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Does Being Different Matter?

Finn E. Kydland and D'Ann M. Petersen

The Economics of Private Placements: Middle-Market Corporate Finance, Life Insurance Companies, and a Credit Crunch

Stephen D. Prowse

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Does Being Different Matter?

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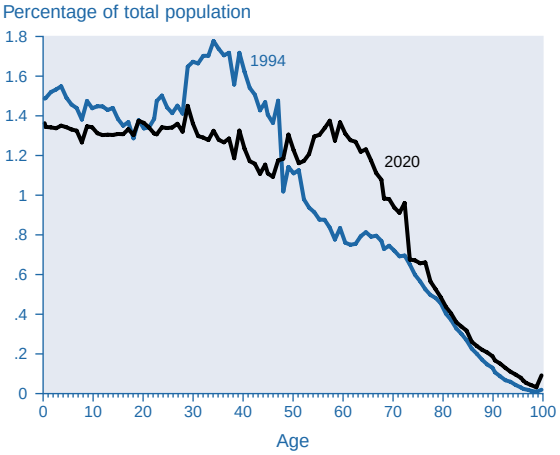
In this article, we outline a general framework appropriate for addressing most quantitative macroeconomic issues.…The research we highlight examines an aging population's impact on savings and/or interest rates and the quantitative impact of immigration policy on savings rates and fiscal policy.

One does not have to look far to notice that, in the real world, people are different. Individuals are of different ages and may have different attributes, such as varying educational achievements or on-the-job skills. There are many real-world examples of why individual differences may matter for economic policy. Some of these examples are related to demographic issues, such as how a population that is getting proportionally older will influence future savings and interest rates or increase the possibility of higher tax burdens for future workers. (See Figure 1 for an illustration of how the population distribution is expected to change.) Another example in which individual differences matter is the question of immigration's impact on society and whether immigrants will reduce the need for higher taxes or increase the burden on the government.

Economists have long conjectured that the best answers to such questions come from models that are inhabited by people—because people make decisions that have implications for the actual economy. Only recently have economists been able to compute the outcomes of models with large numbers of individuals at every stage of the life cycle. Before the 1990s and high-speed computers, solving such models was computationally infeasible. Nevertheless, economists found that they could abstract from life-cycle differences and still get reliable answers to many macroeconomic questions, especially those relating to growth and business cycles.

In this article, we outline a general framework appropriate for addressing most quantitative macroeconomic issues. This approach

Figure 1
Age Distribution of the U.S. Population, 1994 and 2020



SOURCE: U.S. Census Bureau.

requires building artificial economies that replicate (to the degree needed) actual economies, with many mortal individuals making decisions over their lifetimes. Such a framework is ideal for addressing questions in which demographics are at the heart of the issue, and it is presented in the first section of the article.

We next introduce a special case of our general framework that abstracts from life-cycle differences, an assumption that makes solving the model computationally much easier. Economists have found such a framework useful for addressing growth and business-cycle issues for which life-cycle behavior is not essential. The section also discusses how such a framework can be used to incorporate some individual differences—such as skill differences—into the model without adding much computational difficulty.

The final section of this article showcases examples of current work that addresses questions for which life-cycle differences matter. The examples illustrate the type of policy-relevant questions that can be addressed using the mortal consumer framework presented in the first section. In particular, the research we highlight examines an aging population's impact on savings and/or interest rates and the quantitative impact of immigration policy on savings rates and fiscal policy.

The macroeconomist's tool kit

In 1980, Robert Lucas (the 1995 Nobel Prize recipient in economics) described the type of model framework he believes might best serve economists addressing macroeconomic questions. He states, "One of the functions of theoretical economics is to provide fully articulated, artificial economic systems that can serve as laboratories in which policies that would be prohibitively expensive to experiment with in actual economies can be tested out at much lower cost…(Lucas 1980, 696). Our task as I see it…is to write a FORTRAN program that will accept specific economic policy rules as 'input' and will generate as 'output' statistics describing the operating characteristics of time series we care about, which are predicted to result from these policies" (709–10). The desired environments Lucas refers to would make use of information on "*individual* responses [that] can be documented relatively cheaply...by means of …censuses, panels [and] other surveys…" (710). Lucas seems to suggest that economic researchers place people in desired model environments and record how they behave under alternative policy rules.

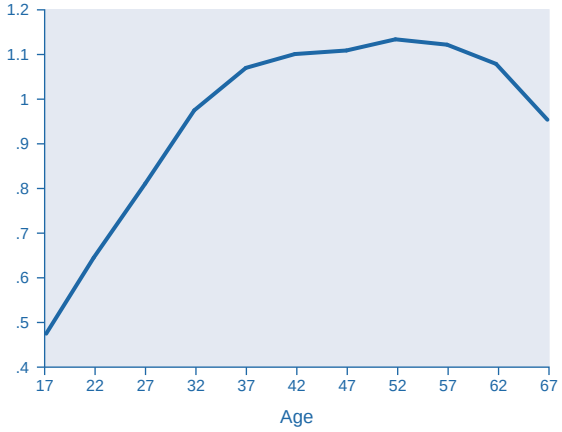
In practice, Lucas' suggestion is easier said than done. All economic models are concerned with the allocation of scarce resources. Accordingly, these models must include a specification of tastes (giving the rate at which people are willing to sacrifice one good in exchange for another) and a specification of technology (giving the rate at which one or more goods can be physically transformed into others).

In our model, the goods are household activity (time) and output. These goods can either be consumed by households (as leisure and consumption) or used (as labor and capital) to produce more output. Tastes are represented by a utility function that depends on the quantities of leisure and output consumed now and in the future. Technology is represented by a production function that gives output as a function of labor and capital. Moreover, it is assumed that goods are allocated across different uses through markets: each good has a market price at which it can be exchanged for other goods. Finally, the economy is assumed to be competitive: households take prices as given as they try to maximize their utility. Details of this model economy (which we call Economy 1) are given in the box entitled "Economy 1: A General Macroeconomic Framework."

An important aspect of Economy 1 is that each individual's decisions about the present are based on expectations about the future. This is especially important when it comes to the consumption–saving decision. For instance, most people receive income from both labor and assets over their lifetime. The individual decides how much to consume now and how much to consume later. The typical hump-shaped lifetime labor earnings profile (a product of the lifetime profile of hourly wages and the lifetime profile of annual hours worked shown in Figures 2 and 3, respectively), combined with a desire for a much less variable consumption path, leads an individual to dissave (or borrow) in the early years, save around the peak of earnings, and finally dissave while approaching and entering retirement.

Computing the aggregate decisions of Economy 1 is complicated for several reasons. First, the economy at each time t includes people at every stage of the life cycle. Second, as indicated above, the market-clearing interest rate depends on the aggregate of capital accumulated up until period t, and the market-clearing wage depends on the aggregate of labor input. The consumption–saving decision depends on each individual's expectations of future asset returns, or real interest rates, influenced by the aggre-

Figure 2
Life-Cycle Wage Profile
(Normalized to 1 on average)



SOURCE: Kjetil Storesletten, Institute for International Economic Studies, Stockholm University.

gate of savings decisions up until that time. With all these considerations, solving such a model is difficult, especially when a lifetime consists of many periods (meaning I is large) and there is uncertainty. Indeed, this task was almost infeasible before the 1990s, given the computational capacity of computers. With today's computers, however, if we define the functional forms for the utility and production functions, and assign values to the parameters and probability distributions to the random shocks, this model economy can be used for computational experiments of the kind Lucas envisioned in 1980.

Calibration. In a sense, model economies, like thermometers, are measuring devices and must be calibrated to provide reliable numerical answers. Some economic questions have known answers (just as we know what the thermometer should read when dipped in boiling water and in ice water), and the model should give an approximately correct answer to them. Thus, economists can use data to calibrate the model economy so that it mimics the world as closely as possible along a limited, but clearly specified, number of dimensions. This way, one will have more confidence in the model's answer to the question for which it was designed. Of course, economic systems are different from models used in the physical sciences, where calibration is commonplace. Economic models are inhabited by people who anticipate and make decisions that are in their ex ante best interest, given that other model people are equally rational. However, in spite of this difference between physical and economic models, the same principle applies: we have more confidence in the answer to the question posed if the model gives correct answers to questions for which we already know the answer.

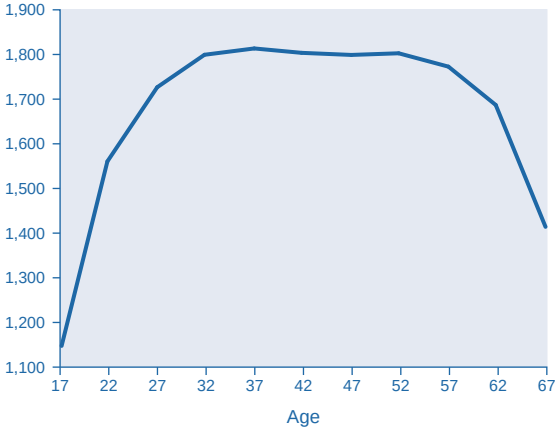
Part of the task of calibration involves merely computing averages of relations among aggregate data series. For example, if the standard Cobb–Douglas production function is used to describe the technology of the business sector in Economy 1—that is, we let $F(N,K) = N^{\theta}K^{1-\theta}$—then the model's average labor share of aggregate national income equals θ. Thus, the parameter θ can be quantified by computing the average labor income as a percentage of GDP over a period of years.

Because model economies are populated by people, another source of calibration is averages across large numbers of the relevant people in the actual economy. For instance, Economy 1 employs a utility function in consumption and leisure, which like the production function mentioned above, is usually specified with a share parameter. The empirical counterpart to this parameter is households' average fraction of time spent in labor market activity. This fraction can be obtained from panel data covering large samples of individuals, such as the Current Population Survey conducted by the Census Bureau. Moreover, the empirical shape of the e_i's, describing the hump-shaped lifetime earnings profile, can be estimated from panel data.

A realistic approach: Immortal consumers

Because computing detailed models inhabited by people at different stages of the life cycle, as in Economy 1, is difficult, researchers aiming for quantitative answers were initially forced to scale down the ambition level of the

Figure 3
Life-Cycle Profile of Hours Worked
Annual hours worked



SOURCE: Kjetil Storesletten, Institute for International Economic Studies, Stockholm University.

questions addressed. In particular, researchers attacked those questions for which certain simplifying assumptions were likely to do little harm to the answers. Especially effective in reducing the computational burden of such detailed models was the assumption that everyone is alike and lives forever—immortal consumers.

When considering long-run growth, life-cycle behavior may not be among the most important contributing factors. Similarly, economists conjectured that heterogeneity and/or life-cycle behavior was not a big deal in answering many business-cycle questions, such as how much of postwar business cycles is accounted for by technology shocks.[1] Thus emerged the neoclassical growth model as a common framework for addressing growth and business-cycle questions.

Consider a basic neoclassical growth model framework with representative agents, which we call Economy 2. This framework is a special case of Economy 1. The difference is that in the representative agent framework, I equals infinity (that is, immortal consumers) and there are no hump-shaped earnings patterns (that is, all e_i's in Economy 1 are set equal to one). In such a framework (with no externalities) it turns out that the equilibrium can be computed by solving the optimization problem of a fictitious social planner, whose objective function corresponds to the utility function of the typical individual:

$$E\sum_{t=0}^{\infty}\beta^t u(C_t, 1-N_t),$$

subject to constraints B.1 and B.2. This property dramatically reduces the dimension of the problem and saves a lot of computational detail, thereby allowing the economist to solve the model with much less difficulty.

