaotic federal response to disaster relief. Under either solution to NFIP reform, rules should be tightened to eliminate repetitive-loss properties from the program, and lenders should be required to enforce mandatory participation in the program as a condition for granting and retaining mortgage loans, as is presently done for homeowners insurance.

Windstorm Coverage in California and Florida. Windstorm coverage is presently provided by private insurers through homeowners and other property insurance policies. The California and Florida programs are noteworthy in that they do not involve the direct government provision of insurance but the creation of quasi-governmental entities not supported by taxpayers.

Following the 1994 Northridge earthquake, the market for earthquake insurance in California collapsed as private insurers stopped writing coverage. The California legislature responded in 1996 by creating a quasi-public entity, the California Earthquake Authority (CEA), to provide earthquake insurance to Californians. The CEA is not a government agency but operates under

²² For further discussion of the role of insurance in risk mitigation, see Kunreuther (1996).

constraints mandated by the legislature. Specifically, the policies written by the CEA are earthquake “mini-policies” designed by the legislature that provide less-extensive coverage than provided by private insurers pre-Northridge. The legislature also mandated that coverage be provided at sound actuarial prices, although these have been “tempered” somewhat to subsidize policyholders in high-risk areas. The legislature also required that the CEA be funded by capital contributions of about \$700 million from private insurers licensed in California in lieu of requiring them to write earthquake insurance. The CEA had claims-paying ability of about \$6.9 billion at the end of 2004 (PricewaterhouseCoopers, 2005). Putting this in perspective, recall that the Northridge earthquake caused insured losses of \$18.5 billion (Table 1). However, because of the mini-policies and because fewer residences have earthquake insurance now than before 1994, it is probable that the CEA could withstand damages on the scale of Northridge.

Since the creation of the CEA, private insurers have re-entered the California earthquake market. In 2004, approximately 150 companies wrote non-zero earthquake insurance premiums in California (California Department of Insurance, 2005). Of the \$985 million in California earthquake premiums written in 2004, however, the CEA accounted for 47.3 percent; and private insurers generally write insurance in relatively low-risk areas of the state (Jaffee, 2005). Nevertheless, the design of the CEA, and especially its mandate to charge actuarially justified premium rates, has had the effect of not crowding-out the private sector. Something of a puzzle in the California market, however, is that only a small proportion of eligible property owners actually purchase the insurance. In the homeowners market, 33 percent of eligible properties purchased earthquake insurance in 1996, the CEA’s first year, but only 13.6 percent had insurance in 2003. The rationale usually given for the low market penetration is that most buyers consider the price of insurance too high for the coverage provided, even though premiums are close to the expected losses (Jaffee, 2005).

As in California following Northridge, the hurricane market in Florida was significantly

destabilized by Hurricane Andrew in 1992.²³ In response to insurer attempts to withdraw and reprice windstorm coverage following the event, the state placed restrictions on the ability of insurers to decline renewal of policies and to increase rates. To provide an escape valve for policyholders who were unable to obtain coverage, the state created the Florida Residential Property and Casualty Joint Underwriting Association (FRPCJUA), a *residual market facility*. Insurers doing business in the state were required to be members of the facility, which insured people and businesses who could not obtain property coverage from the voluntary insurance market. The FRPCJUA was empowered to assess insurers if premiums were not sufficient to pay claims, and there was no explicit government backing. A similar residual market facility was formed to provide “wind only” coverage along the coast—the Florida Windstorm Underwriting Association.

In 2002, the two residual market plans were merged to form the Citizens Property Insurance Corporation, a tax-exempt entity that provides coverage to Floridian consumers and businesses who cannot find coverage in the voluntary market. Citizens operates like an insurance company in charging premiums, issuing policies, and paying claims. If premiums are insufficient, it has the authority to assess insurers doing business in the state to cover the shortfall. It also has the ability to issue tax-exempt bonds if necessary. Citizens was severely stressed by the four hurricanes that hit Florida in 2004, as it struggled to handle the massive numbers of claims that were filed. In 2004, Citizens wrote \$1.4 billion in premiums, accounting for 34 percent of the Florida property insurance market. Unlike California earthquake insurance, the market penetration of property insurance coverage in Florida is very high, in part because mortgage lenders require mortgagors to purchase insurance.

To provide additional claims-paying capacity, Florida also created the Florida Hurricane Catastrophe Fund (FHCF), a state-run catastrophe reinsurance fund designed to assist insurers writ-

²³ For further economic analysis of the Florida windstorm insurance market, see Grace, Klein, and Liu (2006).

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ing property insurance in Florida. Insurers writing residential and commercial property insurance in the state are required to purchase reinsurance from the FHCF based on their exposure to hurricane losses in the state. The FHCF does not have state financial backing. However, it is operated as a state agency and is exempt from federal income taxes, enabling it to accumulate funds more rapidly than private insurers. In addition, the fund has the authority to assess member insurers within limits in case premiums and reserve funds are insufficient and also has the ability to issue tax-exempt bonds. The catastrophe reinsurance issued by the fund kicks in after an industry retention of \$4.5 billion, and the fund has claims-paying ability of about \$15 billion. The FHCF helped to stabilize the property insurance market following the 2004 hurricane season and Hurricane Wilma in 2005.

The California and Florida experience shows that government can play an important role in making insurance available without directly committing taxpayer funding. These programs also have the virtue of not crowding-out private insurers, although it is possible that the mandatory purchase feature of the FHCF may have crowded-out some private reinsurance. However, because these are government-mandated and -designed programs, they probably are not as efficient as purely private market solutions.

Terrorism Insurance. Prior to the September 11, 2001, terrorist attacks, terrorism was generally covered by most property-casualty insurance policies. In fact, the risk was considered so minimal by insurers that terrorism was usually included at no explicit price. Likewise, reinsurers generally covered primary companies for terrorism as part of their reinsurance coverage; and reinsurers paid most of the claims resulting from the WTC attack. After 9/11, however, reinsurers began writing terrorism exclusions into their policies, leaving primary insurers with virtually no opportunity to reinsure their exposure. As a result, the primary insurers sought to write terrorism exclusions into their own policies. Recognizing that substantial exposure to terrorism risk without adequate reinsurance could pose

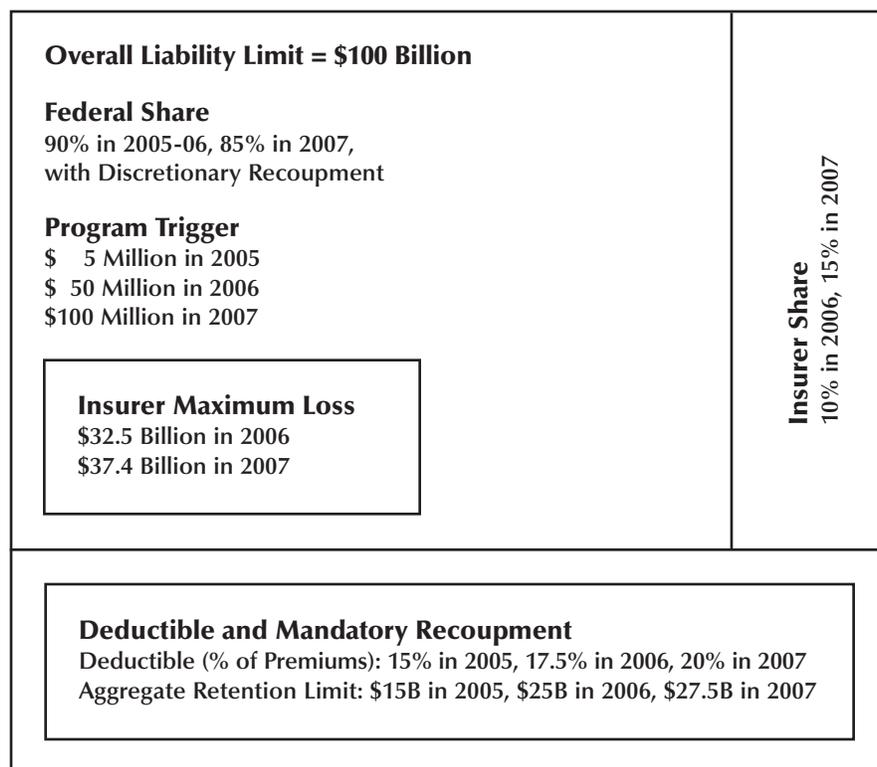
insolvency risks, state insurance regulators rapidly approved terrorism exclusions. By early 2002, insurance regulators in 45 states allowed insurers to exclude terrorism coverage from most of their commercial insurance policies.²⁴

In February 2002, the Government Accounting Office (GAO) gave congressional testimony providing “examples of large projects canceling or experiencing delays...with the lack of terrorism coverage being cited as the principal contributing factor” (Hillman, 2002, p. 9). According to a survey by the Council of Insurance Agents and Brokers, in the first quarter of 2002, the market for property-casualty insurance experienced “sharply higher premiums, higher deductibles, lower limits and restricted capacity from coast to coast and across the major lines of commercial insurance.”²⁵ In November 2002, Congress responded to these problems by passing TRIA. Through TRIA, the federal government required property-casualty insurers to offer or “make available” terrorism insurance to commercial insurance customers and created a federal reinsurance backstop for terrorism claims.

TRIA established the Terrorism Insurance Program within the Department of the Treasury. The program, which has been extended through December 31, 2007, covers commercial property-casualty insurance—all insurers operating in the United States are required to participate. Insurers are required to “make available property and casualty insurance coverage for insured losses that does not differ materially from the terms, amounts, and other coverage limitations applicable to losses arising from events other than terrorism” (U.S. Congress, 2002, p. 7). The legislation thus nullified state terrorism exclusions and requires that insurers offer terrorism coverage. The wording of the Act implicitly omits coverage of chemical, biological, radiological, and nuclear (CBRN) haz-

²⁴ An exception to the general exclusion of terrorism from commercial insurance policies following 9/11 is coverage for workers-compensation insurance, which is mandated by state law to cover work injuries from all causes. The states did not revise the workers-compensation laws to allow terrorism exclusions. Terrorism exclusion also were not introduced for personal-lines policies such as automobile and homeowners insurance.

²⁵ Council of Insurance Agents and Brokers (2002).

Figure 15**Coverage Under the TRIA of 2002**

NOTE: TRIA as extended by the Terrorism Risk Insurance Extension Act of 2005.

SOURCE: GAO (2004), Marsh (2005b).

ards, which are not covered by most commercial property-casualty policies.²⁶

For the federal government to provide payment under TRIA, the Secretary of the Treasury must certify that a loss was due to an act of terrorism, defined as a violent act or an act that is dangerous to human life, property, or infrastructure, and to have “been committed by an individual or individuals acting on behalf of any foreign person or foreign interest, as part of an effort to coerce the civilian population of the United States

or to influence the policy...of the United States Government by coercion” (U.S. Congress, 2002, p. 3). Acts of war are excluded, and losses from any terrorist act must exceed a specified monetary threshold before the Act takes effect. The threshold was originally \$5 million, increasing to \$50 million in 2006 and \$100 million in 2007.

If a loss meets these requirements, the loss is shared by the insurance industry and the federal government under the deductible, copayment, and recoupment provisions of the Act. The coverage structure of the Act is diagrammed in Figure 15. In 2005, each individual insurer had a terrorism insurance deductible of 15 percent of its direct earned premiums from the prior calendar year, which increases to 17.5 percent in 2006 and 20

²⁶ The TRIA Extension Act in 2005 excluded some types of commercial insurance that had been covered under the original TRIA. Specifically, coverage was eliminated for commercial auto, burglary, surety, professional liability, and farmowners multiple-peril insurance (Marsh, 2005b).

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percent in 2007. Above the deductible, the federal government pays for 90 percent of all insured losses in 2005-06, decreasing to 85 percent in 2007. However, the law provides for mandatory recoupment of the federal share of losses up to the level of the “insurance marketplace aggregate retention,” which is \$15 billion in 2005, \$25 billion in 2006, and \$27.5 billion in 2007. This recoupment is to occur through premium surcharges on property-casualty insurance policies in force after the event, with a maximum surcharge of 3 percent of premiums per year. In addition, the Secretary of the Treasury has the discretion to demand additional recoupment, taking into account the cost to taxpayers, the economic conditions of the commercial marketplace, and other factors. In other words, the Secretary of the Treasury could choose to recoup 100 percent of federal outlays under this program through ex post premium surcharges. The total, combined liability of the government and private insurers is capped at \$100 billion.

In both 2006 and 2007, insurers are exposed to potentially large losses under TRIA. As shown in Figure 15, the deductible and recoupment provisions expose insurers to possible losses as high as \$32.5 billion in 2006 and \$37.4 billion in 2007. Although these losses would be large by historical standards, they are of the same order of magnitude as the losses from the World Trade Center and Katrina, which the industry was able to absorb. In addition, the analysis of Cummins, Doherty, and Lo (2002) suggests that the industry could sustain losses of this magnitude without destabilizing insurance markets.

Government Catastrophe Insurance in Other Countries. This section provides a brief overview of the government role in catastrophe insurance in other countries based on OECD (2005a,b), GAO (2005), and other sources. Natural disaster programs are discussed first, followed by terrorism.

In many OECD countries, governments use tax revenues to establish prefunded disaster-relief funds. This approach is used in countries such as Australia, Denmark, Mexico, the Netherlands, Norway, and Poland (Freeman and Scott, 2005). In several of these countries, the government provides compensation only for losses that cannot

be privately insured. This approach is somewhat similar to the disaster-relief funding provided by the federal government in the United States.

Several countries have established government insurance programs to provide coverage for natural disasters. The government collects premiums in return for the coverage, and private insurers generally market the policies and handle claims settlement and other administrative details. An example is Consorcio de Compensacion de Seguros (CCS), which was established by the Spanish government in 1954. CCS is a public corporation that provides insurance for “extraordinary risks,” including both natural catastrophes and terrorism. The extraordinary risks coverage is mandatory and is provided as an add-on to private market property insurance policies. A premium is collected for the coverage, which is passed along to CCS by the private insurers.

Another approach, somewhat similar to TRIA, is for the government to act as a reinsurer rather than a primary insurer as it does in Spain. An example is France, which has two programs, the National Disaster Compensation Scheme and Fonds National de Garantie des Calamites Agricoles. The former is backed by a state-guaranteed public reinsurance program, Caisse Centrale de Reassurance (CCR), which provides unlimited government backing for catastrophe losses. Catastrophe insurance is mandatory for all private non-life insurance policies. Insurers can then reinsure the risk with CCR, which essentially serves as reinsurer of last resort. Premium surcharges for the catastrophe insurance are set by the French government.

Another example of the government as reinsurer is provided by the Japan Earthquake Reinsurance Company, which reinsures natural hazards such as earthquakes and tsunamis in Japan. All earthquake insurance written by private insurers in Japan is reinsured with the Japan Earthquake Reinsurance Company. Reinsurance coverage is based on a layering approach, such that 100 percent of the loss in the lowest-loss layer, up to 75 billion yen, is borne by private insurers; the loss is split evenly between private insurers and the government when the loss is between 75 billion and 1.0774 trillion yen; and 95 percent of

the loss is paid by the government when the loss is between 1.0774 and 4.5 billion yen (Freeman and Scott, 2005).

According to the OECD (2005b), there are government terrorism insurance programs in eight OECD countries: Australia, Austria, France, Germany, the Netherlands, Spain, the United Kingdom, and the United States. All of the programs were established after the September 11, 2001, terrorist attacks except for the Spanish program, where coverage is provided by CCS, and the U.K. program, which was established in 1993 in response to Irish Republican Army terrorist attacks. The programs vary along several important dimensions, including coverage layers and amounts, the limitations on the liability of private insurers, whether a premium is charged for the government reinsurance, and whether the plan is temporary or permanent. In the following, I give examples based on the most prominent plans rather than providing a comprehensive analysis.

In December 2001, a new reinsurer called *Gestion de l'Assurance et de la Reassurance des Risques Attentats et Actes de Terrorisme* (GAREAT) was established in France to reinsure terrorism risk insurance written by private insurers. The French government acts as reinsurer of last resort, providing unlimited reinsurance coverage through CCR. As is common in conventional catastrophe reinsurance, government terrorism reinsurance coverage is provided in a sequence of layers. The first layer of 400 million euros of coverage is provided by the private insurers who participate in GAREAT. As of 2005, there are two layers of private market reinsurance: The first layer provides limits of 1.2 billion euros in excess of the 400 million euro primary layer, and the second layer provides 400 million euros in excess of 1.6 billion euros. Above 2 billion euros, unlimited coverage backed by a government guarantee is provided by CCR. As with other catastrophe insurance in France, terrorism coverage is mandatory for all property insurance. A premium is collected for the government reinsurance, which is remitted to the government. GAREAT is set to expire at the end of 2006 (Michel-Kerjan and Pedell, 2005).

In Spain, terrorism insurance is provided under the CCS program. Therefore, it is mandatory

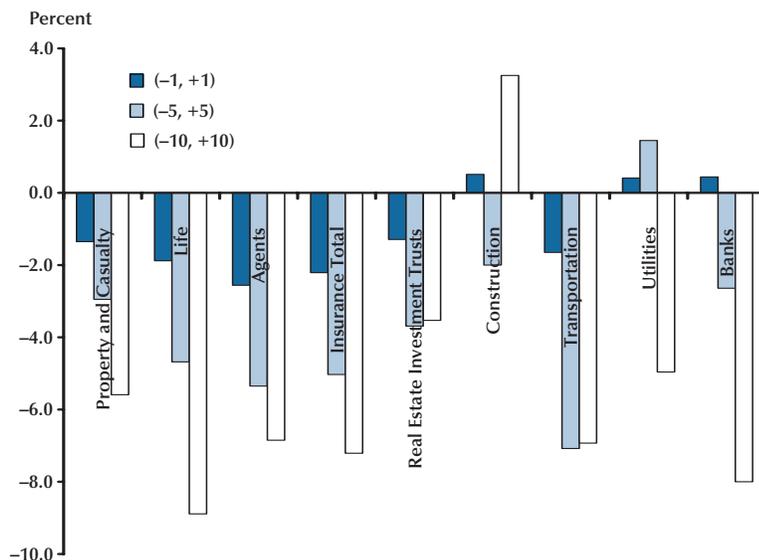
for all non-life insurance. There is no layering. All extraordinary risks coverage is ceded to CCS, which is backed by an unlimited government guarantee. Policyholders pay a premium surcharge for the coverage provided by CCS, including terrorism coverage. The program is permanent.

In Germany, a specialist insurer, EXTREMUS, was established in 2002 to provide terrorism insurance. The program is set to terminate at the end of 2007. Coverage is not mandatory in Germany, and demand for terrorism insurance is reportedly very low. The first 2 billion euros of coverage is provided by private insurers and reinsurers, and there is excess reinsurance coverage (8 billion euros in excess of 2 billion euros) provided by the German government in return for a premium. The annual maximum indemnity for each client is limited to 1.5 billion euros.

In the United Kingdom, a mutual reinsurance company, Pool Re, was established in 1993 to provide terrorism reinsurance to insurers writing insurance in the United Kingdom. Pool Re has a retrocession arrangement with the British Treasury to provide the ultimate layer of reinsurance. The first layer of coverage is provided by primary insurers, up to 75 million pounds per event or 150 million pounds per year (in 2005), industry-wide. Coverage is then provided by Pool Re up to the full amount of its resources. Coverage for events that exhaust the funds in Pool Re is provided by the government in return for a premium.

Among the eight OECD terrorism programs covered in OECD (2005b), only Austria's does not involve some form of government insurance. Among the seven programs with government backing, five are temporary and four have fixed expiration dates. Government reinsurance is unlimited in France, Spain, and the United Kingdom. Among the countries with limits on the liability of the government reinsurance, the highest limit is in the U.S. TRIA program. Among the programs with government backing, only the U.S. program does not charge a premium for the reinsurance, although the Secretary of the Treasury has the authority to seek recoupment of losses exceeding the industry participation limits. The lack of a premium is a defect in the U.S. program because it has the effect of crowding-out private reinsurers, who cannot compete with free coverage.

Figure 16
Stock Price Impact of the Passage of TRIA (11/20/2002)



SOURCE: Brown et al. (2004).

An Evaluation of TRIA. In making the case for TRIA, the president of the United States, Congress, and business leaders argued that the lack of terrorism insurance was having an adverse effect on important segments of the economy, citing cancelled or postponed construction projects, downgrades of commercial and multi-family mortgage securities, and other deleterious effects. However, the evidence was mostly anecdotal and solid evidence of a macroeconomic impact from the restrictions on terrorism insurance during 2002 has been hard to find. One paper that looked at several macroeconomic time series, such as bank construction lending and new construction put in place, did not find any noticeable interruption in trends that had existed before September 11, 2001 (Brown et al., 2004).²⁷ Nevertheless, the general assumption has been that restrictions on terrorism insurance are bad

for the economy, providing a rationale for a federal role. This section briefly considers the macroeconomic impact of TRIA, analyzes TRIA's success in restoring the market for terrorism insurance, and evaluates the likely impact if TRIA eventually expires.

Brown et al. (2004) provide evidence on the expected economic effects of TRIA by investigating the stock price reaction to the Act's adoption on the industries most likely to be affected by terrorism insurance. They conduct a standard event study of 11 TRIA-related news announcements, culminating in the president signing the bill into law on November 26, 2002. The stock price impact on affected industries of the bill's passage by Congress on November 20, 2002, is representative of the general conclusions of the study. The results, shown in Figure 16, reveal that TRIA's passage had an adverse impact on the stock prices of firms in the insurance, banking, real estate investment trusts, and transportation industries and a negative long-window impact on public utilities. Only in the construction industry is there any evidence of a positive stock price impact from TRIA, and

²⁷ A paper by Hubbard and Deal (2004) purports to show that the expiration of TRIA would have a significant adverse impact on the macroeconomy. However, the paper appears to have been written as an advocacy document, and the analysis is not very convincing.

this effect is not statistically significant. The results imply that TRIA's passage caused the stock market to reduce its estimates of expected future cash flows in nearly all affected industries.

It is relatively easy to explain the negative stock price reaction of property-casualty insurers to the passage of TRIA. Prior to TRIA, the availability of terrorism insurance was sharply curtailed, revealing that many insurers did not believe they could write terrorism insurance at a profit. TRIA nullified most coverage restrictions and required insurers to offer coverage that they did not want to provide and, moreover, exposed insurers to significant potential losses from TRIA's deductible, copayment, and recoupment provisions. Although TRIA left the pricing of terrorism insurance to the private market, states regulate insurance prices; and attempts by insurers to avoid providing coverage by offering insurance at excessive prices would attract adverse regulatory attention. Thus, as shown further below, a considerable amount of terrorism insurance has been offered under TRIA that probably would not have been available without TRIA's "make available" rule.

Because the purchase of terrorism insurance is not mandatory under TRIA, it is more difficult to explain the adverse stock price reaction in industries that are buyers rather than sellers of insurance. At first glance, the Act provided firms in these industries with a no-obligation option to buy terrorism insurance that may not have been available otherwise. However, a more careful look reveals some possible reasons for the negative stock price reaction. Brown et al. (2004) provide two possible explanations. A first explanation is a type of "Samaritan's dilemma" problem. That is, the Act may have reduced market expectations with respect to future federal assistance for firms and industries affected by terrorist events by substituting a federal reinsurance program for a potentially more open-ended implicit government commitment. The second explanation is that TRIA may have created insurance market inefficiencies by impeding the development of more-efficient private market mechanisms for financing terrorism losses, especially because no premium is charged for the federal reinsurance. A third possible

explanation, which conflicts somewhat with the Samaritan's dilemma argument, is that TRIA implicitly excludes coverage for CBRN hazards, which have the potential to cause the most severe losses.