This class of models—which obviously abstracts from life-cycle behavior—still has an important role for saving behavior. In a business-cycle model, the impetus is cyclical income volatility rather than life-cycle movements in income. Such saving behavior may occur as individuals attempt to smooth their consumption over time even as income fluctuates, thereby causing individuals to adjust the amounts they save over different business-cycle episodes.

Furthermore, the framework's simplicity makes it relatively easy to introduce additional bells and whistles that are more crucial than heterogeneity.[2] More important for business-cycle questions may be the fact that it takes many quarters to build new productive capital, with newly produced investment goods being allocated to its construction throughout the building period. We can also introduce a role for inventories or allow for increasing worker productivity through on-the-job learning. The interaction of household and market production can be included in the framework.[3]

The introduction of individual differences in a business-cycle framework. Abstracting from life-cycle behavior apparently does not hurt the success of the representative agent model in answering many business-cycle questions, but completely abandoning heterogeneity does prove problematic along at least one dimension. While the early business-cycle models with technology shocks as the main source of fluctuation display considerable similarity between movements of time series such as consumption, investment,

Economy 1: A General Macroeconomic Framework

This model economy attempts to capture the most important economic decisions over individuals' lifetimes. Such an economy would be inhabited by many generations of individuals who live for I periods (where I could correspond to an economic lifetime of about sixty years). People born in period t attempt to maximize the expected value (denoted by E) of a utility function of the form

$$E\sum_{i=1}^{I}\beta^{i-1}u(c_{i,t+i-1}, 1-n_{i,t+i-1}),$$

subject to a budget constraint in every period:

$$R_{t+i-1}a_{i,t+i-1} + W_{t+i-1}e_i n_{i,t+i-1} = c_{i,t+i-1} + a_{i,t+i}, \qquad i = 1,\ldots,I,$$

where c_i is consumption, n_i is market work and $1 - n_i$ is leisure, and a_i is asset holdings, all at age i; R is the gross rate of return on assets; W is price per unit of labor input; and e_i is the person's efficiency in production. Thus, We_i represents the real wage per time unit. Possible additional restrictions are that $a_{1t} = 0$ and $a_{I,t+I} \geq 0$. The maximization is over the lifetime sequences of c_i's and n_i's, and β denotes a discount factor (implied by the utility rate of time preference) for comparing the utility of future outcomes to that of the present.

The individuals in this economy cannot ignore what occurs in the rest of the economy because present and future asset returns (R) and wage rates (W), while taken as given by each individual, are determined by the aggregate of all individuals' decisions. With μ_i people in each generation i, suppose aggregate output is produced according to the production function $z_t F(N_t, K_t)$, where z is the technology level and the arguments represent aggregate labor and capital inputs, which in this case are

$$N_t = \sum_{i=1}^{I}\mu_i e_i n_{it} \text{ and } K_t = \sum_{i=1}^{I}\mu_i a_{it}.$$

Then in equilibrium, asset returns R and labor-input compensation W will be determined by the marginal products of capital and labor, respectively. Also, letting $C_t = \sum_i \mu_i c_{it}$, the following aggregate feasibility constraint must be satisfied:

(B.1) $$C_t + K_{t+1} \leq z_t F(N_t, K_t) + (1-\delta)K_t,$$

where δ is the capital's depreciation rate.

A source of uncertainty in this model could be the technology level, whose movement over time could be described by

(B.2) $$z_{t+1} = \rho z_t + \epsilon_{t+1}.$$

The random disturbance to the technology, ϵ, has a positive mean and variance σ^2. Another stochastic element in this economy could be the number of newborns, μ_1, in every period.

Table 1
Indicators of Skill Versus Hours Worked

	Wage groups				
	1	2	3	4	5
Hourly real wage	1.48	2.37	3.28	4.46	7.24
Annual hours worked	1,112	1,556	1,795	1,920	2,009
Standard deviation of hours worked	579	529	479	415	341
Years of education	11.18	11.97	12.73	13.00	14.30

NOTE: The table contains averages across individuals and is based on data from the Panel Study of Income Dynamics for the period 1969–82. Each individual is grouped by average real wage over the sample period. The brackets used for each wage group are 0 to 2, 2 to 2.8, 2.8 to 3.8, 3.8 to 5.3, and 5.3 and over, in 1969 U.S. dollars. Ríos-Rull chose these boundaries because they result in similar numbers of people per bracket.

SOURCE: Ríos-Rull (1993, 896).

GDP, inventory holdings, and capital stock and the corresponding ones in the data, the behavior of one key variable—hours of work—appears somewhat anomalous. The hours volatility in the data is substantially greater than the standard business-cycle model would imply. Because the hours of high-skill workers generally fluctuate much less than those of low-skill workers, it is reasonable to think that this may account for a large portion of the difference in the actual and model-produced labor-input series. An obvious way, then, to try to resolve the issue of the labor-input anomaly is to modify the model to include some heterogeneity in the form of multiple skills.

Computational problems in dealing with certain dimensions of heterogeneity relevant to such business-cycle issues have been relatively easy to deal with. For example, Kydland (1984) constructs a business-cycle model with two equal-sized groups of high- and low-skill workers, each calibrated to be as skilled in market production as the respective counterpart in the data when workers are ranked by efficiency and divided into two groups.[4] Moreover, the average hours per period match actual observations—that is, the high-skill workers on the average work more hours to an extent corresponding to actual data. The finding is that the model's volatility of aggregate hours, given volatility of technology, increases substantially when skill differences are taken into account. This simple way of introducing heterogeneity into the model still allows the equilibrium to be solved as a fictitious planner's problem.

Kydland's modeling strategy allows for only a limited number of distinct skills, while one could argue that, in the actual economy, there are as many skill levels as there are workers. Table 1 illustrates differences across workers when they are divided into five groups according to average wage rates. The workers differ both because they are at different stages of the life cycle (as represented by their hump-shaped e_i's in Economy 1) and because each age group consists of workers whose abilities differ due to differences in schooling, training, experience, inherent talent for market work, and a host of other reasons. This means that the entire schedule of e_i's is different across these workers.

An alternative to the complication of allowing for multiple skills within this framework is to maintain the assumption of workforce homogeneity but construct an improved measure of N_t, or the labor input. Rather than using the official figures for N_t (from either the household survey or establishment survey), which weight the hours of a janitor and those of a brain surgeon equally, the better measure would weight the hours of different workers by their relative efficiencies. This approach has been utilized by Kydland and Prescott (1993) and Kydland and Petersen (1996). Using the Panel Study of Income Dynamics from the University of Michigan, these researchers construct quality-adjusted labor-input series consisting of all demographic groups. Their findings suggest that the constructed skill-adjusted labor-input series fluctuates substantially less (by almost one-third) than the corresponding aggregate hours series published by the U.S. Bureau of Labor Statistics and more closely resembles the pattern generated by business-cycle models.

There are other reasons variants of business-cycle models understate the volatility of hours worked. One reason is that, taken literally, all of the labor-input volatility is in the form of variation in hours per worker (because everyone is alike), rather than in the number of workers. In the United States, however, about two-thirds of the volatility in hours worked comes in the form of the latter. With recent advances in business-cycle theory, through which movements in and out of the labor force can be incorporated in the model (following the lead of Hansen 1985), we now understand that such movements of the workforce add to the total volatility of hours of work.

In sum, by abstracting from life-cycle differences, the representative agent framework with immortal consumers proves to be useful for answering a certain class of questions—namely, those related to sources of impulse for the business cycle. Even allowing for some heterogeneity, such as skill differences, these models ease the computational difficulties because the equilibrium can be computed by solving the optimization problem of a stand-in social planner.

Nonetheless, the business-cycle model is quite different from our Economy 1, especially with its omission of the life-cycle earnings profile, so the question remains: Would the introduction of the life-cycle dimension of heterogeneity change the conclusions drawn from business-cycle models? Until recently, computational difficulties made answering this question infeasible. However, advances in computing capabilities have allowed researchers to compute artificial economies both with and without heterogeneous/mortal consumers and compare the results. Ríos-Rull (1996), using an overlapping generations (OLG) framework, with the hump-shaped earnings pattern described above, finds that the implications for most business-cycle issues, such as the role of technological shocks, do not change if one switches from an infinitely lived, representative-agent model with no life-cycle behavior to a sophisticated demographic structure with mortal consumers. His finding confirms the early guess by other economists that one can safely abstract from life-cycle considerations when dealing with many questions related to the business cycle.[5]

Accounting for individual differences across generations

While the immortal consumer framework works well for some questions, such model economies are not of much use when asking questions for which life-cycle behavior is likely to be important for the answer. Many interesting policy issues revolve around life-cycle behavior. These include questions for which demographic factors are important, such as the future impact of immigration on the economy, Social Security reform in light of the aging population, and the impact of the baby boomers' retirement on savings and interest rates. For such questions, economists have known that another type of model is required (one that is computationally very intensive), where consumers are considered mortal and make their decisions based on where they are in the life cycle.

Miller and Upton (1974), in their macroeconomics textbook, had already formulated a special case of a life-cycle economy in which each individual lives for four periods ($I = 4$). Mimicking a lifetime divided into four parts, the individuals in their model earn income only in periods two and three but desire a smooth stream of consumption. With this simple textbook framework Miller and Upton shed quantitative light on several issues, such as the time path from a less developed to a fully developed economy, the role of government debt, and money's role in the behavior of output and other real aggregates when debt is denominated in nominal terms.

Given the technology of the time, computing the full equilibrium of such a model was a major task—even for the small number of generations. Instead, Miller and Upton constrained consumers to calculate their wealth on the assumption that interest rates in all future periods will be the same as in the current period. In contrast, in the examples we discuss in the remainder of this article, the models' people understand how future interest rates will adjust to clear markets. The resulting computational burden is heavy but, given the vastly improved capabilities of today's computers, eminently feasible, even with a value of I much greater than four (perhaps 55 or 60 if the model uses a period length of one year).

In the remainder of this article, we focus on examples of questions that can be addressed using the mortal consumer framework envisioned by Miller and Upton and others. Although many researchers have addressed life-cycle issues, we focus on the work of two researchers in this article because of space constraints. This is obviously not meant to be an exhaustive survey of the literature. Rather, these researchers' work provides representative examples of the type of questions that can be addressed using such a framework and of what has been done to answer them. We chose the work of Ríos-Rull because he has been instrumental in expanding this type of model to relevant life-cycle questions. We chose Storesletten because of his work on immigration and the current national interest in this topic.

Demographics and savings. The change in the age distribution of the population associated with the aging of the baby boom generation has sparked economists' interest in the potential impact on the national savings rate. Because typical consumers tend to borrow when young, save during middle age, and dissave during retirement, people's savings are affected by demographic factors, especially age. In addition, because a nation's savings is the sum of all individuals' savings, changes in the composition of the population could drastically affect the national savings rate. A policy issue associated with this question is the effect the retirement of the baby boom population will have on the Social Security system—a question that has recently become a hot topic in both the popular press and among economists.[6] Several researchers have addressed the savings issue. But, as mentioned earlier, we focus on the work

of Ríos-Rull and Storesletten as examples of what can be done using a mortal consumer, OLG framework.

Ríos-Rull has made great strides in the ability to deal with OLG models. His pioneering models allow for uncertainty about individuals' lifetimes as well as labor force productivity, which affects individuals' earnings differently, depending on which stage of the life cycle they are in. Ríos-Rull (1994) attempts to provide a quantitative answer to the issue of how the aging of baby boomers will affect savings rates and interest rates in the future. He permits laws of motion for population movement rather than simply assuming constant population growth. For example, in our notation from Economy 1, the number of newborns in the following period is given by $\mu_{1,t+1}$. If the age-specific fertility rates are ϕ_i (which are readily quantifiable from panel data), then this number can be written as

$$\mu_{1,t+1} = \sum_{i=1}^{I} \phi_i \mu_{it} + \zeta_t,$$

where ζ_t is a stochastic term whose statistical properties can be estimated from past population data. In studies that include population dynamics such as these, researchers have typically opted for a period length of five years, so that a lifetime of ninety years corresponds to a value of the parameter I of 18. Moreover, if the probability of surviving between age i and age $i + 1$ is s_i, then $\mu_{i+1,t+1} = s_i \mu_{it}$ for all $i = 1, \ldots, I - 1$. In the lifetime decision problem, the utility associated with age i would presumably be weighted by the unconditional probability of reaching age i, $\Pi_{j=1}^{i-1} s_j$, as well as by the usual term involving the discount factor. Finally, a rule needs to be specified for how the assets of the deceased are divided among the survivors.

With these features added to Economy 1, Ríos-Rull calibrates the model with age-dependent birth and mortality rates and simulates the population distribution, with an associated asset distribution, until a combination similar to the current distribution is obtained. This is used as the initial condition. Accounting for population dynamics is especially difficult to do for the United States because immigration is such an important factor in the country's population growth. For that reason, Ríos-Rull considers Spain, which like many Western countries is experiencing an aging of its population due to a baby boom in the 1950s and 1960s. As he notes, "The aging of the population brings forward a variety of very important issues as so many features of individual behavior are age-dependent. The allocation of time between work in the market and leisure, and the allocation of income between consumption and savings, are among the key variables for which the age of the individuals is a very important determinant" (1994, 1). Such a statement applies to the United States as well as Spain; thus his findings have implications for the U.S. economy.

Ríos-Rull reviews the economic implications of the baby boom based on two fertility schemes (one using historic fertility and one that assumes the current drop in fertility is permanent). In addition, for each of the two fertility scenarios, he considers alternative paths for productivity growth, an open versus closed economy, and alternative asset distributions. His main findings suggest that the aggregate savings rate will be reduced, but the amount of reduction depends on the fertility scheme used. Under the historic fertility scenario, the reduction in savings is relatively small—at most, a reduction of 2 percentage points at the lowest value. But, under this scenario, the aggregate savings rate rises again as the baby boom exits the economy (after the year 2010). In contrast, based on the permanent fertility scheme, aggregate savings rates decline sharply over the entire period—about 12 percentage points from 1980 to 2040.

Immigration's impact on savings and fiscal policy. A policy issue that has spurred debate both in the press and among economists is the effect of immigration on the U.S. economy. Opponents of immigration suggest that immigrants are "stealing" U.S. jobs and that immigrants do not contribute to the country's welfare because they are less educated, have lower wages, and are more likely to require social assistance. On the other hand, proponents for immigration suggest immigrants are hard workers who already have an education and give back to the country by saving and investing.

Economists have joined in the debate on the impact of immigration. In a survey article based on his own and others' work, Borjas (1994) suggests that on balance, current immigration policy may be detrimental to the U.S. economy. He finds that the newer waves of immigrants to the United States have lower wages relative to Americans and are unlikely to reach parity with U.S. native wages over their work life. He concludes that the increase in the flow of less skilled immigrants may have been partly responsible for the decline in the earnings of unskilled U.S. workers during the 1980s. Borjas also indicates that immigration may have an adverse fiscal impact on the United States

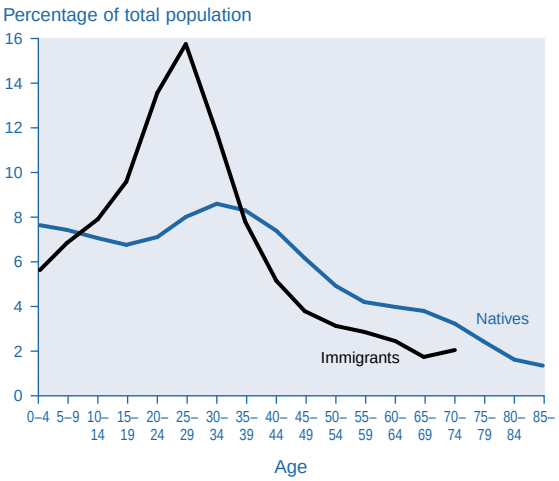
because the new waves of immigrants participate in welfare programs to a greater extent than the previous waves of immigrants.

Storesletten (1997) positions the impact of immigration in a more positive light, suggesting immigration can be beneficial to the U.S. economy—helping to offset a decline in savings as the baby boom generation begins to retire and possibly even sustaining current fiscal policy in the face of rising public expenditures associated with an older population. Building on the work of Ríos-Rull, Storesletten takes the finitely lived consumer, OLG framework one step further by modifying the population dynamics of the model to include both natives and immigrants. He calibrates a general equilibrium model to U.S. data and creates a role for immigration where immigrants are separate distinct agents. The individuals in his model differ in national origin and age at the time of immigration. The key difference between immigrants and natives in the model is in labor productivity, which is strongly influenced by the age at the time of arrival. Children of immigrants are assumed to be identical to natives.

Impact on savings. Storesletten's (1995) findings indicate that changes in immigration policy can significantly affect projected savings rates and interest rates in the United States. First, he solves his model under current immigration policy, and then he explores three alternative immigration policies, which range from shutting down all future immigration to doubling the current level of immigration. Under the current policy, he finds that the aging of the U.S. population is likely to cause the savings rate to decline as the baby boom population moves into retirement—the decline being 3.6 percentage points from peak to trough (2036). This finding is consistent with the work of other researchers that suggests the aging of the baby boom population will negatively affect aggregate savings, with Storesletten's work providing a quantification of this effect.

Findings from the alternative scenarios suggest savings rates are quite sensitive to changes in immigration policy. In fact, the projected savings rates from different scenarios differ by as many as 3 percentage points at the trough. Storesletten's results indicate that by boosting immigration quotas, savings rates would be higher than under current immigration policy. Under one scenario—increasing future immigration to twice the current level—there is an instant increase in the U.S. savings rate of 0.4 percentage point relative to the base case, and the difference between the two rises

Figure 4
Age Distribution of U.S. Natives And New Immigrants



NOTE: The figure shows the age distribution of natives in 1991 and the average distribution of new immigrants over 1982–88.

SOURCE: Kjetil Storesletten, Institute for International Economic Studies, Stockholm University.

to about 1.4 percentage points by the year 2041. In contrast, by shutting down all future immigration, the projected savings rate falls 0.5 percentage point below the base scenario, and the difference between the two projected savings rates rises by 1.5 percentage points over the next fifty years. These results arise because the population ages faster without immigration (immigrants on average tend to be younger than natives, as shown in Figure 4).

Impact on fiscal policy. It is a widely held view that maintaining government expenditures at current levels without a significant increase in taxes will not be a practical policy for the U.S. government as the population ages. For example, Social Security and Medicare—major players in fiscal policy—transfer wealth from the young working population to the old. With the aging trend of the U.S. population, such payments will become a larger liability for the government in future years, at the same time that there will be fewer workers to pay for it. This, combined with the current budget deficit, makes future tax increases seem inevitable. Storesletten (1997), on the other hand, argues that changes in immigration policy could reduce the need to raise taxes on future generations—and that by changing immigration policy alone, current fiscal policy could be sustained. Because on average new immigrants are younger than the native population but still old enough to have acquired some education, an increase in immigration has an impact on the age structure

of the population, which in turn increases government receipts by more than it raises government expenditures.

To illustrate the quantitative impact of immigration policy on fiscal policy, Storesletten examines whether there exists a class of immigration policies that could sustain fiscal policy at the current level, in the sense that the current debt will eventually be paid off without a tax increase. Using his OLG model with immigration, his findings suggest that such policies do exist if immigrants are added, most of whose ages range from the mid-twenties to the late forties. A particular implementation of the policy is to increase annual immigration to roughly four times the current level, assuming all the new immigrants are in their thirties. Such a policy turns out to be an alternative, in his model, to raising the income tax rate by about 5 percentage points. While this is a dramatic change in immigration policy, the example illustrates that, even for less extreme scenarios, significant fiscal relief could be achieved and that immigration policy can be viewed as an important tool in the determination of fiscal policy.

Concluding remarks

In concluding, we return to our initial question: Does being different matter? And the answer is: It depends. Many quantitative macroeconomic issues can be addressed using models that abstract from life-cycle behavior. For example, many business-cycle and long-run growth questions can be answered in an immortal consumer framework in which everyone is alike and lives forever. Such questions might include: What percentage of business cycles are accounted for by technology shocks? By monetary shocks? By changes in fiscal policy? For this class of questions, differences across generations have been found not to matter to any degree of quantitative importance. Still, although dissimilarities *across* generations may not be relevant to this class of questions, individual contrasts *within* generations, such as skill variation, may be. Researchers have found that it is relatively easy to introduce some such differences into the immortal consumer framework and still be able to compute the models with relative ease.

There is another class of questions for which individual differences—both across generations and within generations—matter a great deal. These are questions in which demographics are at the heart of the issue. Such questions can be addressed using an overlapping generations framework in which consumers are mortal and make decisions based on where they are in the life cycle. Issues that dictate this type of life-cycle framework include the quantitative impact of an aging population on savings rates and interest rates and the quantitative effect of alternative immigration policies. While it is still computationally difficult to solve such models, as computers become ever more powerful and theoretical advances are made, the scope of questions that can be addressed with the help of such models is broadening steadily.[7]

Notes

We would like to thank Carlos Zarazaga, Evan Koenig, and Lori Taylor for helpful comments and suggestions. We would also like to thank Kjetil Storesletten for providing us with his data.

1 This question is addressed in Kydland and Prescott (1982).

2 For an overview of the use of such model features, especially as they relate to the labor market, see Kydland (1995).

3 See Benhabib, Rogerson, and Wright (1991).

4 For a recent extension see Prasad (1996).

5 An exception is the Altig–Carlstrom (1991) study of the cyclical implications of the interaction of inflation with personal tax rates when taxes are not fully indexed. The issue addressed by them dictates an OLG framework with life-cycle earnings profiles. For example, a progressive income tax schedule implies cyclical bracket creep to an extent that depends on where the worker is in the life cycle.

6 See Imrohoroglu, Imrohoroglu, and Joines (1995).

7 Recently, researchers have even begun to explore questions about institutional arrangements that may arise when people vote. For example, Krusell and Ríos-Rull (1994) study the quantitative implications for capital accumulation arising from different systems of collective choice of taxes as reflected in the frequency of elections and the lag between policy decision and policy implementation. Cooley and Soares (1995) investigate how a pay-as-you-go Social Security system is maintained by subsequent voters even though it is not actuarially fair. A methodological challenge of such models is that they require both an economic and a political equilibrium.

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The Economics of Private Placements: Middle-Market Corporate Finance, Life Insurance Companies, and a Credit Crunch

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This article examines the private placement market for corporate debt and the recent credit crunch in that market.

This article examines the private placement market for corporate debt and the recent credit crunch in that market. Neither the private placement market nor the crunch have received much attention from economists, but both are important. The private market is a significant source of funding for medium-sized companies. Starting in the early 1990s, the credit crunch in the private market cut off most below-investment-grade companies from a traditional source of long-term funds; it is an example of a mechanism of credit market disruption that economists have yet to focus on.