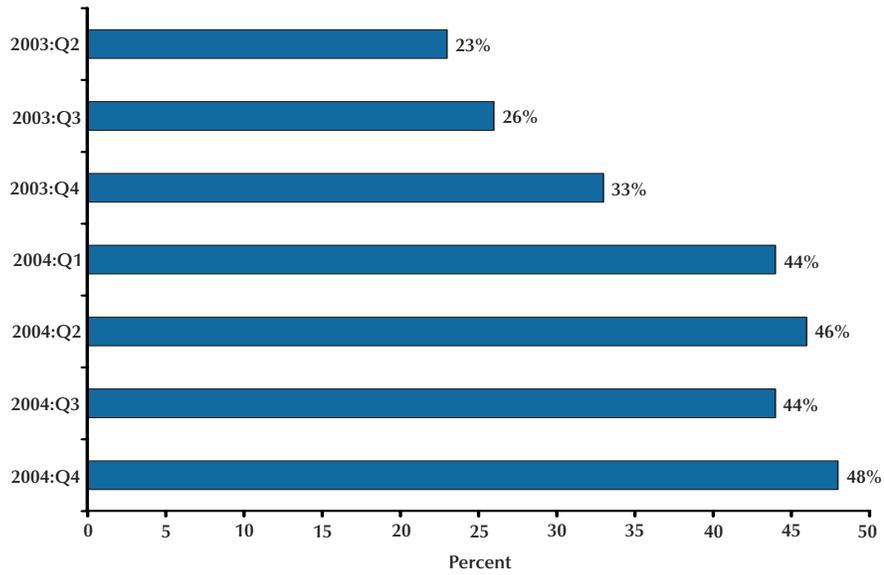
Although initial reports indicated that take-up rates (the percentage of buyers who accept insurers' offers of terrorism insurance) under TRIA were very low, more recent data reveal that significant amounts of terrorism insurance have been purchased under TRIA. Marsh (2004, 2005a) surveyed their clients in 2004 and 2005 to provide information on terrorism coverage. The results are shown in Figure 17, which provides quarterly take-up rates based on approximately 2,400 Marsh clients from 2003:Q2 to 2004:Q4. The take-up rate increased from 23 percent in 2003:Q2 to 48 percent in 2004:Q4. Thus, the large firms which constitute Marsh's clientele demonstrated a significant demand for terrorism insurance, especially in 2004.

Further evidence on terrorism insurance take-up rates is provided by surveys conducted by the U.S. Department of the Treasury (2005) as part of its congressional mandate to provide an evaluation of TRIA's effectiveness. The Treasury surveys are a valuable complement to the Marsh surveys because they also included smaller firms. The results, shown in Figure 18, indicate that the take-up rate increased from 27 percent in 2002 to 54 percent in 2004. This provides further evidence that a strong demand for terrorism insurance has existed under TRIA. The 2002 results are also important because they reveal that terrorism insurance did not disappear between September 11, 2001, and the passage of TRIA. In fact, significant amounts of coverage were being offered and purchased during this period, even though no federal reinsurance was in effect.

The final source of evidence on take-up rates is a survey conducted in 2004 by the Mortgage Bankers Association (2004). The Association surveyed the commercial and multi-family mortgage market to determine the prevalence of terrorism insurance protection for properties covered by these types of mortgages. The results, shown in Figure 19, reveal that lenders require terrorism insurance for mortgages, accounting for about 94

Figure 17

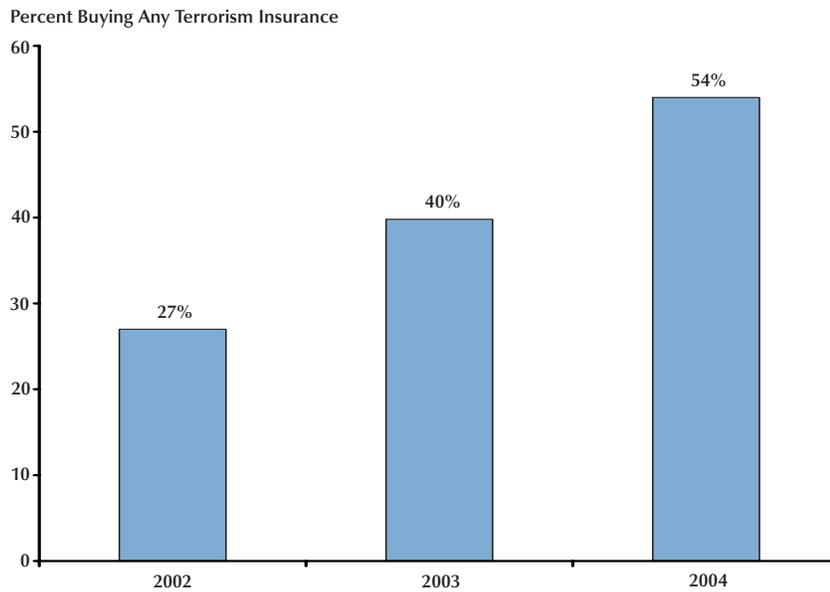
Terrorism Insurance Take-Up Rates: Marsh Estimates



SOURCE: Marsh (2005a).

Figure 18

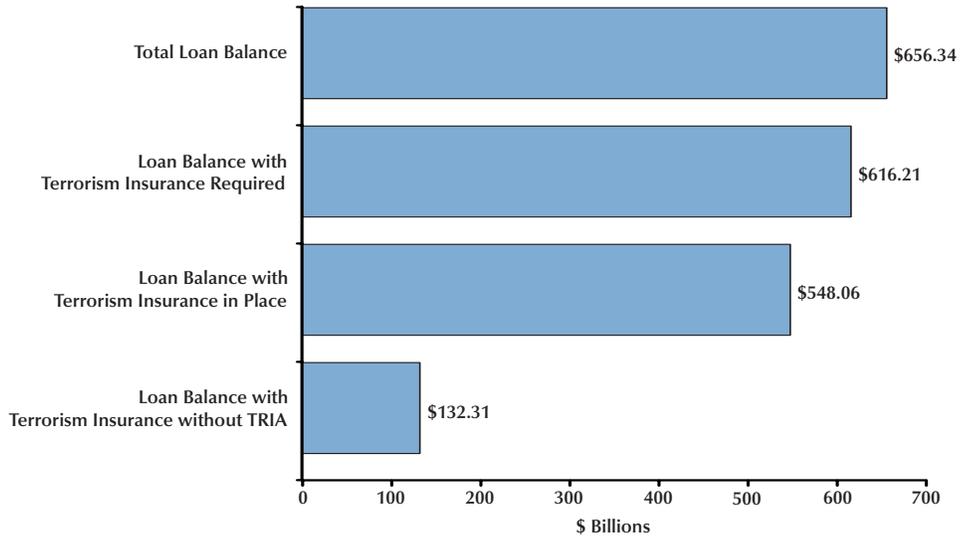
Policyholder Terrorism Insurance Take-Up Rates



SOURCE: U.S. Department of the Treasury (2005).

Figure 19

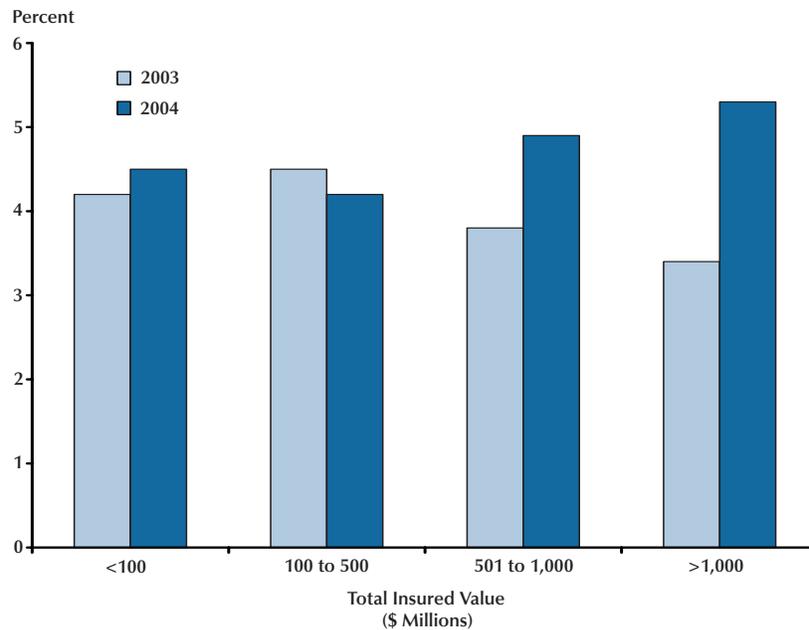
Terrorism Insurance in the Commercial/Multi-family Mortgage Market, 2004



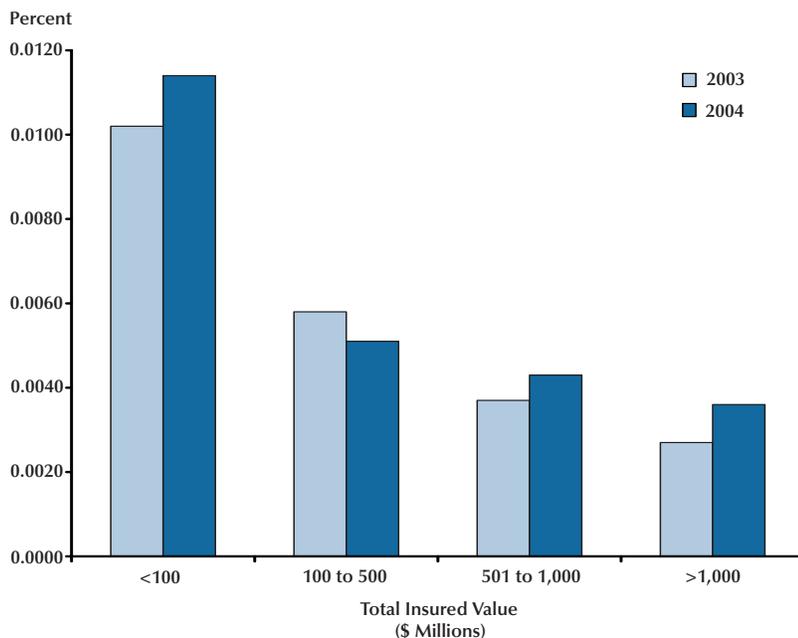
SOURCE: Mortgage Bankers Association (2004).

Figure 20

Terrorism Insurance Price as a Percentage of Property Insurance Premiums



SOURCE: Marsh (2005a).

Figure 21**Terrorism Insurance Pricing: Median Rates by Total Insured Value**

SOURCE: Marsh (2005a).

percent of loan balances. Of the \$616 billion in loan balances where terrorism coverage was required, insurance was purchased for \$548 billion, or 89 percent. Respondents estimate that only \$132 billion would have been covered by terrorism insurance absent TRIA. Although the accuracy of this counterfactual estimate is not clear, the results do indicate the respondents' belief that TRIA plays a major role in creating a supply of terrorism insurance.

The pricing of terrorism insurance was also analyzed in the Marsh and U.S. Treasury surveys. Results from Marsh (2005a) are presented in Figure 20. The figure indicates that terrorism insurance constituted between 4 and 5 percent of total commercial property insurance premiums for the Marsh clients included in the survey and that prices increased in 2004 for larger properties. However, even at the 2004 levels, prices do not seem unreasonable in a relative sense. Figure 21 provides information on the absolute values of terrorism insurance prices from the Marsh survey.