The article first examines the structure of the private placement market, including contract terms and who the typical borrowers and lenders are. The private placement market is an information-intensive market that shares much with the more familiar bank loan market: borrowers and lenders typically negotiate lending terms, lenders evaluate and monitor borrowers' credit risk, covenants are used to control risk, and borrowers generally lack access to public debt markets because they are too information-problematic for public market investors to evaluate.[1] As in the bank loan market, a key activity of lenders in the private placement market is the gathering and production of information about borrowers' credit quality. However, there are also significant differences from the bank loan market: debt instruments in the private placement market are securities rather than loans, maturities of private placements are much longer than those of bank loans, interest rates are fixed rather than floating, and the principal financial intermediaries investing in private placements are life insurance companies, not banks.

The article also analyzes the credit crunch that occurred in the below-investment-grade sector of the private placement market in the early 1990s. Credit crunches have long been an interesting and controversial topic, because producing compelling evidence that a crunch occurred is often difficult and because economists have proposed a variety of mechanisms that can cause crunches. For the recent credit crunch in the private placement market, relatively extensive evidence is available. In addition, the causes of the crunch appear to differ from the standard ones proposed in the academic literature. Another interesting aspect of this credit crunch is that it apparently continues to this day, long after its initial causes—financial problems at life insurance companies and a policyholder focus on the industry's below-investment-grade bond investments—appear to

have waned. I examine some possible reasons for the persistence of the crunch.

The structure of the private placement market

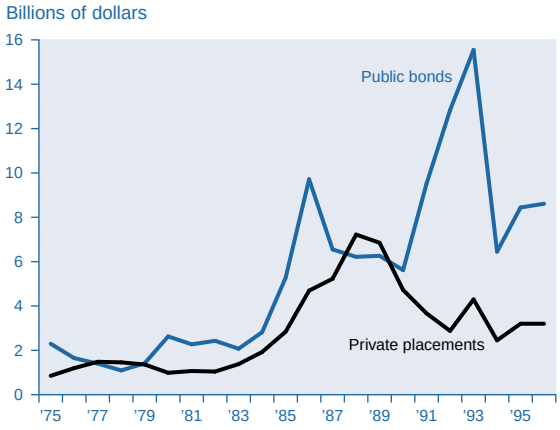
A private placement is a debt security issued by a firm that is exempt from registration with the Securities and Exchange Commission (SEC). By law, private placements must be sold only to a limited number of sophisticated investors (typically life insurance companies). Both initial offerings and secondary transactions of private placements are restricted in this fashion.

This article focuses on the traditional market for privately placed debt, which is distinct from the so-called Rule 144A market for private debt securities. Rule 144A, adopted by the SEC in 1990, provides more formal exemption from registration for secondary transactions in private placements. It has essentially evolved into a quasi-public market that is quite distinct from the traditional market. Most borrowers in the Rule 144A market are less information-problematic than traditional market borrowers. Lenders include traditional public bond buyers such as mutual funds and pension funds as well as life insurers; securities very often have registration rights attached to them and are formally underwritten (as in the public bond market), as opposed to sold on a "best-efforts" basis by agents (as in the traditional private market). There is generally substantially less gathering and production of information on borrower credit quality by lenders in the Rule 144A market.[2]

Private placements are a significant source of funds for U.S. corporations. During 1994–96, gross issuance of private placements by nonfinancial corporations was almost 40 percent of that in the public market. For a few years in the late 1980s, private issuance actually exceeded public issuance (*Figure 1*). The surge in public issuance in periods of falling interest rates (for example, in the mid-1980s and early 1990s)—which primarily reflects refinancing activity—has not been matched by private issuance because most private bonds carry punitive prepayment penalties, making refinancing unattractive.[3] The market size in terms of the outstanding stock of bonds also suggests that the private placement market is an important one. At year-end 1996, the nonfinancial corporate sector had about $450 billion of private placements outstanding, roughly 70 percent of the amount of bank loans ($640 billion) and almost 50 percent of the amount of public bonds ($950 billion) outstanding.[4]

Table 1 sets out some of the differences in

Figure 1
Gross Issuance of Publicly Offered and Privately Placed Bonds by Nonfinancial Corporations, 1975–96



SOURCE: Federal Reserve Board.

contract terms, borrowers, and lenders between the private placement market and the two other major debt markets—the public bond and bank loan markets. Many of these differences are consistent with the notion that, for many firms, these are very distinct markets to which there is a hierarchical pattern of access. In other words, there are many firms that are too information-problematic to borrow in the public bond market—they need to take advantage of the intensive due diligence and monitoring in the private placement or bank loan market. Of these, the most information-problematic firms are probably restricted to the bank loan market, where the most intensive monitoring takes place. Thus, the private placement market is a much more information-intensive market than the public bond market but probably somewhat less information-intensive than the bank loan market.

Contract terms and borrowers. Contract terms differ substantially across the three debt markets listed in Table 1. On average, private placements are larger than bank loans and smaller than public bonds. Carey et al. (1993) report that in 1989 roughly 80 percent of all private placement issues ranged from $10 million to $100 million. In contrast, more than 80 percent of all bank loans ranged from $10,000 to $1 million, while more than 80 percent of all public bonds issued ranged from $100 million to $500 million.

Maturities of private placements are generally longer than those of bank loans but shorter than those of public bonds. Bank loans have relatively short maturities—Carey et al. (1993)

Table 1
Credit Market Characteristics

Characteristic	Market		
	Bank loan	Private placement	Public bond
Contract terms			
Average loan size	Small	Medium	Large
Average maturity	Short	Long	Longest
Interest rate	Floating	Fixed	Fixed
Covenants	Many, tight	Fewer, looser	Fewest, loosest
Covenant renegotiation	Frequent	Less frequent	Rare
Collateral	Frequent	Less frequent	Rare
Liquidity of instrument	Low	Low	High
Borrowers			
Average borrower size	Small	Medium to large	Large
Severity of information problems posed by borrowers	High	Moderate	Low
Lenders			
Lenders	Intermediaries	Intermediaries	Varies
Principal lender	Banks	Life insurers	Various
Lender monitoring	Intense	Significant	Minimal

report that in 1989 roughly 80 percent of all bank loans were for less than one year. Private placements are generally of intermediate to long term (between seven and fifteen years) maturity—more than half of all private placements issued in 1989 were within this maturity range. Finally, public bonds are typically long term—roughly 70 percent of all public bonds issued in 1989 were longer than ten years in maturity.

The use of covenants also varies substantially across these three debt markets. Covenants are a mechanism lenders use to control risk. Affirmative covenants require a borrower to meet certain standards of behavior. They include requirements that the firm stay in the same business and meet its legal and contractual obligations. Affirmative covenants are common in all three debt markets. Negative covenants restrain the borrower from taking actions that would be detrimental to debtholders. They include restrictions on capital expenditures, the sale of assets, dividends, merger and acquisition activity, and the amount of additional debt the firm can take on. Finally, financial covenants restrict measurable financial variables and can stipulate minimums to be maintained on capital, interest coverage, and the ratio of assets to liabilities.

The frequency and tightness of negative and financial covenants in both the bank loan and private placement markets vary with the degree of information problems the firm poses to outsiders and its observable credit risk. "Tightness" refers to the likelihood that a particular covenant will be binding in the future. Both private placements and bank loans for more information-problematic firms often contain many financial and negative covenants, whereas covenants are fewer and looser (that is, with minimum values further from current values) in both markets for firms that pose fewer information problems. In particular, however, bank loan agreements appear to contain more and tighter covenants than private bonds, even for borrowers with the same characteristics, while negative or financial covenants in public bonds are extremely rare.[5]

Since covenants limit a borrowing firm's financial and operational flexibility, there are usually either implicit or explicit provisions for contract renegotiation, whereby the lender can examine requests for a waiver or relaxation of a covenant. Lenders that offer such provisions must of course have the ability to monitor and evaluate borrowers and the effect on their creditworthiness of relaxing particular provisions in the debt contract. The more frequent and tighter covenants in bank loans mean that covenant renegotiation is most frequent in this market. However, renegotiation is also quite frequent in private placements, while renegotiation is extremely rare in public bonds.[6]

These cross-market differences in contract terms are usually consistent with the notion that firms posing the greatest information problems for outside investors are generally restricted to the bank loan market, firms with less severe information problems have access to the private placement market, and only those large public firms with the fewest information problems can access the public bond market. In other words,

different debt markets specialize in providing financing to borrowers that differ in the degree of information problems they pose to investors.

Cross-market patterns of issue size are consistent with this notion. The information problems borrowers pose to lenders span a spectrum. Firm size is an important determinant of where on this spectrum a firm is because size is correlated with age and the length of a track record. Size is also related to the number of externally visible contracts the firm has, as well as to the firm's stake in its own reputation. Of course, borrower size is also highly correlated with issue size. Thus, smaller borrowers, which make smaller issues, are often less well-established and less well-known firms; consequently, they require more due diligence and loan monitoring by the lender. In fact, as Carey et al. (1993) show, borrowers in the public market are substantially larger than borrowers in the private placement market, which are in turn substantially larger than firms that are restricted to the bank loan market for raising funds.

Cross-market patterns of covenants are also consistent with the notion that each debt market serves borrowers differing in the degree of information problems posed to lenders. Information-problematic firms are subject to covenants that limit their risk-taking ability. But in order not to restrict the firms' activities too much, there must be room for renegotiating them at appropriate times. This can only occur in markets where the lenders are willing and able to renegotiate. Information-problematic firms cannot borrow in the public market because covenants are not effective there, since public lenders have little capacity for monitoring.

Differences in maturity between the bank loan and private placement markets appear related to the liability structures of the differing lenders in each market. Banks have short-term, floating-rate liabilities, which they can match with short-term, floating-rate loans. Conversely, life insurance companies have primarily long-term, fixed-rate liabilities, which are conveniently matched by private placement investments. Although banks could in principle make long-term, fixed-rate loans and execute swaps to obtain payment streams matching their floating-rate liabilities, they seldom do so. Perhaps this is because the transactions costs of such swaps are too high. An alternative explanation, however, is that the different markets serve borrowers that differ in terms of the credit evaluation and monitoring they require, and that in equilibrium the different credit analysis requirements require different maturities to be most efficient. For example, the tighter the covenants used to control borrower behavior, the shorter the maturity of the contract needs to be to provide flexibility for the borrower.

Lenders. Market participants estimate that life insurers purchase between 50 and 80 percent of all private placement issues. Carey et al. (1993) provide evidence supporting estimates at the high end of this range. Foreign and commercial banks, pension funds, finance companies, investment banks, and thrifts are all minor players in the market. As mentioned above, one reason for life insurers' dominance is that they are uniquely suited to investing in private placements because the fixed-rate, intermediate- to long-term nature of the security can be easily matched with their liabilities. At year-end 1995, life insurers held about $250 billion of private placements, representing about 14 percent of their general account assets and 37 percent of their total corporate bond holdings.[7] Within the life insurance industry, private placement lending is concentrated in the hands of the largest twenty insurers, which hold about 70 percent of total life insurance industry private placement holdings.[8]

Life insurance companies are information-intensive lenders—that is, they conduct both substantial due diligence on the borrower before making the loan and continuous monitoring after the loan is made. Thus they have large investments in risk-control technologies. Most insurers have traditionally had large staffs of credit analysts, who evaluate the credit quality of potential borrowers and monitor the health of firms to which credit has been extended. Most review each private placement in their portfolio quarterly and conduct a more formal semiannual or annual review. Violations of or requests for renegotiation of covenants generate further reviews. The costs of risk-control operations are covered by the higher risk-adjusted yield of private placements relative to public bonds, which require little or no active monitoring by securityholders.

Their large investments in credit evaluation and monitoring have traditionally led most life insurance companies to focus on more complex and lower rated credits, and the industry's expertise in investing in such bonds has largely been built up over the postwar period. For example, Shapiro (1977) notes that between 1960 and 1975, the share of insurers' annual commitments to private placements devoted to bonds rated Baa or below was roughly 60 percent, with the share going to below-investment-grade private bonds (those rated Ba or below)

Table 2
Gross Issuance of Private Placements by Nonfinancial Corporations, 1989–95

	1989	1990	1991	1992	1993	1994	1995
Total issuance (in billions)	$54.7	$49.9	$42.1	$29.5	$52.0	$31.0	$41.0
Below investment grade (BIG) (in billions)	$6.6	$8.1	$3.8	$3.2	$3.0	$2.0	$1.0
BIG as percentage of total	12.1	16.2	8.9	10.8	5.8	6.4	2.4

NOTE: Excludes restructuring-related issues in excess of $250 million, issues to finance employee stock ownership plans, and Rule 144A issues.

SOURCE: Securities Data Corp.

at roughly 20 percent. As late as 1990, insurers were still following this investment pattern: at year-end 1990 the life insurance industry held 56.8 percent of its total private bond holdings in bonds rated Baa or below, with 19.8 percent in bonds rated below investment grade. As described in the next section, however, in 1990 and 1991 the share of insurance industry commitments to below-investment-grade bonds was abruptly and sharply lowered, a phenomenon I call a "credit crunch."

The credit crunch

The private placement market is fundamentally an information-intensive market, with life insurance companies as the principal intermediaries. One feature all intermediaries share is their vulnerability to withdrawals of funds by liabilityholders, or runs, with consequent disruptions in the markets in which they lend. This section investigates an example of a disruption in the private placement market.[9]

Starting in mid-1990, issuers of below-investment-grade securities encountered a sharp contraction in the availability of credit in the private placement market. A coincident sharp rise in interest rate spreads on these securities suggests that the reduction in supply was larger than any decline in credit demand associated with the weak economy in that period. The primary mechanism for this credit crunch appears to have been asset-quality problems at life insurance companies in 1990 and 1991, which focused regulatory, stock market, media, and policyholder attention on the financial solvency of life insurers. For a variety of reasons, such attention focused on the share of below-investment-grade bonds on life insurance company balance sheets: insurers with a high share were penalized by lower stock prices, unfavorable media reports, and slower sales growth of life insurance products. Insurers thus began competing with each other not just on price but also on the basis of the share of below-investment-grade bonds on their books. As a result, insurers stopped buying below-investment-grade bonds, precipitating a crunch in the private market for these bonds where they had previously been the dominant investors.[10] In other words, there was a flight to quality by life insurance companies.

This flight-to-quality mechanism differs somewhat from those proposed by economists. It is most closely related to the class of models that focuses on runs caused by liabilityholder concerns about financial intermediaries' solvency. However, unlike in these models, no actual runs occurred to trigger a flight to quality by an insurance company.

One surprising aspect of the credit crunch is its persistence. Even today, life insurers appear to be infrequent purchasers of below-investment-grade private bonds, while gross issuance remains low and spreads remain high, despite the fact that solvency concerns about life insurance companies and concerns about below-investment-grade bonds have largely been put to rest. I investigate reasons for the persistence of the crunch.

Definition of a credit crunch. Many definitions of the term *credit crunch* appear in the literature (see Clair and Tucker 1993 for a review). My definition is that, for a given price of credit, lenders substantially reduce the volume of credit provided to a group of borrowers whose risk is essentially unchanged. That is, a credit crunch is caused by a reduction in lenders' willingness to make risky investments—in terms of a supply-and-demand diagram, a credit crunch is a substantial leftward shift in the supply of credit, when the shift is not principally due to an increase in the riskiness of borrowers.[11]

Note that a supply shift alone does not imply a credit crunch, as the supply curve may shift due to an increase in the riskiness of bor-

rowers. Thus my credit crunch definition does not encompass the reduction in supply that is a normal response by lenders in a recession. In a recession, borrower riskiness normally increases, and lenders demand compensation either in higher interest rates or in tighter nonprice credit terms. Although borrowers might characterize such a reduction in credit as a credit crunch, such a characterization would be incorrect because the decrease in credit is a normal response of lenders to changing conditions. Cantor and Wenninger (1993) refer to this situation as a "credit slowdown."

My definition of a credit crunch differs from some, notably that of Owens and Schreft (1992), in that it does not require that the credit reduction be accomplished by nonprice rationing. The reduction may be effected entirely by an increase in the relative price of credit, as would normally occur in response to a leftward shift in the supply curve, or by some combination of price increase and nonprice rationing.

Evidence for a credit crunch. Events in the below-investment-grade sector of the private placement market in the early 1990s qualify as a credit crunch because gross issuance of below-investment-grade private placements declined substantially and spreads on such debt increased sharply, whereas spreads on investment-grade private debt declined. A general increase in the riskiness of borrowers due to the 1990–91 recession cannot account for these phenomena.[12]

Data from three sources confirm a reduction in issuance of below-investment-grade private placements. First, gross issuance by below-investment-grade nonfinancial corporations fell by more than 50 percent in 1991, a much steeper drop than issuance by investment-grade corporations (*Table 2*).[13] As a share of gross offerings, below-investment-grade issuance declined from 16 percent in 1990 to about 10 percent in 1991 and 1992, and 6 percent in 1993. Note also that the share of below-investment-grade issuance continued to fall through 1995. I will return to the persistent nature of the crunch later.

Second, according to survey data from the American Council of Life Insurers (ACLI), the share of total commitments by life insurers to below-investment-grade private placements dropped sharply in mid-1990, from 21 percent in the first half of the year to 11 percent in the second half (*Figure 2*). Since then, this share has never risen above 7 percent. While data are unavailable on a continuous basis before 1990, Shapiro (1977) reports that the average annual share of commitments going to below-investment-grade bonds between 1960 and 1975 was 19.9 percent. In other words, starting in mid-1990, there was a historically unprecedented shift in insurers' investments away from below-investment-grade private bonds.

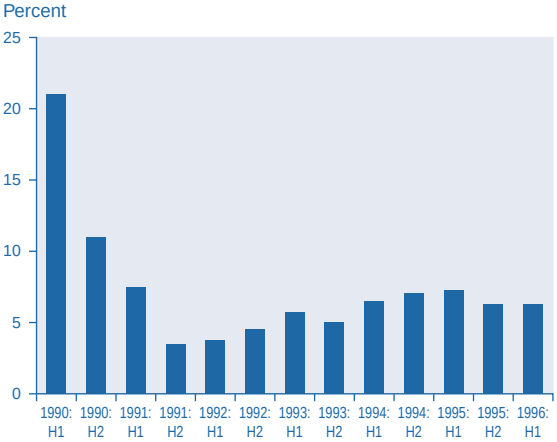
Consistent with the reduced rate of purchase of below-investment-grade bonds, life insurance companies' holdings of these securities fell 11 percent in 1991, whereas holdings of investment-grade securities rose by nearly 12 percent. As a result, as shown in Table 3, below-investment-grade private bonds as a percentage of all private placements in insurance company portfolios declined from 19.8 percent in 1990 to 12 percent in 1993 (and to 10 percent by year-end 1995). As private bonds are infrequently sold in the secondary market, this sharp decline in outstandings is consistent with an abrupt cessation of new investments in below-investment-grade private bonds. Life insurance companies appear to have simply let their portfolios of such bonds run off without replacing them. Table 3 illustrates that this aversion also

Table 3
Life Insurance Industry Below-Investment-Grade Bond Investments
(Percentage of bonds held that are below investment grade)

	1990	1991	1992	1993	1994	1995
Private placements	19.8	16.5	15.3	12.0	11.4	10.0
Public bonds	6.8	4.7	3.7	3.8	6.1	8.4
Total bonds	10.3	7.7	6.5	5.7	8.1	9.0

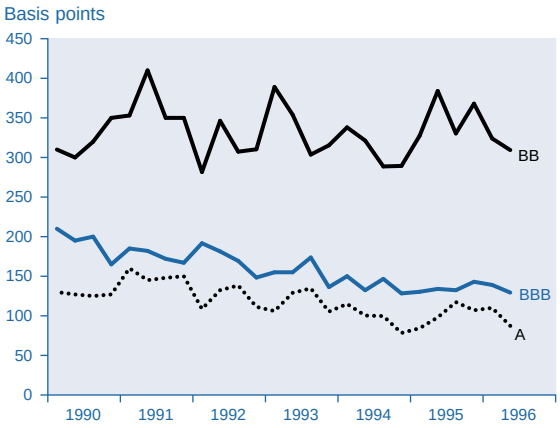
SOURCE: National Association of Insurance Commissioners.

Figure 2
New Commitments to Purchase Below-Investment-Grade Private Placements, As a Percentage of Total Commitments by Life Insurance Companies, 1990–96



SOURCE: American Council of Life Insurance.

Figure 3
Yield Spreads on Privately Placed Corporate Bonds, 1990–96



NOTE: Spreads are quarterly-weighted average spreads over the 7-year Treasury bond.

SOURCE: American Council of Life Insurance.

extended to the public market in the early 1990s—holdings of below-investment-grade public bonds as a share of total public bonds fell from 6.8 percent in 1990 to 3.7 percent in 1992.[14]

Accompanying the decline in issuance and outstandings was a sharp increase in yield spreads on below-investment-grade private bonds. According to market reports, before 1990 the difference in yields on BB- and BBB-rated private bonds with comparable terms was about 100 basis points; since then, the difference has been as high as 250 basis points.[15] Although data are unavailable before 1990, the spreads reported in the ACLI survey confirm this movement (*Figures 3 and 4*).[16] During the first half of 1990, the spread between yields on BB-rated private placements and comparable Treasury securities was just over 300 basis points, compared with just over 200 basis points for BBB-rated privates. This implies a difference in yields between BB- and BBB-rated bonds of about 100 basis points, consistent with market reports of the "normal" spread between such bonds at the end of the 1980s. During 1991–93, however, the spread over Treasuries on BB-rated privates rose sharply to around 350 basis points (peaking at 425 basis points in early 1991), while the spread over Treasuries on BBB-rated privates actually fell somewhat.[17] The yield spread between BBB- and BB-rated bonds thus rose to between 130 and 220 basis points over this period. Note again that spreads between BB- and BBB-rated private bonds remained between 180 and 200 basis points through 1995 and 1996.