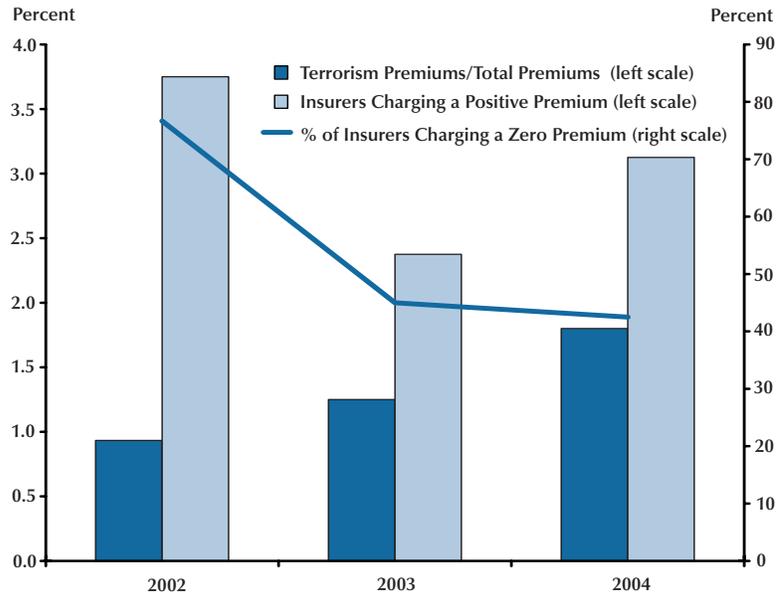
Terrorism insurance premiums represented 0.01 percent of insured value for relatively low-valued properties, dropping to about 0.004 percent for the largest properties.

Further pricing results from the Treasury surveys are summarized in Figure 22. Perhaps surprisingly, the results reveal that many insurers were still not charging an explicit price for terrorism insurance following the enactment of TRIA. In 2002, about 80 percent were not charging for terrorism coverage, but this had dropped to 40 percent by 2004. Including both the zero price and positively priced insurance, terrorism insurance accounted for about 1 percent of total property insurance premiums in 2002, rising to approximately 2 percent in 2004. Considering only the positive-premium terrorism insurance, the terrorism premium was about 3 percent of total premiums in 2004. Hence, the price of terrorism coverage does not seem to be exorbitant under TRIA.

I now turn to an evaluation of what the terrorism insurance market might look like without

Figure 22

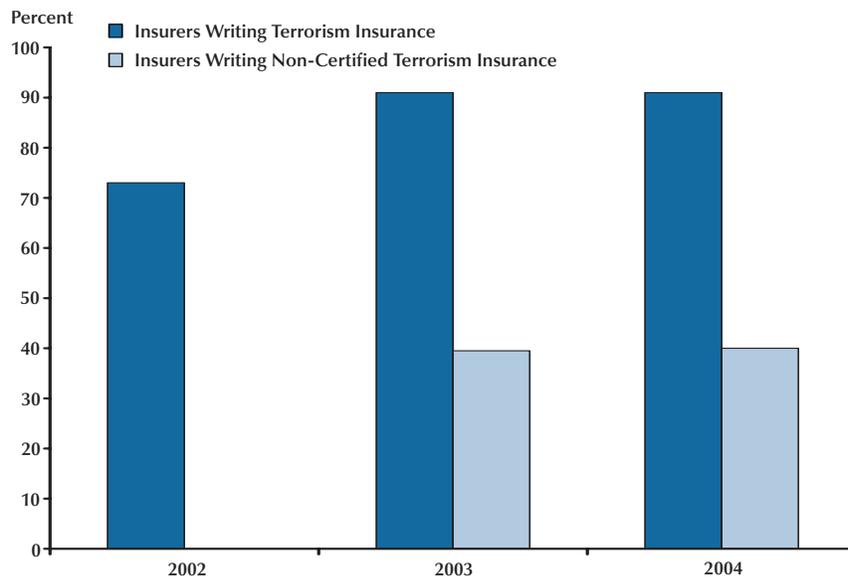
Terrorism Insurance Premiums as a Percentage of Total Premiums



SOURCE: U.S. Department of the Treasury (2005).

Figure 23

Extent of Terrorism Coverage



SOURCE: U.S. Department of the Treasury (2005).

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TRIA. Some evidence helpful in making this evaluation is provided in the U.S. Treasury surveys. In addition to terrorism insurance reinsured under TRIA, which is limited to foreign terrorism, some insurers also write *non-certified* terrorism coverage, which insures against events such as domestic terrorism not covered by TRIA. The percentages of insurers writing certified (i.e., TRIA-reinsured) coverage and non-certified coverage for 2002 through 2004 are shown in Figure 23.²⁸ The results are striking—approximately 90 percent of insurers wrote certified terrorism coverage in 2002 through 2004, but only 40 percent wrote non-certified coverage. Given that non-certified (i.e., domestic) terrorism events are generally viewed as less risky than foreign terrorism, these results may suggest that no more than 40 percent of insurers would continue to offer terrorism coverage for foreign terrorism if TRIA expires.

The Treasury also queried responding insurers about their 2005 renewals that extend into 2006, when TRIA's renewal was uncertain. Fifty percent of the respondents indicated that they would not provide terrorism coverage "that is roughly similar to TRIA coverage" for the segment of the policy period extending into 2006 (U.S. Treasury 2005, p. 75). Of these respondents, 55 percent planned to exclude terrorism altogether in 2006, 22 percent had a contingent exclusion for terrorism going into 2006, and 24 percent included coverage that was not comparable to TRIA coverage. These results do not bode well for the availability of terrorism insurance coverage absent TRIA.

In conclusion, it is clear that TRIA has been effective in making terrorism insurance widely available. That about half of policyholders do not buy terrorism insurance seems to be more a reflection of the fact that many policyholders do not have significant terrorism exposure rather than a belief that terrorism prices are too high. In fact, terrorism coverage is being made available at prices representing only a small proportion of total property insurance premiums. However, because the government reinsurance is being provided for free, it is likely that the current prices mainly reflect insurer expected losses under the

deductible and copayment provisions of TRIA. Thus, prices can be expected to rise once the terrorism deductibles, copayments, and recoupment provisions increase beginning in 2006.

The survey results also suggest that availability of terrorism insurance is likely to decline sharply if TRIA eventually expires. This could be a temporary decline until private market solutions begin to emerge. However, the experience with catastrophic risk insurance in California and Florida suggests that many buyers, especially in high-risk areas, will not be able to obtain terrorism insurance without some form of government involvement in the market. Although such involvement does not necessarily imply that the government should serve as reinsurer of last resort, the experience of other OECD countries suggests that some form of government reinsurance may be needed to sustain the market for terrorism coverage in the future. However, care should be taken in designing any federal terrorism program, to avoid adverse incentives and unintended consequences. For example, an economic analysis conducted by Michel-Kerjan and Kunreuther (2006) shows that it would be possible for large insurers to "game" the system under TRIA, shifting responsibility for terrorism losses to smaller insurers and policyholders.²⁹

EVALUATION OF GOVERNMENT INVOLVEMENT MECHANISMS

This section begins with an evaluation of theories of government involvement in insurance markets. The discussion then turns to an evaluation of the principal mechanisms for government involvement and recommendations for improving the markets for insurance against catastrophes.

Theories of Government Involvement

Three primary theories of public policy are relevant in evaluating the role of government in addressing market failures in the insurance indus-

²⁸ This distinction is not meaningful in 2002 because federal terrorism reinsurance did not exist for most of the year.

²⁹ For further economic analysis of terrorism insurance, see Kunreuther and Michel-Kerjan (2004), Kunreuther et al. (2003), Lakkawalla and Zanjani (2002), and Wharton Risk and Decision Processes Center (2005).

try: laissez faire, public interest, and market enhancement. Laissez faire theory maintains that any market-based equilibrium, however imperfect, provides a more efficient allocation of resources within the economy than an equilibrium involving government intervention. From this perspective, government intervention in markets results primarily from rent-seeking behavior of special interest groups (e.g., Stigler, 1971). Thus, industry calls for government protection against catastrophic risk are viewed as opportunistic attempts to secure an ex ante wealth transfer from taxpayers.

Several types of inefficiencies can arise from government insurance programs. Provision of subsidized insurance is likely to crowd out private attempts to enter the market, permanently locking in an inefficient solution to financing catastrophe losses. Government programs tend to develop constituencies that engage in intensive lobbying to maintain government support, strengthening concerns about rent-seeking by special interests.³⁰ Subsidized insurance also tends to create moral-hazard problems whereby policyholders underinvest in loss prevention. Government insurance also may create resource allocation problems if subsidized terrorism insurance leads to overbuilding of building types and locations that are relatively vulnerable to terrorism. Actuarial pricing of government insurance can alleviate some of these problems. However, because the design of government programs is determined by politics rather than the operation of markets, even unsubsidized insurance programs are not likely to represent the most efficient solution.

The public interest theory of regulation contests the laissez faire view (e.g., Musgrave and Musgrave, 1984). This theory suggests that market failures can lead to suboptimal allocation of resources and that government intervention targeted at addressing the market failures can improve welfare. Although laissez faire policy suggests that private sector coordination is optimal, public interest theory suggests that, in specific instances, the government can improve upon

the market equilibrium by substituting for private sector coordination. Proponents of public interest theory, therefore, maintain that the information asymmetries and bankruptcy costs associated with the market for terrorism insurance may necessitate the role of the government in “completing” the market for terrorism insurance.

The third view of public policy intervention, the market-enhancing view, takes a middle position (e.g., Lewis and Murdock, 1999). The market-enhancing view recognizes that market failures can create suboptimal allocations of wealth and that private sector coordination is not always effective. This view holds that public policy should facilitate the development of the private market but should not create new governmental institutions to substitute for private solutions. The market-enhancing policy recognizes that government (de)regulation can help facilitate the creation or enhancement of private institutions for solving market failures, such as how the federal government facilitated mortgage securitization markets.³¹

Mechanisms for Government Involvement

This section first considers natural catastrophes and then analyzes terrorism. The private insurance market seems to have difficulty in providing adequate coverage for the largest natural catastrophes. Projected catastrophes, such as a \$100 billion California earthquake or Florida hurricane, are large relative to the resources of the insurance industry; and holding additional equity capital in the industry to shield against such events does not seem to be feasible (Jaffee and Russell, 1997). GAAP accounting rules do not allow insurers to establish reserves for events that have not happened. Similarly, insurers are not permitted to take tax deductions for events that have not yet occurred, requiring that capital to pay for catastrophe claims has to be accumulated out of after-tax income.³² In addition, large pools

³⁰ At least one lobbying group, the Council to Insure Against Terrorism, was formed specifically to lobby for renewal of TRIA on behalf of business insurance buyers. Several groups representing insurance agents and insurance companies also have active TRIA lobbying efforts.

³¹ Of course, there is always the risk that government-sponsored enterprises' special privileges may remain fully in place years later, even if the market failures no longer exist.

³² It is noteworthy that both the California Earthquake Authority and Florida's residual market and catastrophe insurance plans have been allowed to establish reserves using pre-tax revenues.

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of capital tend to attract corporate raiders and may induce management to engage in negative net-present-value projects. Raising capital to pay losses following a large-loss event also is difficult because informational asymmetries between capital markets and insurers regarding loss exposure and reserve adequacy raise the cost of capital to potentially prohibitive levels. Thus, private insurance markets tend to be much more efficient at *cross-sectional* rather than *cross-time* diversification.

There are several possible solutions to the cross-time diversification problem. Because the resources of capital markets are more than adequate to fund large catastrophes, a market-enhancing approach would be for the government to facilitate the growth of the insurance-linked securities market. This is an attractive solution because it could be implemented without committing tax dollars to paying for catastrophe losses. There are several areas where removal of remaining regulatory and bureaucratic barriers as well as simplification and clarification of rules and approval procedures would facilitate the securitization of catastrophic risk. The GAAP consolidation rules should be clarified and codified for CAT-linked securities, and such securities should be given conduit status for federal income tax purposes. State insurance regulations should be clarified and streamlined to reduce transactions costs and enhance the speed to market of new securities.

Even if all regulatory impediments were removed, the CAT bond market still might not attain sufficient size to fund major catastrophes. However, it is also possible that “critical mass” would be reached, where scale economies and the ability to form worldwide CAT bond portfolios would reduce transactions costs and spreads to the point where the market would rival the asset-backed securities market. The costs of relaxing the regulatory and accounting rules are low, so it would seem to be worthwhile to conduct the experiment. The federal government could play a major role by creating a task force to coordinate with Congress, the Financial Accounting Standards Board, and the National Association of Insurance Commissioners to bring down the regulatory barriers.

A somewhat more intrusive solution to the time diversification problem would be to exploit the federal government’s ability to implement intergenerational diversification through federal borrowing. Unlike private insurers, the federal government can effectively accomplish cross-time diversification because it can raise money following a disaster by borrowing at the risk-free rate of interest.³³ The government’s ability to time-diversify led to a Clinton administration proposal for government intervention in the market for catastrophe property insurance (Lewis and Murdock, 1999), whereby the federal government would hold periodic auctions of catastrophe excess-of-loss (XOL) reinsurance contracts to insurers and reinsurers in loss layers where private market reinsurance is not available. The auctions would be conducted subject to a reservation price sufficient to support the expected loss and expense costs under the contracts as well as a risk premium to encourage private market “crowding out” of the federal reinsurance. If a catastrophe were to occur that triggered payment under the contracts, the federal government would finance the loss payments by issuing bonds. Although the proposal was not adopted, it could provide a model for a different type of federal involvement in the terrorism insurance market consistent with the market-enhancing view of regulation. However, given that securitization offers a viable private market solution, it would be advisable to give higher priority to exploring that option.

Another alternative to government intervention to enhance the private market would be to permit insurers to accumulate tax-deductible reserves for catastrophe losses, a proposal that has been advocated by the insurance industry for at least a decade. One obvious problem with the proposal is that it would reduce federal tax revenues, when other solutions such as securitization are available that would not have this effect. Another problem is that there would be no way to prevent insurers from reducing reinsurance purchases in such a way as to substitute tax-advantaged reserves for other forms of hedging,

³³ The assertion that the government has superior ability to time-diversify may be challenged on the grounds that it places risks on taxpayers regardless of their willingness to bear them.

with little or no net gain in risk-bearing capacity. Finally, a tax-subsidized reserving program would have a crowding-out effect on the securitization market.

As mentioned above, state governments have intervened to “make markets” in catastrophe insurance in California, Florida, and other states. These might be considered market-enhancing efforts, except to the degree that they involve an element of coercion. That is, insurers are required to participate in the California and Florida programs if they wish to continue to participate in the states’ other lucrative insurance markets, such as the market for automobile insurance. It is likely that less insurance would be available in these states, at least on a cyclical basis, if the state-mandated plans had not been adopted. However, it is also possible that the private market would provide adequate coverage if insurance prices were deregulated, allowing the market to clear. The periodic difficulties in private markets for natural catastrophe coverage provide additional impetus for developing the CAT bond market because insurers might be more willing to write coverage on a voluntary basis if more reasonably priced diversification mechanisms were available for mega-catastrophes.

The market response to the increasing frequency and severity of catastrophe insurance losses since the 1990s has potentially quite significant implications. In spite of the lack of federal government intervention in the market for natural catastrophe insurance, the private market for natural catastrophe insurance did not collapse completely. Although insurance and reinsurance prices rose following Andrew and Northridge, significant amounts of new equity capital flowed into the industry and reinsurance prices eventually declined (Guy Carpenter, 2005). For the most part, insurance continued to be available in disaster-prone areas, such as Florida, and private insurers eventually re-entered the market for California earthquake insurance. There is evidence of continuing market anomalies, however, such as the skewness of reinsurance toward the coverage of relatively small catastrophes and the thinness of reinsurance coverage for mega-catastrophes (Froot, 2001). Nevertheless, private markets for

natural catastrophe insurance have continued to function with reasonable efficiency in the absence of federal support.

Terrorism, and particularly mega-terrorism events, pose more-difficult problems for private insurance markets than natural catastrophes—mega-terrorism events potentially cause much more extensive losses than natural hazards; the frequency and severity of terrorist events are difficult to estimate, both inherently and because much of the most useful information is confidential for national security reasons; and terrorists can adjust strategies and tactics to defeat efforts to protect against terrorism and mitigate loss severity. The same factors that make terrorism difficult to insure and its similarity to war risk may rule out terrorism-risk securitization, at least on a large scale. Among the other obstacles, the existence of terror-linked securities might influence target selection by terrorists, and terrorists and their sympathizers could attempt to profit by trading in terror-linked securities.³⁴ Consequently, even if government provision of insurance against natural catastrophes is not needed, there may be a legitimate role for government in the market for terrorism insurance. The experience under TRIA provides somewhat mixed messages on the need for a government role—the stock market reacted negatively to the adoption of TRIA but survey evidence strongly suggests that TRIA succeeded in making terrorism coverage widely available.

There are various mechanisms for government to become involved in the terrorism insurance market. Because there is great uncertainty surrounding the insurability of terrorism risk, a guiding principle of any government involvement should be that programs be designed to not crowd out the private market. This necessitates that the program be explicitly priced and that the price

³⁴ However, there is some evidence that securities markets might provide a source of risk-bearing capacity for terrorist events. In 2003, the Golden Globe Financing transaction resulted in a \$260 million securitization covering the risk of the cancellation of the 2006 FIFA World Cup. The transaction explicitly included terrorism risk. Swiss Re has executed two securitization transactions covering catastrophic mortality risk, including mortality spikes from terrorism. A key to the success of these issues may be that they are multi-event bonds, not applying strictly to terrorism (Swiss Re, 2005b).

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be set above the expected value of loss. One possibility would be to adapt the Clinton administration proposal and auction off federally backed XOL terrorism reinsurance contracts. Another would be a reinsurance program patterned after TRIA but with a positive premium charge and continuing increases in insurance industry deductibles to encourage the private market to develop gradually.

Another important problem is how to handle CBRN hazards. Under TRIA, the federal policy approach is to “look the other way” and to permit insurers to exclude CBRN hazards to the extent they were excluded from non-terrorist commercial coverages. In this respect, CBRN hazards are being treated similarly to war risks. If an XOL reinsurance or TRIA-like program is to be implemented going forward, a case could be made for including CBRN hazards. Because government is likely to compensate CBRN victims after the fact, it might make sense to handle as much compensation as possible through a formal insurance program rather than as disaster relief. As Katrina has shown, the federal response to a disaster can be chaotic and inefficient, whereas private insurers are very effective at settling claims and have incentives to settle them efficiently provided the government insurance has appropriate deductibles and copayment provisions to control moral hazard.

CONCLUSIONS

The frequency and severity of losses from natural catastrophes such as hurricanes, earthquakes, and tsunamis have increased dramatically in the past 15 years. Even though the resources of insurers and reinsurers worldwide also have grown, the rising costs of catastrophic risks have placed significant stress on insurance markets. Man-made disasters also have led to monetary losses and loss of life. However, until the terrorist attacks of September 11, 2001, terrorism losses did not fall into the mega-catastrophe category; and, in fact, insurers routinely covered terrorism losses for little or no charge. The 9/11 losses revealed a shift in the terrorism probability of loss distribution, which led insurers and reinsurers

to exclude terrorism losses from many insurance policies. Governments in several countries responded by adopting government terrorism insurance programs. The U.S. Terrorism Risk Insurance Act of 2002 (TRIA) requires insurers to offer terrorism coverage in commercial property-casualty insurance policies and provides federal terrorism reinsurance. This paper investigates the appropriateness of government insurance programs for catastrophic risk, focusing on coverage for natural catastrophes and terrorist events.

A review of the resources of the insurance and reinsurance industries as well as the current state of the market for insurance against earthquakes and windstorms in the United States reveals little need for a government role, beyond the programs currently in effect in Florida and California. Adequate insurance is now available in the states with the highest exposure to natural catastrophes. The earthquake and hurricane insurance markets in the United States fall under the category of a second-best solution; that is, better than an alternative system involving a more-intrusive role for government.

Although few policyholders in California purchase earthquake coverage, windstorm insurance is widely purchased in Florida. The lack of interest in earthquake coverage among buyers in California is a matter of concern, and the resources of the California Earthquake Authority (CEA) would be inadequate to pay claims from a major earthquake if coverage were more widespread. This situation is likely to lead to pressures for massive governmental disaster relief following a major earthquake. Hence, measures should be considered, such as making earthquake insurance mandatory in quake-prone areas of the state and strengthening the resources of the CEA, on the hypothesis that it is more efficient to provide assistance through prearranged programs where claims are settled by private industry rather than by ex post government assistance programs.

Even though government insurance for hurricanes and earthquakes does not seem to be needed, government could deepen and enhance the markets for these and other catastrophe coverages by removing regulatory impediments to the development of the market for insurance-linked

securities. This would involve clarifying and/or changing GAAP accounting rules for special-purpose reinsurers, granting insurance-linked securities conduit status for federal tax purposes, and giving non-indemnity securities reinsurance status under state regulatory accounting rules. Giving insurers the ability to accumulate catastrophe reserves on a pre-federal income tax basis would reduce federal tax revenues without necessarily adding net capacity to insurance markets.

The federal government is already involved in the market for flood insurance, providing subsidized insurance through the National Flood Insurance Program. However, the program is badly in need of reform. It is currently bankrupt and generally does not charge actuarially sound premiums or have a provision for building up reserves in low-loss years to minimize the need for federal borrowing to pay claims. Flood insurance penetration rates are very low, and the program is not effectively meeting its stated objectives of encouraging loss mitigation and flood-plain management. Although the program could and should be fixed, a better alternative would be to develop private sector solutions by requiring insurers to make available flood insurance coverage, perhaps with a federal reinsurance backstop, and requiring lenders to enforce flood-coverage requirements, as is presently done for homeowners insurance.

Terrorism is a more difficult problem for private insurance markets than natural hazards, for several reasons. Terrorism is a deliberate act, similar to war, which has long been excluded from private insurance policies. Moreover, because terrorists can potentially use weapons of mass destruction, terrorism losses are potentially much larger than losses from natural hazards. Terrorism losses are also much more difficult to estimate than losses from natural catastrophes. Prediction is made especially difficult because terrorists are constantly changing strategies, targets, and tactics. Finally, the likelihood of terrorist attacks is affected by government policies for homeland security, foreign affairs, and defense; and much of the information that would be useful to insurers in estimating premiums remains confidential for national security reasons. Consequently, a case can be made

for some degree of government involvement in the terrorism insurance market.

Terrorism insurance did not disappear after 9/11, and some coverage will undoubtedly continue to be available if TRIA eventually expires. However, a review of survey data provides convincing evidence that terrorism insurance is much more widespread under TRIA than it would have been with no government reinsurance in place. Thus, insurance availability will decline, at least initially, if government reinsurance is withdrawn, especially for the most vulnerable targets and locations. As with natural catastrophes, it is likely to be more efficient to cover terrorism losses through a pre-existing insurance program rather than through ex post government assistance. Fairly priced terrorism insurance also provides the proper incentives for resource allocation in terms of the siting of construction projects and private mitigation efforts.

If government does continue to participate in the terrorism insurance market, care should be taken that the program does not prevent the re-emergence of the private market. In particular, terrorism insurance should be priced at the expected loss plus a sufficient risk margin to make it attractive for private reinsurers to re-enter the market and to encourage the development of a terrorism risk-linked securities market. Any government terrorism reinsurance should have industry deductibles at least as large as under TRIA. Consideration also should be given to covering the chemical, biological, radiological and nuclear hazards under public and private terrorism insurance. Finally, care should be taken in designing any government terrorism program, to avoid creating adverse incentives and prevent gaming of the system by insurers or other market participants.

Future research is needed to determine the effects of catastrophe losses and catastrophe insurance on the macroeconomy. Although catastrophe losses are small relative to U.S. and world GDP, it is still unclear whether such losses and/or the availability of insurance coverage have significant macroeconomic effects. It would be useful to further analyze the relationship between catastrophes and macroeconomic time series, such as construction, bank loans, and mortgages, as well as the

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correlations of catastrophes with securities returns. Such information would be valuable both to policymakers and to participants in the catastrophe insurance and insurance-linked securities markets. Finally, the experience with Hurricane Katrina suggests that the time has come for a comprehensive re-evaluation of disaster assessment, prevention, mitigation, and financing in the United States.