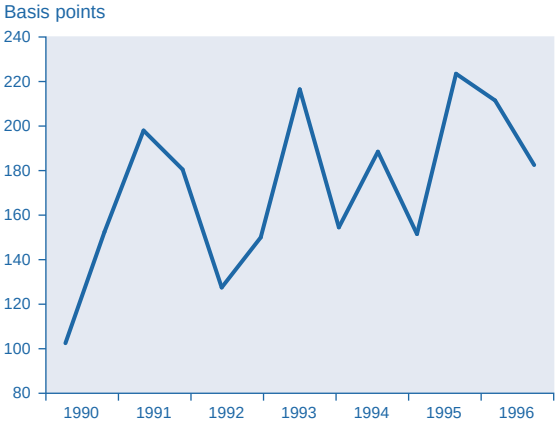
Of course, one could argue that the increase in spreads over Treasuries for BB-rated private bonds in late 1990 and 1991 largely resulted from the slowdown in economic activity. The recession could have increased borrower riskiness, and life insurers could have demanded higher interest rates in response. However, such an argument does not account for the fact that spreads over Treasuries on investment-grade private bonds actually *declined* in the recession, as shown in Figure 3. This pattern of behavior is *not* observed in the previous recession, when spreads over Treasuries of investment-grade bonds rose, and in fact rose by a greater amount than spreads on below-investment-grade bonds.[18] This argument would also fail to account for the continuing high spreads on BB-rated securities during the expansion that followed the 1990–91 recession. Overall, it appears more likely that, within the below-investment-grade sector of the private placement market, for a given level of risk, loan prices went up, whereas the volume of loans went down. These facts are consistent with a credit crunch in this market.

Mechanisms behind the credit crunch

The mechanism behind the credit crunch in the private placement market is somewhat different from those that have been proposed in the research literature. This section briefly reviews the literature on credit crunches and contrasts it with the mechanism that I argue is behind the recent credit crunch in the private placement market.

One branch of the literature on credit crunches focuses on reductions in intermediaries' lending activity caused by regulatory

Figure 4
Difference Between BB Spread and BBB Spread, 1990–96



SOURCE: American Council of Life Insurance.

actions that affect lenders' ability or incentives to assume certain risks. For example, Bernanke and Lown (1991), Clair and Tucker (1993), Berger and Udell (1994), Peek and Rosengren (1995), and Brinkman and Horvitz (1995) examine the effect of overzealous bank examination and the imposition of risk-based capital requirements on banks as a reason for the slowing of bank lending in the early 1990s. Banks facing binding capital constraints as a result of large loan losses, low earnings, and the introduction of higher regulatory requirements for capital levels had three options for increasing their capital–asset ratios: raise new capital, shrink assets and thereby liabilities, or change the mix of assets to include more government securities and fewer loans to businesses.[19] The latter two choices involve cutting back lending to borrowers. More aggressive examination practices that forced banks to make excessive charges against capital and accept new credit risks more cautiously would have a similar effect.

Another branch of the literature focuses on a decline in indebted firms' net worth and the value of their unencumbered collateral as a reason for a contraction in financial intermediary lending. Bernanke and Gertler (1989) suggest that borrowers' net worth can affect lending activity by financial intermediaries. As borrower net worth declines, then the agency costs of external finance rise. Thus lenders will be increasingly unwilling to lend to firms as their net worth declines. Shocks that impact firm net worth negatively can thus produce credit crunches.[20]

A third branch of the literature focuses on contractions of lending by intermediaries caused by liquidity problems, as modeled by Diamond and Dybvig (1983). In their model, a bank transforms illiquid assets into liquid deposits. Although bank assets are riskless, there is a cost to turning them liquid. Thus a bank run can still occur if depositors conjecture that all other depositors will withdraw their deposits early and consequently run to the bank to close their accounts before the bank exhausts its assets. Since the bank's assets are riskless, however, runs are not caused by rumors about the bank's solvency. Instead, runs arise as a random phenomenon, like sunspots. However it is caused, the effect of a run is the same—the bank must liquidate its illiquid loans and contract lending activity.

A final branch of the literature focuses on contractions in intermediaries' lending caused by runs due to liabilityholder concerns about financial intermediaries' solvency. Chari and Jagannathan (1988) and Gorton and Calomiris (1991) model situations where bank assets are risky. Some depositors have private information about the value of the bank's assets, while others try to infer this information from the number of depositors who line up at the withdrawal window. If there is a long line, these depositors will (sometimes incorrectly) infer bad news about the value of the bank's assets and this will trigger a bank run, which in turn triggers a sharp contraction in bank lending.

As I argue in the next section, the mechanism behind the credit crunch in the private placement market was largely unrelated to the liquidity-based models of runs and was not associated with a decline of indebted firms' net worth or regulatory action.[21] It was most closely related to the last class of models, which focuses on runs caused by liabilityholder concerns about financial intermediaries' solvency. However, unlike in these models, no actual runs occurred to trigger a flight to quality by an insurance company: the mere threat that potential customers were focusing on an insurer's below-investment-grade bond holdings was enough to trigger a withdrawal from the market for these securities. Thus, the signal to liabilityholders provided by the length of the line at the withdrawal window was not crucial, because most life insurers did not experience runs. What was crucial was the perception that the share of below-investment-grade bonds on the insurer's books was impeding the ability to sell life insurance policies to potential customers and hurting the firm's stock price. The next section reviews the flight-to-quality mechanism behind the credit crunch.

The flight-to-quality mechanism in the private placement market[22]

Until the early 1990s, the life insurance industry had enjoyed a long-standing reputation for financial stability. In 1990, however, concerns arose about the financial state of some life insurers when two insurance companies announced large write-downs of their bond and commercial real estate portfolios.[23] In 1991, five life insurance companies were seized by regulators.[24] Of these, two had large exposures to below-investment-grade bonds, and one had heavy exposures to commercial real estate.

In 1991, life insurers also became subject to more rigorous disclosure requirements with regard to their below-investment-grade holdings. In 1990, the National Association of Insurance Commissioners (NAIC) revised its system of rating bonds held by life insurance

Table 4
NAIC Ratings

NAIC rating designation	Equivalent rating-agency designation
Old system	
Yes	AAA to B
No*	BB, B
No**	CCC or lower
No	In or near default
New system	
1	AAA to A
2	BBB
3	BB
4	B
5	CCC or lower
6	In or near default

SOURCE: Securities Valuation Office, National Association of Insurance Commissioners.

companies to more closely resemble those of the major credit rating agencies. As shown in Table 4, under the old rating system, bonds that would have been rated below-investment-grade by the major ratings services—BB or below—were often rated investment grade (a "Yes" rating) by the NAIC for regulatory purposes. A "Yes" rating under the old system could be given to securities rated from AAA to B, while a "No*," "No**," or "No" rating could be given to securities rated from BB to those in default. Under the new system, all bonds rated below-investment-grade by the major ratings agencies were rated below-investment-grade by the NAIC. NAIC-1, the top rating, was given to securities rated AAA to A, NAIC-2 to BBB securities, NAIC-3 to BB securities, and NAIC-4 to B securities.

The first balance sheet data (from 1990) incorporating the new ratings were released in spring 1991. Although life insurance company investments in below-investment-grade bonds had changed little from 1989, the new system made it look as if there had been a huge jump in life insurance company exposure to below-investment-grade bonds. From 1989 to 1990, reported below-investment-grade holdings of the life insurance industry rose 40 percent and, as a share of all corporate bond holdings, increased from 15 to 21 percent. The sudden appearance of larger below-investment-grade holdings by life insurance companies focused the attention of regulators, stock investors, the media, advisors to the institutional buyers of life insurance products, and policyholders themselves on the composition of insurers' bond holdings. Below-investment-grade bonds became a source of concern for these constituencies, with the ultimate result that insurance companies ceased investing in them.

Fenn and Cole (1994) document that stock prices of insurance companies with higher than average concentrations of junk bonds were adversely affected by the publicity surrounding First Executive's write-down of its bond portfolio in early 1990.[25] In contrast, stock prices of insurance companies with lower than average exposure to below-investment-grade bonds were not affected.

The media also reacted unfavorably to those insurers with large holdings of below-investment-grade bonds. DeAngelo et al. (1994) suggest that First Executive—whose financial problems stemmed from overexposure to below-investment-grade bonds—received much more press coverage than other large life insurers with serious financial problems stemming from other reasons at the same time. They report that from July 1989 to April 1991, thirty-two feature articles on First Executive appeared in four major newspapers. Over the same period, there were only seven feature articles on any of the industry's top ten companies, despite the fact that, during this period, other life insurers suffered substantial financial problems unrelated to their below-investment-grade bond investments.

Finally, potential customers of life insurance companies became sensitive to the share of below-investment-grade bonds held by insurers. Fenn (1995) finds evidence indicating that life insurance companies' asset growth from 1990 to 1993 was extremely sensitive to their below-investment-grade holdings. Consistent with this finding, life insurance companies began to market themselves to policyholders on the basis of their below-investment-grade bond holdings. Insurers began to advertise explicitly their low exposure to below-investment-grade bonds in print and television media (see Lublin 1990).

Of course, much of this activity would have been warranted had below-investment-grade bonds truly been a serious problem for the life insurance industry. However, Fenn (1995) suggests they were not and that the use of below-investment-grade bond holdings as a signal of insurance company solvency problems was probably not warranted. First, below-investment-grade bonds were actually only a small factor in life insurers' asset quality problems: none of the largest twenty life insurance companies had more than 10 percent of their general account assets in the form of below-investment-grade bonds. Far more serious was the industry's sizable exposure to commercial real estate: in 1990, only two of the twenty

largest life insurers had less than 15 percent of their general account assets tied up in commercial real estate. In 1990, the largest twenty life insurance companies together held 31 percent of their general account assets in real estate, versus under 6 percent in (public and private) below-investment-grade bonds.[26]

Second, the slump in the commercial real estate market was longer and deeper than in the below-investment-grade market. Fenn (1995) reports that commercial real estate prices fell 24 percent between 1990 and 1992. In some regions of the country, prices fell by considerably more. In contrast, Fenn reports that public below-investment-grade bond prices fell 9 percent from 1989 to 1990 and then recovered sharply in 1991 and 1992. No data are available on prices in the private bond market because these bonds are rarely traded on the secondary market, but there is little evidence that default rates increased sharply in this period for private placement below-investment-grade issuers.

Regardless of whether the share of below-investment-grade bonds on an insurer's books was an accurate signal of its financial condition, there is evidence that the media, the stock market, and life insurance companies anticipated (correctly) that policyholders would be especially sensitive to this signal. The result was an almost complete withdrawal by life insurers from the below-investment-grade sector of the private placement market in 1991 and 1992.

Reasons for the persistence of the crunch. One surprising aspect of the credit crunch is its persistence. Data on issuance and yield spreads in Tables 2 and 3 and Figures 2, 3, and 4 suggest that the credit crunch in the private market is an ongoing phenomenon six years after it started. This is in stark contrast to the public bond and bank loan markets, which revived as long ago as 1993 and are now very active markets for firms seeking funds. Why has the private placement market been special in this regard?

It is unlikely that insurance companies still feel the need to advertise low below-investment-grade bond exposure. Possibly this was true as late as 1993, but it is hard to believe that it is still the case. Concerns about life insurance company financial stability appear to have disappeared: the financial condition of the industry has improved significantly since 1992, and capital–asset ratios for the industry are at their highest level in almost a quarter of a century. In any case, life insurers appear no longer averse to investing in below-investment-grade *public* bonds. As illustrated in Table 4, over the last three years, insurance companies have increased the share of their public bond investments going to below-investment-grade issues. At year-end 1995, the industry's 8.4 percent share was higher than it had been in 1990.

One reason may lie in the influence of risk-based capital standards, which became effective at the end of 1993 and which may have reinforced the reluctance of insurance companies to buy below-investment-grade securities. The new standards are aimed at measuring the prudential adequacy of insurers' capital as a means of distinguishing between weakly and strongly capitalized companies. To this end, insurers must report the ratios of their book capital to levels of capital that are adjusted for risk. As an insurer's ratio falls progressively below one, successively stronger regulatory actions are triggered. One way insurers can raise their risk-based capital ratios is to shift into lower risk assets, and below-investment-grade securities carry risk-weights much higher than those on investment-grade bonds and even commercial mortgages. While the introduction of risk-based capital standards may in part explain insurers' continued reluctance to invest in below-investment-grade private bonds, it is unlikely to be the whole story, since insurers have returned to the public below-investment-grade market, and the capital standards do not discriminate between private and public bonds.