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Dwight M. Jaffee

AGENDA

First, the conference planners must be complemented for their foresight to put catastrophe insurance on the agenda for this conference, long before Hurricane Katrina crashed into New Orleans. As Katrina illustrates, the problems affecting catastrophe insurance in the United States are taking on, well, catastrophic proportions. Major changes are required in how the government intervenes in each of the major catastrophic risks—earthquakes, floods, hurricanes, and terrorism.

Turning to the task at hand, it is always a pleasure and enlightening to read a paper by David Cummins (2006). This one is no exception. My comments follow the lines of David's paper, taking up these topics in turn:

- Why do private markets for catastrophic risks fail?
- Should the government pick up the slack?
- And, if so, how is this best done?

WHY DO PRIVATE MARKETS FOR CATASTROPHE INSURANCE FAIL?

Capital Market Imperfections Are a Key Factor

The paper begins with a cogent discussion of the key role that capital plays for insuring against catastrophic risks. Applying his earlier work in Cummins and Weiss (2000), Cummins computes the capital an insurer should hold, based on its

insurance liabilities and the stochastic processes generating losses. It is assumed the insurer collects premiums at the beginning of the period equal to the expected loss. Capital is therefore required to cover the actual losses in excess of the expected value. The computations are basically applications of the law of large numbers and the central limit theorem. Cummins assumes a normal distribution, although he properly states that comparable results are available for a wider range of distributions. Cummins shows that, when the risks are identically and independently distributed (i.i.d.), the required capital per policy approaches zero as the number of individual policies approaches infinity. In contrast, when the risks are correlated, some amount of capital is required even in the limit as the number of risks approaches infinity. Cummins reasonably interprets this as meaning that catastrophic risks, which sensibly imply correlated risks, require more capital than do independent risks.

I think it important to add that fat-tailed distributions raise an even more distinctive issue, which may help explain why most catastrophe insurance lines are generally not offered by private insurers. A key property of fat-tailed distributions is that the benefits of diversification may not arise. For example, let an insurer start with a portfolio consisting of just one catastrophic risk, say risk A. Now suppose the insurer decides to diversify by creating a portfolio with one-half risk A and one-half risk B. Remarkably, the risk exposure of the portfolio may actually rise, contrary to the normal case of diversification benefits. The intu-

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ition is that, with fat tails, each catastrophe is potentially so large that holding equal shares of two risks may entail more total risk than holding one risk only.¹ And the same result can extend over a large number of such risks; see Ibragimov and Walden (2005) and Ibragimov, Jaffee, and Walden (2006). Thus, it might not be surprising that insurers often prefer a corner solution in which they take on no catastrophe risks at all.

In summary, I believe more work on the role of fat-tailed distributions might be rewarding in explaining why private markets for catastrophe insurance fail so regularly. Still, I surely agree with the main point of David Cummins's analysis that catastrophe insurance market failures arise out of capital market frictions of one sort or another.

Capital Market Imperfections Are Necessary But Not Sufficient for Catastrophe Market Failure

Although capital market imperfections are likely a necessary condition for the failure of private catastrophe insurance markets, they seem not to be sufficient. For example, only 15 years ago, the United States had active private markets for hurricane, earthquake, and terrorism risks. Even today, the United Kingdom has an active private market for flood insurance (which is sold in clear recognition of the possibility that the Thames could flood London). We also see certain insurers willing to put their money at risk to insure against catastrophes. In 1996, for example, Warren Buffett's insurance firms pledged several billions of dollars in capital to reinsure the California Earthquake Authority. And Lloyds of London stands ready to provide terrorism insurance (at the right price). So, other factors must play a role in determining who will and who will not offer catastrophe coverage.

Agency Problems for Catastrophe Insurers

Basic finance theory suggests that capital markets face no special problem with taking on

catastrophic risks. First, catastrophes mainly reflect idiosyncratic risks, which implies that capital markets should not even require much in the way of a risk premium. Second, the special problems created by fat-tailed distributions could be solved by allocating the risk among a large number of equity investors in each insurance firm, with each such investor holding a well-diversified portfolio. Thus, the financial structure of insurance firms should diversify risks even if diversification is not achieved within each insurer's portfolio.

But insurance firm managers strongly disagree. The following quote from Edward Liddy, president of Allstate, in the *Wall Street Journal*, September 6, 2005, illustrates their position:

The insurance industry is designed for those things that happen with great frequency and don't cost that much money when they do. It's the infrequent thing that costs a large amount of money to the country when it occurs—I think that's the role of the federal government.

(Francis, p. c.1)

This has the ring of a classic agency problem. An insurance firm manager is certainly at special risk—to lose his job and ruin his reputation—were he to be the one who bankrupted his firm by taking on a catastrophic risk that went bad. It is also intriguing that those insurers that do appear willing to take on catastrophic risks, for example, Warren Buffett and Lloyds of London, also appear to have special structures that eliminate the traditional manager-shareholder agency problem.

Zealous Regulators and Daffy Consumers

Insurance regulators compound the problem by restricting the degree to which primary insurers can use reinsurance and similar risk-sharing instruments. One issue is that regulators often do not allow primary insurers to include the full costs of reinsurance in their premiums. Another issue is that offshore reinsurance is often discounted as a means through which a primary insurer can meet its capital requirements. To be fair, regulators may have a basis for questioning the premiums charged by reinsurers and for discounting the credit worthiness of certain offshore insurers. Nevertheless, reducing or eliminating

¹ This may seem to conflict with Paul Samuelson's famous (1967) paper, in which he showed that diversification generally pays. Samuelson, however, carefully ruled out fat-tailed distributions that do not have finite moments.

such frictions certainly would help persuade private insurers to offer coverage against catastrophic risks.

Consumers, furthermore, are also not always rational in evaluating the contracts offered by insurers, which is another likely reason that catastrophe insurance markets fail to operate. The fundamental issue is that policyholders often consider the likelihood of a future catastrophe to be much lower than do the insurers. The result is that consumers often feel the premiums charged by the insurers are far too high. This is not a comfortable position for an insurer that has an otherwise profitable business writing auto and homeowner insurance for these same customers. An easy solution is just not to offer the catastrophe coverage.

Other Issues Seem Less Fundamental

Still other explanations are often offered for why insurers are reluctant to cover catastrophic risks, but these appear to me to be less fundamental than the capital market imperfections, fat-tailed risk distributions, agency problems, regulator problems, and daffy consumers already discussed. Here, I offer brief comments on two of these other issues.

Quantifying the Risk Parameters. It is often pointed out that, because of the infrequency of catastrophic events, it is difficult to obtain reliable estimates of their statistical frequency. It should be recognized, however, that estimation problems arise for all risks, whatever their frequency. For example, “parameter uncertainty” for the capital asset pricing model was studied long ago, with the conclusion that it created no fundamental problem. More recently, Froot and Posner (2002) have carried out a parallel analysis focusing on catastrophic risk estimates, reaching an equally sanguine conclusion. Furthermore, as a specific counterexample, telecommunications satellites were “insurable” from their very first launch, confirming that a long-established historical record is not an essential basis for firms to offer insurance coverage.

Time Diversification Versus Cross-Section Diversification. It is also sometimes suggested that catastrophic risks are more difficult to diver-

sify because the risk-sharing occurs across time more than across individual risks. To be sure, large catastrophic risks may have to be diversified across time, but capital market imperfections aside (discussed above), time-series diversification does not appear intrinsically more difficult. Indeed, asymmetric information, in which the insured party knows more than the insuring firm, is less likely to inhibit risk-sharing for catastrophic risks (where Mother Nature is the source) than for consumer lines such as auto insurance (where the propensity of individual drivers is important).

WHEN PRIVATE MARKETS FAIL, IS GOVERNMENT INSURANCE THE ANSWER?

Insurance, by sharing individual risks across a large number of agents, creates immense social benefits. Risk-sharing, by its very nature, is also arguably the most social of economic activities (self-insurance being interpreted as no insurance at all). It is thus not surprising that when private catastrophe markets fail, citizens dependably call on their government to fix the failure. And it is no more surprising that governments typically respond. So the question regarding government intervention is not so much “if” as it is “how” and “how long.” Before turning to some possible answers to these questions, it is useful to have a quick look at how government insurance is actually working in the United States across the four major catastrophe lines.

National Flood Insurance Program

Flood insurance is the longest standing of the government interventions in catastrophe insurance markets in the United States, dating from the 1960s. It is a federal program, initiated, expanded, and revised by Congress. Congress has required that the premiums be set on an actuarial basis, but at the same time it has required deep subsidies for homes that existed at the time each community entered the program. The effect is that expected losses on grandfathered properties are five times those on newly built homes, with an average annual grandfather subsidy of \$610

(compared with a total premium of \$310 on newly constructed homes) (see Government Accounting Office, 1999). It has reached the point that the National Flood Insurance Program (NFIP) is now considering a proposal to buy the grandfathered homes to save the high cost of future claims! At this writing, it is expected the NFIP losses from Katrina are likely to be about \$20 billion, virtually all of which will have to be provided as a one-time transfer from the U.S. Treasury.

In contrast, the United Kingdom appears to have a well functioning private market for flood risks. The plan operates as a private/public partnership, in which the government “guarantees” levees and requires good upstream practices, but the insurance rates and risks are all handled entirely within the private markets (for further details, see the Association of British Insurers; www.abi.org.uk/flooding).

Terrorism Risk Insurance Act

Following the terrorist attack of 9/11, Congress passed the Terrorism Risk Insurance Act, which provides reinsurance at the upper risk levels for qualifying terrorism insurance offered by the primary insurers. Premium setting is left fully in the hands of the insurance firms, but the government reinsurance is offered without charge. Assuming the subsidy is passed through to the policy holders, it creates an incentive against mitigation and induces new properties to continue to be built in risky locations. The Terrorism Risk Insurance Act was just renewed at year-end 2005, following, not surprisingly, the major endorsement of key parts of the real estate and insurance industries.

California Earthquake Authority

Although the government interventions in flood and terrorism risks are federal, the California Earthquake Authority (CEA) is a state program. This program was created by the California legislature in the aftermath of the Northridge earthquake of 1994. Although state funds are not committed to the CEA, it operates under rules set by the legislature and it is a good guess that state funds would be made available to support the

program if that became necessary. The enabling legislation requires that the premiums be “actuarially based,” but scientists disagree substantially over what the correct numbers are. This allows for substantial differences of opinion between the insurers and their customers. Indeed, less than 14 percent of applicable homeowners are currently purchasing CEA coverage. There is also consternation over the standard 15 percent deductible, although few consumers opted for a new 10 percent deductible (presumably because the premium is still higher).

In this context, David Cummins has raised the possibility that earthquake insurance be made mandatory on all homeowners, as a means to increase the participation rate. I have to disagree, certainly as long as the proper premiums are a matter of dispute. In addition, a government requirement would imply government backing for a potentially bankrupt plan, create the need for an “assigned risk pool” for those homeowners excluded from the regular program, and create pressure for further rate subsidies. It is also enlightening that mortgage lenders in California do not require earthquake coverage as the basis for a home loan, no doubt because earthquakes rarely create serious damage to wood-framed, detached homes.

Florida Hurricane Funds

The state of Florida created a complex of insurance structures following Hurricane Andrew in 1992, including an assigned risk pool for homeowners who could not otherwise obtain coverage and a state-backed reinsurance fund. These plans have taken substantial losses as a result of the bad hurricane seasons in recent years. In fact, the plans are surviving only because they provide for quite high deductible limits and for ex post additions to premiums going forward. Florida does not, however, face a low take-up rate, because mortgage lenders uniformly require wind-damage coverage as a requirement for obtaining a mortgage on a Florida property.

How the Government Should Intervene

In view of the rather dire experience with the existing government interventions in catastrophe

insurance markets in the United States, I will suggest a simple proposition: *When intervening in catastrophe risk insurance markets, government plans should mimic as closely as possible what operating private markets would have been expected to do.* (See also Jaffee and Russell, forthcoming). In particular, based on this principle, government plans would generally be expected to do the following:

- *Use risk-based premiums* in setting the price charged for each individual risk. Risk-based premiums, of course, create the proper incentives for policyholders to take actions to mitigate the underlying risks. In the case of location-based real estate risks, property owners may even decide not to build in particularly risky locations.
- *Do not offer subsidies* in setting the premiums on individual risks and certainly do not subsidize the riskiest locations. To do otherwise—that is, to provide subsidies—would be to actively induce people to put themselves in harm’s way. Such subsidies would also be sure to crowd out any potential private market initiatives. Of course, to follow this advice, the government must have the will to reject requests to provide special help to affected industries and/or regions.

CONCLUSION

In conclusion, David Cummins and I firmly agree the first best solution is to keep the government out of the insurance business entirely, or to retire the government from active duty as soon as practical after a major event. To reach this goal, we also agree that a key step is for the government to rapidly remove all existing impediments to catastrophe bonds. And if the government is willing to go further, a good next step is to create a facility that auctions off access to these catastrophe bonds.

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What Is the Appropriate Role of the Federal Government in the Private Markets for Credit and Insurance? What Is the Outlook?

Robert E. Litan

It is a privilege to appear on such a distinguished panel, and I thank the organizers for inviting me and for organizing this excellent conference.

The theme of this panel discussion centers on the unrecognized liabilities of the federal government and what to do about them. I will skip some of the most obvious ones—the pension guarantee system, Social Security, and Medicare—as they have been addressed at this conference and by many others. Instead, I want to concentrate on federal relief for natural disasters, a topic addressed in David Cummins’s (2006) excellent paper and which is quite timely given the recent devastation of Hurricane Katrina and other hurricanes of the extraordinary 2005 “season.”

There should be two objectives in dealing with natural disasters: (i) to encourage individuals, businesses, and all levels of government to take cost-effective measures to minimize the cost of disasters that do occur and (ii) to encourage compensation of losses in a way that does the least to discourage mitigation or objective (i). Government policy, in fact, has attempted to achieve both these

objectives, in part. But a few comments on them at the outset are warranted.

First, the notion that the best policymakers can do is to minimize the costs of disasters, taken the *fact* that disasters will occur as a given, is probably true only in the short run and only for some kinds of disasters. In the long run, government policies that affect the emissions of carbon dioxide and perhaps other compounds can have a significant effect on the environment, which in turn can affect the frequency and severity of hurricanes and droughts, for example.

Second, the federal government has gradually assumed the role of providing compensation and reconstruction assistance following a variety of natural disasters and, in the case of the tragic events of 9/11, man-made disasters (or attacks on the United States). Putting aside the man-made events and some natural disasters (such as tornadoes), where it may be difficult (though not impossible) for potential victims to take measures to minimize losses should these events occur, there are well-known steps that individuals can take to mitigate losses from hurricanes (reinforcing roof ties to house frames, ensuring that garages are well constructed, etc.) and earthquakes (bolting foundations to the rest of the house, bracing water heaters, etc.). But the more people expect the government to compensate them after one of these catastrophes, the less likely they are to pursue mitigation and, thus, reduce both the personal and societal losses from these disasters. Furthermore, disaster relief provided to state and local governments for reconstruction of destroyed infrastructure can perversely attract more people and

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Panel Discussion

businesses to high-risk areas. This is exactly what seems to have occurred in Florida following the hurricanes of 2004-05. Construction is booming in the same places that were wiped out. In short, the problem of moral hazard arising from disaster relief is one that deserves policymakers' attention.

Third, private insurance can and does play an important role in helping the government meet both its mitigation and compensation objectives. Assuming that insurance premiums for residences and commercial establishments are actuarially appropriate, insurance prices and deductibles then provide economic incentives for insureds to take some or all of the mitigation-related steps I have just noted. Furthermore, the more people and firms that are covered by private insurance, the less need there is for government-funded disaster relief. Accordingly, it is very much in the government's interest for individuals and businesses to purchase private insurance.

Government policy formally recognizes this in the case of floods, for which the government has operated an insurance program since 1968. Individuals in defined flood zones are *required* to purchase flood insurance if their residence was financed by a federally chartered lending institution. A key problem, however, is that this requirement is not well enforced, in part because it is difficult to do so. Families that take out flood insurance when they buy a home and assume a mortgage often drop coverage at a later point, and there is little that the originating lender (who has probably since sold the loan into the secondary market) or the government can do about that.

Mortgage lenders, also on their own, without a formal government mandate, typically require purchasers to buy standard fire and wind policies. This seems to have worked better than the flood insurance requirement. After the Northridge earthquake in 1994, the state of California required insurers doing business in the state to offer also earthquake coverage in their homeowners' policies, either directly or through a separate state-sponsored earthquake fund (the California Earthquake Authority). Similarly, after Hurricane Andrew, the state of Florida established what eventually would become two funds to support insurance coverage for hurricanes: Citizens

Property Insurance, a residual insurer that provides primary coverage to individuals who cannot find it in the "voluntary" market; and the Florida Hurricane Catastrophe fund, which extends reinsurance to all primary insurers that do business in the state and are exposed to hurricane risk. So far, take-up rates for hurricane coverage are far higher in Florida (which has a residual markets facility that offers subsidized rates) than in California (where even under the California Earthquake Authority fund, earthquake coverage comes with a high deductible—15 percent of the loss).

Still, the central question in the wake of the unprecedented devastation of Katrina is whether the private insurance industry, buttressed by state insurance plans in selected high-risk states, can reasonably handle future catastrophe risks. Here is where I part company with Professor Cummins. I do not have his faith that the private sector—including private reinsurers and the nascent catastrophe-linked securities market—can be expected to provide adequate coverage at affordable premiums for "mega-catastrophe" years, like 2005, indefinitely into the future. In other words, I believe that there is a kind of "market failure" for these very large risks that only a formal government reinsurance program can remedy. Indeed, somewhat paradoxically, *only* if the federal government takes on this role will it in the long run minimize the costs it bears for disaster relief and the larger social costs that natural disasters inevitably impose on the private sector.

As Cummins demonstrates in his paper, insurance works because of the "law of large numbers" coupled with independence of the risks covered. Even "ordinary" natural catastrophes—those costing several billion dollars—stretch these assumptions. Hurricanes or earthquakes cause damage to many properties in the same location, violating the independence condition. And if the catastrophe is large enough, then the law of large numbers won't help: Insurer's capital, or surplus, can be devastated by one or more very large events.

In principle, insurers—and their reinsurers—can deal with "high consequence" events by raising premiums sufficiently high to cover not just the *expected losses* associated with them, but

the possibility that the events occur well before insurers have collected sufficient premiums (plus interest) to cover the claims they ensure. Insurers call the latter possibility “timing risk,” and they attempt to deal with it by charging premiums that reflect a multiple of expected losses, or a “risk load.” Prior to the 2004-05 hurricane seasons, the Congressional Budget Office reported that reinsurers charged risk loads as high as five to six times expected loss. It is too early to know how high-risk loads on reinsurance contracts will be after this hurricane season, but, needless to say, it should not surprise anyone if they turn out to be even higher than this.

Catastrophe-linked securities do not solve this problem and indeed have been a disappointment to those who have advocated them as solutions to the catastrophe insurance problem. As Professor Cummins documents, only about one to two billion dollars in catastrophe (CAT) bonds have been outstanding in any single year during the past several years. I don’t find this difficult to understand. The buyers of these securities, knowing that their principal value (and interest) can be wiped out with one event, will insist on interest rates that also take account of timing risk to the same degree as reinsurance contracts. This should not change materially even if regulators adopt the recommendations suggested by Professor Cummins in his paper to ensure that non-indemnity CAT bond are treated for regulatory purposes like reinsurance. If Hurricane Katrina demonstrated anything, it is that timing risk is as much of a problem for buyers of CAT bonds as it is for primary insurers and reinsurers.

The critical question for policymakers, of course, is at what level timing risk becomes so much of a problem that either homeowners reduce their insurance coverage (by purchasing policies with much larger deductibles, to make them more affordable) or insurers withdraw from writing any coverage at all, viewing the risk of remaining in the market not to be worth it at any price. Admittedly, it is difficult to establish at what level of damage this becomes a significant problem. Nonetheless, I submit that there is somewhat of a “I know it when I see it” aspect to this issue. Clearly, if the nation continues to experience several more

hurricane seasons like 2004-05, it is likely to be all too evident that the private market will have failed.

As a citizen and taxpayer, I’d rather not risk waiting to find out. As long as we continue to do nothing except to provide after-the-fact disaster relief, the nation will have an inefficient and unfair policy toward large-scale natural disasters in particular. It is inefficient because the prospect of disaster relief, coupled with inadequate loss mitigation measures and incentives, will result in more damage, and thus more federal assistance, than need be the case. And the after-the-fact disaster approach is unfair to taxpayers (if not this generation, then the next one) in parts of the country who at some point end up subsidizing those who voluntarily choose to live and work in high-risk areas.

The nation can do better, in my view, by establishing a more formal reinsurance system for mega-catastrophes, which also has incentives for better loss prevention or mitigation. The insurance should be available only for upper-tier losses or annual losses beyond some admittedly arbitrary threshold (defined either as a percentage of premiums, as in the case of federal terrorism insurance, or for damage above some probability, such as 1 in 50 or 1 in 100). Below the threshold, private reinsurance, state insurance plans, and primary insurance should continue to operate. But all such parties should be allowed to purchase reinsurance beyond some attachment point from the federal government.

Unlike federal terrorism insurance, for which no premiums are charged and thus no pre-funding is in place, federal catastrophe insurance should be pre-funded because it can be. Catastrophe risk at least can be modeled with some degree of precision because the events have occurred frequently before (albeit not with the frequency and severity of the storms of the past two years). Premiums should reflect actuarial risk and should credit buyers for local and state mitigation efforts (building codes and zoning policies) that cost-effectively mitigate losses. The program could be administered by a quasi-independent arm of the Treasury Department (analogous to the regulator for federally chartered banks, the Comptroller of the Currency).

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Such a “layered system” of financial responsibility coupled with better preparedness and cost-effective mitigation incentives for mega-catastrophes makes sense on many levels:

- A layered system provides appropriate incentives for the parties in each “layer” to take loss-mitigation measures to minimize their own exposures to financial loss in a cost-effective manner. Faced with the actuarially justified annual costs for living or working in exposed areas, some individuals and businesses may choose to locate elsewhere. Others may decide to accept the inevitable risks associated with particular locations but to improve construction of their houses and businesses to minimize losses. If the federal reinsurance contains appropriate incentives for well-enforced, up-to-date building codes and sensible land-use policies, state and local governments will be more likely to improve public infrastructure and prevent reconstruction in high-risk areas.
- It is fully appropriate that the federal government reinsure against mega-catastrophe risks. As I have noted, because of its borrowing capacity and its ability to print money, the federal government does not have the “timing risk”—or the risk that losses will occur too soon before premiums are collected to fully fund them—that private insurers, reinsurers, state-sponsored catastrophe insurers, and reinsurers inevitably face. By providing backstop insurance for the largest losses, the federal government would dramatically shrink this timing risk

and, thus, improve the ability of private and state-sponsored insurers and reinsurers to charge actuarially appropriate premiums that are not burdened with additional and costly risk loadings. Furthermore, actuarially appropriate premiums would promote cost-effective mitigation and thus reduce the social and economic costs of future natural catastrophes.

- Formal federal reinsurance, thus, also would help ensure that private insurance remains available for homeowners in risk-prone areas of the country.

In short, ironically, the best way for the federal government to minimize its liabilities for future natural disasters is to take proactive measure now, in the form of more formal pre-funded reinsurance rather than to continue to muddle through, year after year, with ad hoc supplemental appropriations for disaster relief.¹

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¹ I address some of the operational details of this proposal in Litan (2005).

What Is the Appropriate Role of the Federal Government in the Private Markets for Credit and Insurance? What Is the Outlook?