The change in the composition of life insurers' assets between those held in general accounts and separate accounts may partly explain insurers' investment behavior. Insurers' separate account assets are held apart from their general account assets. All gains and losses of a separate account are directly attributed to the policyholders of that account. Separate account assets have grown much faster than general account assets since the early 1990s, when concern about insurers' financial stability first arose.[27] However, the shift from general to separate account products may have impeded the industry's traditional lending activities, since separate account assets must be marked-to-market and therefore consist primarily of liquid assets such as public bonds and publicly traded equities. Public below-investment-grade bonds are considered significantly more liquid than private below-investment-grade bonds and are thus more suitable assets for separate accounts.[28]

It is possible that the recent proliferation of below-investment-grade public bond investors has "cherry-picked" the better credits from the private market, thereby substantiating the

need for permanently higher spreads in the private market. However, as discussed above, the public and private bond markets are very different debt markets, and for many firms there is a limited scope for switching between them. Thus, this is unlikely to be the whole story for the persistence of high spreads and low insurer interest in this market.

A final reason has to do with the information-intensive nature of the private market for below-investment-grade issues and the high start-up costs facing many insurers that might consider getting back into the below-investment-grade sector of the private market. At the height of the credit crunch in 1991 and 1992, many life insurance companies scaled back substantially on their credit staffs, which are necessary for investing in the most information-problematic private bonds in the below-investment-grade sector. Many insurance companies may now be reluctant to incur the start-up costs associated with expanding their risk-control resources, particularly if they feel there is some likelihood of the same policyholder focus on below-investment-grade bond holdings when the next downturn in the industry occurs.[29]

Conclusions

The credit crunch in the private placement market is an example of a flight-to-quality mechanism at work. Private placements are information-intensive securities that require substantial due diligence and monitoring by intermediaries in order to ascertain their value. They make up a substantial portion of life insurance company assets; these companies are therefore vulnerable to the flight-to-quality mechanism because, unlike banks, their liabilities are not insured. Financial problems at life insurance companies, a change in regulatory reporting requirements, and runs on a few insurers combined to raise doubts about the solvency of life insurance companies and focused regulatory, media, stock market, and public attention on the share of life insurance company assets in below-investment-grade bonds as a signal of solvency. Life insurance companies, therefore, began to compete with each other on the basis of this share. This created a large-scale withdrawal from the market for below-investment-grade bonds, creating a credit crunch in this segment of the private placement market. Ironically, it is likely that the share of below-investment-grade bonds on an insurer's books was not a very good signal of its solvency. But the information-intensive nature of the securities meant that outsiders could be misled in this regard.

The existence of a mechanism that could induce the credit crunch in the private placement market does have some more general implications. Flights to quality by U.S. commercial banks have been rare since the advent of deposit insurance. However, this might change if recent proposals for "narrow" banks are enacted. Under these proposals, banks would be split into two parts: a narrow bank that would be fully insured, provide payments system services, and invest only in Treasury securities; and a "broad" bank that would raise uninsured funds in the open market and invest in traditional bank loans. Although the payments system would be fully insured under this system, broad banks might be an unstable source of funds for firms as they would be subject to the kind of flight-to-quality mechanism I've described for life insurance companies. A fuller understanding of the role of deposit insurance in promoting stable financial intermediation is necessary before the welfare effects of narrow bank proposals can be fully analyzed.

Notes

I thank Mark Carey and George Fenn for helpful discussions, and Ken Robinson and Harvey Rosenblum for comments on an earlier draft.

1 "Information-intensive" refers to the requirement that due diligence be performed by the lender at the time of loan origination and monitoring be done thereafter. "Information-problematic" borrowers are those that pose particularly severe information problems to lenders, which must consequently engage in costly due diligence and monitoring to evaluate and control the credit risk of the borrower.

2 Although I focus on the traditional market, the Rule 144A market has become quite significant, totaling almost 50 percent of gross issuance in 1995.

3 Of course, this implies that in terms of net new funds raised, the private market is even more important than the gross issuance numbers suggest.

4 Outstandings of public bonds are the sum of bonds rated by Moody's Investors Service and publicly issued medium-term notes. Private placements are estimated by subtracting the figure for public bonds from outstandings of all corporate bonds reported in the Flow of Funds accounts. Data for bank loans are from the Flow of Funds accounts.

5 Further, bank loans tend to have maintenance covenants, whereby the criteria set forth in the covenant must be met on a continuous basis (at the end of each quarter, for example), whereas private bonds tend to have incurrence covenants, whereby the

criteria must be met at the time of a prespecified event, such as an acquisition or the issuance of new debt. See Carey et al. (1993).

[6] Kwan and Carleton (1996) report that over half of a sample of private placements were renegotiated at least once, with most of the renegotiations occurring for loans in good standing.

[7] See American Council of Life Insurance (1996).

[8] This reflects both the general concentration of the life insurance industry—the twenty largest life insurers hold about 50 percent of total industry assets—and the fact that large lenders have an advantage in investing in private placements because their large investment volume allows them to participate continuously in the market, giving them up-to-date information on pricing.

[9] See also Carey et al. (1993) for a discussion of this phenomenon.

[10] This also contributed to a crunch in the public below-investment-grade market, where life insurance companies were also significant lenders (but not nearly so dominant as they were in the private market).

[11] This definition is similar to that of Bernanke and Lown (1991), who in their analysis of the credit crunch in the bank loan market in the early 1990s define a crunch as "a significant leftward shift in the supply of bank loans holding constant both the safe real interest rate and the quality of potential borrowers."

[12] The decline of issuance may or may not have been achieved by nonprice rationing: I have no quantitative evidence either way. Interviews with market participants on this topic revealed mixed views.

[13] Gross issuance excludes offerings to finance employee stock ownership plans and restructurings. Underlying developments are more evident with their exclusion, as both were heavy in 1989 but fell off sharply in 1990 and 1991. Also excluded are Rule 144A offerings. Before 1990, ratings reflected the judgment of agents supplying information on the transactions they assisted. Thereafter, ratings assigned by the National Association of Insurance Commissioners are used.

[14] Note, however, that unlike in the private market, life insurance companies appear to have returned to buying below-investment-grade public bonds in recent years.

[15] See Carey et al. (1993). BBB-rated bonds are the lowest investment-grade rating category, while BB-rated bonds are the highest below-investment-grade rating category.

[16] Care must be used in comparing the reported spreads. Although they are transaction prices, they do not reflect a standardized security. As noted in the first section of the article, the nonprice terms of private placements can differ widely for bonds carrying the same credit rating, and the terms affect the yields. For example, at any given moment, the difference in spreads between the highest-risk BB-rated issue and the lowest-risk BB-rated issue may be as much as 150 basis points. Under normal circumstances, averaging spreads within a rating category produces a representative spread for the rating. However, as most of the BB-rated bonds issued since mid-1990 probably were at the least-risky end of the BB risk range, the increase in the BB spread shown in Figures 3 and 4 probably understates the actual increase.

[17] Similarly, the spread on A-rated private bonds also declined during 1991–93.

[18] In the 1981–82 recession, spreads over the 7-year Treasury on A- and BBB-rated bonds rose by 60 and 52 basis points, respectively, over their level for the twelve months prior to the recession, while those on BB-rated bonds rose by 45 basis points. These spreads are for public bonds; data for private bonds are unavailable.

[19] Risk-based capital may be viewed as a regulatory tax that is higher on assets with higher risk-weights, encouraging substitution out of assets in the 100 percent risk category—such as commercial loans—and into assets in the zero risk category—such as Treasury securities.

[20] In this case, the phenomenon would not qualify as a credit crunch as I have defined it, since the risk of the borrower presumably increases as net worth declines.

[21] However, regulators were probably at least partly responsible for the flight to quality to the extent they promulgated bad news to the public about below-investment-grade bonds.

[22] Much of the information in this section is from Fenn (1995).

[23] First Executive wrote down its bond portfolio by $515 million in January; in October, Travelers reserved $650 million for anticipated commercial real estate losses.

[24] The five were Executive Life and Executive Life of New York (both insurance subsidiaries of First Executive), First Capital and Fidelity Bankers (insurance subsidiaries of First Capital Corp.), and Mutual Benefit.

[25] Although they document that insurance company stock prices also fell in response to Travelers' announcement of $650 million in commercial real estate losses, the price declines were only about one-quarter the size (per unit of investment in below-investment-grade bonds or commercial real estate).

[26] Rating agencies downgraded more than half of rated life insurance companies in 1991 and 1992, mostly for reasons of commercial real estate exposure.

[27] This is primarily because separate account policyholders have a preferred claim on separate account assets and are therefore afforded greater protection if an insurer defaults.

[28] This of course has implications for how banks might behave if forced to implement market-value accounting for their assets. In such circumstances, illiquid commercial loans would be viewed as more costly relative to liquid Treasury securities.

[29] The fact that other potential investors in below-investment-grade private placements—such as pension funds and finance companies—have not dramatically expanded their role as lenders to take advantage of the high spreads is evidence that there are likely to be high start-up costs to entering this market.

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"Tough Love": Implications for Redistributive Policy

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Policies formed by tough love will result in less redistribution to the poor but also result in greater labor force participation than would be the case under policies motivated solely by concern for the income of the poor.

In 1965, President Lyndon Johnson launched the most ambitious effort in American history to eliminate poverty. Known as the Great Society, this effort consisted of a variety of social programs designed to alleviate the problems of the poor. Declaring that "the days of the dole in this country are numbered," Johnson sought to provide short-term assistance to the able-bodied poor in the belief that it would enable recipients to lift themselves out of poverty; the smaller population of individuals who could not work would receive long-term support. The belief that poor individuals would escape poverty if given short-term support was echoed by the *New York Times*, whose editorial board claimed that the ultimate benefits of the War on Poverty would be reaped through "the long-term reduction of the need for government assistance" (Royal 1985).

An enormous number of people entered the welfare rolls as a result of Great Society programs. However, the hope that they would use the programs as "a hand, not a handout" was unrealized. The poverty rate, which had been declining since World War II, began to rise despite a twentyfold increase in social welfare expenditures (Novak 1985). Increasingly, the ranks of the poor were composed of single-parent families and an "underclass" of able-bodied males who remained in poverty considerably longer than poor two-parent households (Mead 1991; Murray 1992). Great Society supporters suggested that higher welfare benefit payments were needed in order to care for long-term recipients, while opponents found themselves accused of indifference to the plight of the poor.

Indifference is clearly one reason someone might favor a reduction in welfare benefits. However, an increasing number of analysts have argued in favor of such a reduction *for the sake of the poor* (Murray 1984; Novak 1985). By providing income to those individuals who do not work, welfare discourages recipients from entering the labor force and encourages workers to join the welfare rolls, aggravating the unemployment problem and lowering the rate at which the economy can grow. Traditional notions of altruism assume that compassion for the poor is measured by one's willingness to redistribute income, but, to the extent that more generous support for the poor actually encourages recipiency, welfare programs simultaneously mitigate and exacerbate the problem of poverty. It is therefore conceivable that altruism, when defined as concern for both the well-being and the num-

ber of poor, could imply "tough love" toward welfare recipients.[1]

This article explores the differing implications of traditional altruism and the "new altruism," which combines the traditional with tough love. The first section of this article describes the economic model. Next, the article introduces the model's political framework and demonstrates that, when altruism is defined in the traditional sense, a relatively altruistic individual will prefer relatively generous welfare benefits. The following section compares the public policies favored by a traditional altruist and an otherwise identical new altruist. It shows that benefit levels are unambiguously higher under the traditional altruist but that labor force participation is unambiguously higher under the new altruist. The conclusion summarizes these points.