Joseph E. Stiglitz

I want to focus my remarks this morning on the role of government in risk-bearing. A little over a decade ago, I addressed the issue of the role of government in risk-bearing at a conference sponsored by the Federal Reserve Bank of Cleveland (Stiglitz, 1993). I used the market failure/government failure paradigm, sketching out in particular limitations in markets and government that led to a role for government in this area. I identified

- important risks for which the market does not provide adequate insurance, such as inflation, floods, and crime;
- important risks for which individuals and firms frequently choose not to buy insurance, but which result in significant adverse consequences for those individuals, leading to government bailouts (and because government cannot commit itself not to engage in such bailouts, there is in fact an incentive for individuals not to purchase adequate insurance);
- important risks for which the market provides insurance, but inefficiently and/or at a high cost (contributing, of course, to individual's *not* purchasing adequate insurance); and
- intergenerational risks.

I explored, too, the reasons for these market failures, including the problems arising out of asymmetries of information (adverse selection

and moral hazard). By then, the theory of asymmetric information had already developed to the point where it helped explain why insurance markets often do not function well. Private insurance firms may spend an inordinate amount of resources in attempting to identify low-risk individuals—essentially dissipative expenditures intending to limit the extent of redistribution. Michael Rothschild and I had shown how these attempts to screen also limited the extent of insurance that might be provided in the market. Our later work (Rothschild and Stiglitz, 1997) explained how the availability of better information might actually impede the ability of insurance markets to provide coverage for important risks.

I want to briefly explore what has happened since then to our understanding of the role of government in risk-bearing, focusing on particular episodes and events.

1. We have learned that the problems of accounting in insurance are even more difficult than we had thought, making it more difficult to ascertain whether a private insurance firm is, or is not, solvent. The ability of so many firms in the United States to manipulate their books (most recently in the case of AIG)—even when it has not resulted in bankruptcy—has highlighted the problems of accounting. These problems played into the government bailouts (and impending bailouts) of private pension (and possibly retirement health insurance) programs. (But more was at play there—the politics of wealth transfer, discussed below.)
2. It means, of course, that individuals have enormous difficulties in assessing whether they do or do not have coverage for important risks—the firms from which they have bought insurance may not be able to deliver when needed. This was key to understanding some of the problems in East Asia, where many Korean firms thought that they

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Panel Discussion

had purchased protection against exchange rate risk, but the insurance was not there when the insured-against event occurred.¹

3. Natural disasters, such as Hurricane Katrina and, in earlier years, hurricanes in Florida and floods along the Mississippi, have made two things clear: Large numbers of individuals facing large risks have not purchased insurance (for one reason or another); and, when disasters happen, there will be a government bailout. (The recognition of this, in turn, provides one of the reasons individuals limit the purchase of insurance; that is, if it is left as a voluntary matter.) There is clearly a role for government *ex ante*, but ascertaining what that role should be (requiring the provision of private insurance, providing public insurance, etc.) is not so simple. Determining appropriate actuarial odds for small-probability events is, in any case, difficult, and there is always a worry about private insurance companies exploiting consumers, especially when the insurance is made mandatory. But if the private sector has strong incentives to overcharge, the public sector has strong incentives to undercharge. Finding the right balance is not going to be easy. Private insurance companies have some advantage in providing insurance for fires—in particular in providing “regulations” concerning sprinklers, which if imposed by the government would be viewed as bureaucratic intrusion. They may perform this role in flood and hurricane insurance; in addition, they may have an easier time charging higher premia for properties that are more at risk.
4. By the same token, East Asia taught us that when large numbers of individuals and firms fail to buy adequate coverage, it can have macroeconomic consequences. The government may be forced to bail out

firms, or intervene to stabilize the exchange rate (a kind of indirect bailout), at great cost to others. The failure of large numbers of individuals to purchase insurance has externalities, which is a concern that provides a rationale for government intervention. The failure to buy insurance may be partly related to high transactions costs (see point 5), but also to individual irrationality, the importance of which has been stressed in recent research (for example, the difficulties individuals have in assessing small risks). This research has called into question the conventional paradigm based on rationality. Governments may want to take “preventive” actions when adverse consequences result from large numbers of individuals failing to act in ways consistent with rationality, especially when those consequences lead to perceived needs for collective action. (Government currently subsidizes insurance considerably through preferential tax treatment. But these subsidies often distort the market and are hardly directed at correcting the market failures.)

Three lessons emerge:

- i. the importance of restrictions on exposure, both by banks and financial institutions;
 - ii. the importance of anti-trust policies in reducing the number of firms that fall into the “too big to fail” category; and
 - iii. the importance of governments paying attention to the impact of various policies (such as capital market liberalization) on national exposure to risk and the ability of governments to respond to those risks.
5. I had written earlier about transactions costs as a rationale for government provision, but in some cases the size of transactions costs have turned out to be truly enormous. One study of the partial privatization of the provision of pensions (annuities) in the United Kingdom showed that benefits were reduced by 40 percent as a result of transactions costs. These costs are,

¹ The problems are exacerbated by the importance of hard-to-estimate correlations among the risks. Some of the standard methods used by regulators to assess financial soundness ignored these correlations.

of course, related in part to consumer irrationality, e.g., the gullibility of individuals to promises (or at least prospects) of higher returns gives rise to “churning.” While regulators know how to (imperfectly) insure *viability* of insurance companies, regulating practices that exploit consumer ignorance is far more difficult.

6. Meanwhile, the market by itself has shown little improvement in its ability to provide insurance against many of the potentially long-run risks that individuals care about, such as annuities that protect against inflation, though in some cases there have been some steps in the right direction by the government. (Providing inflation-protected securities was one of the important initiatives of the Council of Economic Advisers during the Clinton administration.)
7. The difficulties that national insurance and global reinsurance companies faced in the wake of the natural disasters of 1993-94 raised the problem of the ability of private markets to handle large losses. The Council of Economic Advisers in the Clinton administration, in an attempt to avoid the moral hazard associated with solutions proposed by the insurance industry (a variety of forms of bailouts), proposed creating a kind of government-sponsored Arrow-Debreu securities market for these catastrophic losses. Though there was some political support for this idea, many in the industry wanted a more outright subsidy.
8. The political economy of insurance has turned out to be one of the more interesting developments. At one time, it became recognized that providing underpriced insurance to individuals and firms was a good way of providing hidden subsidies, with costs borne by future governments. Subsequently, there was an attempt, through the Credit Reform Act, to have the government provide *current* actuarial estimates of losses and hidden subsidies. Although this was an important step forward, it has clearly not been executed as thoroughly as

one would have wanted. In the case of the Employee Retirement Income Security Act, regulations have left pension funds with large holes that the government will have to fill.

The same issue arises in the recent debate about Social Security reform. Clearly, some of the proposed reforms will, in not implausible circumstances, leave large numbers of individuals with what will be clearly viewed as insufficient levels of income. As it is highly likely that society will not tolerate large numbers of the elderly living in poverty, there will necessarily be a government bailout. Thus, though the reforms are being promoted as a way of avoiding a bailout of Social Security using general revenues, they are clearly only changing the form of the bailout—from that of the Social Security program to one that will bail out individuals. This is, of course, one of the difficult issues arising in the analysis of “implicit” liabilities. The government has an implicit obligation to provide Social Security benefits *roughly* commensurate with those promised, though clearly there can and will be adjustments. The government also has an implicit obligation to make sure that large numbers of its citizens are not living in poverty, though the nature of this obligation may be harder to quantify.

(The current reforms also raise questions about intergenerational social contracts and, more broadly, what may be viewed either as intergenerational insurance or intergenerational social solidarity. The current social insurance system is designed, in effect, to allow some smoothing of incomes across generations, of a kind consistent with what individuals might have wanted could they purchase such insurance behind a veil of ignorance [not knowing the generation into which they would be born]. The so-called progressive indexation reform would greatly undermine this kind of social insurance.)

Panel Discussion

The debate over Social Security reform again illustrates the difficulties of risk assessment. The financial soundness of the Social Security system depends on 75-year projections of variables such as life expectancy, birthrates, migration, retirement ages, and wage and productivity increases. Under some scenarios, the Social Security system is solvent; under others, it faces significant problems. The administration has chosen to emphasize those scenarios which are adverse—though in its advocacy of other reforms (such as tax cuts) it has used scenarios which, were they used to assess the solvency of the Social Security system, would make it appear to be in far better shape.

9. Nowhere are the inadequacies of the current system of providing insurance more evident than in the case of health insurance, where, as a result of preferential tax treatments, we have over-insurance on the part of some, while nearly 50 million Americans have no insurance against one of the most important risks they face. This system has resulted in huge inequities and inefficiencies in the provision of care (including preventive care) and treatment. Some of the proposed (and recently instituted) reforms probably result in increased distortions, associated with cream skimming (self-selection out of the insurance pool), that in turn will lead to higher prices for those remaining in the insurance pool, which will thus cause some to drop out and increase the number of those without insurance. The appropriate response to this problem clearly would take me beyond this short discussion. Suffice it to say that any successful reform will require a more thorough analysis of the areas in which moral-hazard problems really arise and a more extensive public discussion of attitudes toward separating equilibria (cross-subsidization of the sick by the healthy). There are huge explicit and hidden government expenditures, and it would seem that these expenditures could

be spent in ways that were more conducive to efficiency and more consistent with basic principles of equity.

This review of the role of government in the provision of insurance has been necessarily sketchy. There are many lessons to be drawn from these experiences.

- There is not just a single moral-hazard problem but several, often interrelated, moral-hazard problems. Reducing one set of problems may increase another. Care needs to be exercised in determining the design of government intervention. This is illustrated by the controversy over deposit insurance. Deposit insurance, it has been argued, leads to an increase in the moral hazard of individuals taking insufficient care in assessing banks' risk-taking behavior and a consequent moral-hazard problem of banks undertaking excessive risk-taking. But government cannot commit *not* to intervene, so that even without formal deposit insurance, there may be implicit insurance, with similar consequences. On the other hand, it is virtually impossible for depositors to monitor bank behavior effectively; and such monitoring is a public good. It should accordingly be provided by government. The most effective and efficient way of controlling the moral hazard may be a combination of incentives (ensuring that the owners of the bank have enough at risk not to undertake excessive risk taking) and controls (both of the nature of lending and of conflicts of interest that give risk to problematic lending.)²
- Government policies play a central role in affecting many of the key risks facing market participants. Capital market liberalization exposes countries to new risks; automatic stabilizers reduce economic volatility. With government as an actor within the economy, this suggests the need to confront government with appropriate incentives to miti-

² The general principles of "robust regulation" are set forth in Stiglitz (2001).

gate these risks. For instance, indexing (say, government interest payments) increases the government's cost of failing to keep inflation under control. There are, however, two counterarguments. The first results from the presence of multilayered agency problems. Government is affected by voter responses. Increasing voters' cost of inflation may provide greater incentives for government to control inflation than the direct budgetary costs of indexation. This is related to the second problem: Government is not a single "actor." Governments today may try to pass on costs to future governments. What matters are incentives facing current governments, and designing appropriate incentives may not be easy.

- Underlying many of the problems we have identified are difficulties in assessing risk—and systematic biases in individual risk assessments. Research in behavioral economics in recent years has emphasized systematic problems in risk assessment, especially associated with small-probability events. But even if individuals are fully rational and are able to take into account complex correlations using sophisticated Bayesian analysis, there simply may not be sufficient data to make an adequate risk assessment with much confidence. Global warming is proceeding at a pace far faster than even most climate scientists expected. We still do not know the impact on weather variability, and this is what is relevant in assessing actuarially fair insurance premia for damage due to hurricanes or floods.

Government may be in a better position to provide risk assessments than ordinary citizens; but standard political economy analyses suggest that government itself may be tempted to exploit voter misperceptions, just as insurance companies are.

Most importantly, we have repeatedly seen government bailouts—the provision of insurance *ex post*. The current system of providing such *ex post* insurance is inefficient and inequitable. There has to be a better way. To find that better way requires understanding why individuals have been inadequately insured, which further requires a deeper understanding of both the market and public failures in risk markets. I hope this discussion has provided some illumination into a number of these recent failures.

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