The economic model

Consider a system of jurisdictions, which are inhabited by individuals for whom migration is both costless and unrestricted. These mobile individuals may choose whether to enter the labor force. Employed individuals are endowed with one unit of labor, which must be used to produce the numeraire according to a production function $f_i(e_i)$, where e_i denotes the number of employed individuals in jurisdiction i. In exchange for their labor, employed individuals receive their marginal product, $f_i'(e_i)$, from the jurisdiction. Poor individuals, by contrast, receive no labor endowment but obtain welfare payments from their jurisdiction. A jurisdiction may engage in neither wage nor benefit discrimination.

In addition to wages and benefits, each person receives disutility from congestion, and every employed individual receives disutility from work. I assume a congestion function of the form $c_i(p_i + e_i)$, where c_i is the monetized value of congestion and p_i represents the number of welfare recipients in jurisdiction i.[2] I assume that each individual has a finite disutility value, which expresses, in monetary terms, the degree to which that individual is averse to work.

Since migration is costless, the net income of the poor must be equalized across jurisdictions, and the net income of the employed must also be equalized across jurisdictions. These incomes are given by

$$Y^P = b_i + c_i(p_i + e_i), \tag{1}$$

and

$$Y^E = f_i'(e_i) + c_i(p_i + e_i), \tag{2}$$

where b_i represents the benefit level in jurisdiction i.

In addition to these individuals, I suppose that each jurisdiction contains a single immobile landowner. This landowner claims any residual profits from the production process and finances redistributive benefits.[3] The net income of the landowner is

$$Y_i^L = f_i(e_i) - e_i f_i'(e_i) - b_i p_i, \tag{3}$$

where $f_i(e_i) - e_i f_i'(e_i)$ is the residual profit from production (output less wages), and $b_i p_i$ is the total benefit payment from the landowner to the poor in his jurisdiction.

Given these assumptions, it is possible to characterize the behavior of mobile individuals under a change in benefit policy. When a jurisdiction increases its level of redistributive benefits, poor people will immigrate and employed people will emigrate until the net incomes of both groups are equalized across jurisdictions. This movement spreads the impact of the increase across every jurisdiction, ensuring that every welfare recipient is aided by the increase but that no recipient reaps the full amount of the increase. The increase also induces a certain number of workers to leave the workforce, which reduces the total number of workers and thereby lowers the gross domestic product of the system of jurisdictions.

A decision-making framework

The previous section establishes an economic framework from which to examine redistributive policy. However, redistribution is as much a political as an economic process. For this reason, the motivations of political actors are crucially important to the study of redistribution. This section surveys existing political models and examines optimal redistributive policy under the most common model: the landowner/policymaker.

Perhaps the most important result in political theory is the median voter theorem of Bowen (1943) and Black (1948). This theorem gives conditions under which, when each voter has a most-preferred policy and judges other alternatives by their distance from that policy, the preference of the median voter cannot be beaten in a majority vote. When governments act in accordance with median voter theory, an analyst who can describe the preferences of the median voter has a complete description of political outcomes. The intuitive appeal of

median-voter theory in democratic states has led to its use in a wide variety of applications, including several associated with the debate about redistributive policy (Brown and Oates 1987; Epple and Romer 1991). There is also empirical evidence to suggest that median-voter theory is relevant to discussions of politics (Stigler 1970; Inman 1978).

Substantial anecdotal evidence about excessive government spending prompted a renewed examination of the extent to which government behavior is consistent with median-voter theory. In a seminal analysis, Niskanen (1971, 1975) concludes that government services are provided by inefficient bureaucracies that have an incentive to overproduce. This analysis is extended by Romer and Rosenthal (1979), who argue that politicians also increase the size of government through their ability to restrict the set of policies over which voters may choose. Empirical studies on a variety of governing bodies—ranging from Oregon school districts to the government of the United States—provide support for the big-government thesis (Romer and Rosenthal 1982; Peltzman 1992). This evidence suggests that a simple median-voter framework is inappropriate for analyses of redistribution.

While both the median-voter and the bureaucratic approaches offer insights into political behavior, the most common political model in analyses of migration and redistribution is the landowner/policymaker. In the tradition of Pauly (1973), these analyses assume that the poor abstain from politics and permit immobile landowners to control government policy. Examples include the "profit-maximizing communities" of Sonstelie and Portney (1978) and Epple and Zelenitz (1981), the "bad politics" scenarios of Henderson (1985) and Hoyt (1993), and the analytical work of Wildasin (1991). Because of its prevalence in the literature, the landowner/policymaker is the political model employed here.

Consider a landowner who is empowered to change the level of redistributive benefits provided by the landowner's jurisdiction. Landowners who feel no altruism toward the poor will simply maximize their net income. From equation 3, the landowner receives the residual income from the production process but finances redistributive benefits from this residual. The change in residual income from a small increase in benefits is given by

$$\frac{dR}{db_i} = -e_i f_i''(e_i)\frac{de_i}{db_i} < 0, \tag{4}$$

where R denotes output less total wages, and the change in total redistribution from the landowner to the poor is given by

$$\frac{d(p_i b_i)}{db_i} = p_i + b_i \frac{dp_i}{db_i} > 0. \tag{5}$$

Since redistribution unambiguously lowers residual income, the landowner would never choose a positive level of redistributive benefits.

Suppose, however, that the landowner is altruistic in the traditional sense of desiring a higher net income for the poor. This altruism could derive from personal convictions, or the landowner may behave in an altruistic manner to retain political office. Denote the landowner's (monetized) benefit from altruism as $\lambda_i(Y^P) > 0$, and suppose that the function is increasing in its argument at a decreasing rate. Although the landowner would oppose redistributive benefits in the absence of altruism, a sufficiently high level of altruism will induce support for welfare benefits. To examine the conditions under which an altruistic landowner would be willing to redistribute, it is necessary to examine the comparative statics of the system. The derivative of the altruism function with respect to a change in redistributive benefits is given by

$$\frac{d\lambda}{db_i} = \lambda'(Y^P)\frac{dY^P}{db_i}, \tag{6}$$

and the condition under which the politician would choose to increase redistributive benefits is

$$\frac{dY^P}{db_i} > \frac{e_i f''(e_i)\frac{de_i}{db_i} + p_i + b_i\frac{dp_i}{db_i}}{\lambda'(Y^P)} > 0. \tag{7}$$

Rewriting this equation as

$$\lambda'(Y^P) > \frac{e_i f''(e_i)\frac{de_i}{db_i} + p_i + b_i\frac{dp_i}{db_i}}{\frac{dY^P}{db_i}} > 0 \tag{8}$$

demonstrates that there is a unique level of altruism above which the landowner will engage in redistribution. In other words, a landowner who is sufficiently concerned about the income level of the poor will redistribute, while one who is not, will not.

Redistributive policy and the new altruism

Although redistribution raises the income of the poor, it provides an incentive for able-bodied individuals to choose welfare benefits over work. This section examines the behavior of new altruist policymakers who simultaneously wish to raise the income of the poor and

reduce their ranks. It demonstrates that policies favored by the new altruist will always result in less redistribution to the poor than would policies formed by a traditional altruist. It also shows that new altruist policies will always result in fewer welfare recipients (and a higher number of workers) than would policies formed by a traditional altruist.

Consider a new altruist who values both greater income for the poor and fewer people in the ranks of the poor. Suppose that these terms are separable, such that the total altruistic benefits reaped by the new altruist are of the form $\lambda_i = \lambda_1(Y^P) + \lambda_2(\sum p_i)$. It can be shown that an increase in redistributive benefits increases the total number of poor individuals by some positive level and that the total change in landowner utility derived from altruism is

$$(9) \qquad \frac{d\lambda_i}{db_i} = \lambda_1'(Y^P)\frac{dY^P}{db_i} + \lambda_2'(\sum p_i)\frac{d(\sum p_i)}{db_i}.$$

Equation 9 demonstrates that the new altruist is always less willing to redistribute than is an otherwise identical altruist to whom the number of poor is irrelevant. However, it also suggests that it is possible for the new altruist to favor more redistribution than would traditional altruist, as would be the case if, for example, the traditional altruist ($\lambda_2 = 0$) in question were primarily concerned about his or her own income, while the new altruist ($\lambda_2 > 0$) were primarily concerned about the income of the poor. Thus, new altruism is consistent with any level of welfare expenditures. What is unique about the new altruist is a willingness to trade a portion of the poor's income for a reduction in their ranks.

The willingness to reduce welfare benefits in the name of the poor has led some to question the new altruist's sincerity. Ironically, income distribution arguments made by redistribution proponents could also justify a reduction in welfare benefits. Thurow (1971), for example, argues that society is better off under a more equal distribution of income. However, welfare expenditures have an indeterminate effect on income distribution: they help the poor while simultaneously encouraging middle-income workers to become poor. To the extent that welfare programs discourage labor force participation, then a reduction in redistribution might be justifiable—which is precisely the argument new altruists make.

Conclusion

This article examines the economic and political ramifications of tough love for redistributive policy. It confirms the traditional result that a politician who feels no altruism toward the poor would not engage in redistribution. It shows that a traditional altruist might engage in redistribution if the desire to help the poor is sufficiently strong. Finally, it models the preferences of an altruism that incorporates tough love and describes the implications of those preferences. Policies formed by tough love will result in less redistribution to the poor but also result in greater labor force participation than would be the case under policies motivated solely by concern for the income of the poor.

This article has important implications for American public policy, both because of the results it demonstrates and those it does not demonstrate. It shows that the broader definition of altruism held by the new altruist leads one to favor less generous welfare benefits than would an otherwise identical traditional altruist. But it does not show that the new altruist wishes to reduce or abolish redistribution: a new altruist is perfectly willing to support a generous welfare benefit system if the labor force consequences are sufficiently low. This article suggests that efforts such as the Great Society can have significant work-disincentive effects, but it does not show that the Great Society itself should be viewed as a failure by the new altruist. A traditional altruist whose altruism is sufficiently low could reject Great Society programs, and a new altruist whose concern for the income of the poor is sufficiently high could embrace them.

Finally, this article shows that both support of and opposition to welfare benefit programs are consistent with altruism, but does not show that every real-world policymaker is motivated by altruism in making judgments about welfare. People can oppose redistribution because they do not wish to give up their income to the poor, and people can support redistribution because they do not object to spending other people's income on the poor. The conclusions reached in this article suggest the need for a renewed examination of the policy proposals of the new altruists and a renewed effort to understand the impact of redistributive programs on labor force participation.

Notes

[1] There are, of course, welfare recipients who cannot work because of physical disability. Neither the new altruists nor Great Society supporters suggest that these individuals would benefit from tough love.

[2] For purposes of this article, one can assume that the congestion is the result of a fixed supply of housing

for which all residents must bid. Congestion might also result from a fixed supply of public goods, such as parks and roads.

[3] The theoretical analysis holds for a variety of financing arrangements, provided the arrangement does not violate the landowner's position as residual claimant. An example of such an arrangement is a payroll tax on workers under which the landowner must finance the difference between payroll tax collections and benefit disbursements.

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