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PRIVATE PENSIONS AND PUBLIC PENSIONS: THEORY AND FACT

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This paper originated as the W.S. Woytinsky Lecture given in Washington, D.C., on December 28, 1981. My work on this subject has been done in collaboration with Roger Gordon and Donald Wise. The usual acknowledgment of intellectual indebtedness would be trite here. It is more accurate to say that I can no longer remember which ideas originated with me and which with them. Mark Twain said that only kings and people with tapeworms should use the "royal we." I am neither. When I use the pronoun "we," it refers to our joint research. But Gordon and Wise should not be implicated in the uses to which I have put our findings. I am also grateful for useful comments from Gary Burtless, Glenn Loury, James Morgan, June O'Neill, Joseph Stiglitz, and Larry Thompson. Finally, I am indebted to the Department of Labor and the National Science Foundation, which have supported our research. The research reported here is part of the NBER's research program in Pensions. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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ABSTRACT

An economic theory of public and private pensions is developed, and the implications of the theory are compared with some empirical evidence, of both the econometric and casual varieties. Among the questions addressed are: why are there private pensions? why have they grown so rapidly in recent decades? why do they have the particular features that they do? why does the government intervene by regulating the provisions of private pensions and mandating a public pension system? what are the effects of private and public pensions on savings and retirement decisions?

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1. Introduction

The extraordinary growth of both private and public pensions is one of the outstanding developments of the postwar American economy. As late as 1950, only 59% of the labor force was covered by social security; by 1975, 84% were covered. Social security benefit payments were only $3 billion (in 1980 dollars) in 1950; by 1980, they were up to $119 billion.

Private pension growth has also been explosive: coverage doubled from 1950 to 1975.[1] Contributions to private pension plans increased from $2 billion (or $5 billion in 1975 prices) to $32 billion over this same period, and the fraction of payroll expenses accounted for by pensions rose by about one half.[2] All this amounts to a major structural change in the nature of employee compensation.

Recently, there has been a great outpouring of public policy interest in our nation's pension system. Social security has been examined and reexamined repeatedly over the past decade. Some sort of major overhaul is all but inevitable because the system is probably not financially viable as presently constituted, and several suggestions for sweeping reform have been made. Recent years have also witnessed important public policy interventions into

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[1] The percentage of the labor force covered by a private pension plan rose from 16% to 33%. The percentage of private wage and salary workers covered rose from 24% to 49%. See Kotlikoff and Smith (forthcoming).

[2] Specifically, it was 3.0% in 1951 and 5.5% in 1975. See Kotlikoff and Smith (forthcoming).

the private pension system. The Employee Retirement Income Security Act of 1974 (ERISA) imposed a web of regulations on private pensions. The Age Discrimination in Employment Act of 1977 raised the minimum age for mandatory retirement. Both of these acts represent substantial efforts by government to alter the equilibrium that arises from a free market in pensions.

Several sets of questions are raised by these developments, questions that provide the outline for this paper.

(1) Why are there private pensions? Why have they grown so much in recent decades? And why do they have the features that they do? (Section 3)

(2) What are the economic effects of pensions? On the surface, this would seem to be a well-formulated question for a publicly-imposed pension plan, but a nonsensical question for pension arrangements that arise voluntarily through markets. However, I will argue that the differences between private and public pensions in this respect are not nearly as sharp as simpleminded economic theory might suggest. (Section 4)

(3) Why intervene in the pension system? Why should we have a publicly-imposed pension system (social security) instead of relying on the free market? And why should we pass laws to regulate and change the face of the private pension system? (Section 5)

This is a long list of questions. While I will try to provide tentative answers to all of them, readers should interpret these answers as working hypotheses which, given what we now

know, seem plausible. Each and every answer offered here should be subjected to further theoretical scrutiny and subsequent empirical verification or falsification.

2. What is a Pension?

Before we plunge into the preceding list of questions, it is useful to think at a fairly fundamental level about precisely what a pension is. I find it useful to think of a pension plan as a bank account with a number of peculiar features. For example:

1. The worker normally cannot withdraw money from his account until he reaches a certain age.

2. The worker must leave his firm in order to start making withdrawals.

3. The amount of money that can be withdrawn may depend not only on how much has been "deposited," but also on the life-cycle time patterns of both wages and hours of work. That is, most workers have defined benefit, not defined contribution, pension plans.[1]

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[1] In a defined benefit plan, benefits are related to earnings in some particular years (example: benefits might be a fraction of earnings during the last five years of employment). In a defined contribution plan (like TIAA-CREF), some portion of wages is invested in a fund, and benefits depend on the earnings of the fund's investments. In 1977, almost three-quarters of workers covered by private pensions were in defined benefit plans even though the majority of plans were defined contribution plans. (The defined benefit plans are, on average, much larger.) See Kotlikoff and Smith (forthcoming).

4. Only a small fraction (often zero) of the accumulated balance in the account can be taken as a lumpsum payment upon retirement. For the most part, withdrawals must take the form of annuity payments. Thus use of this bank account is tied to the purchase of insurance against longevity.

5. A worker who leaves his firm too soon (before the pension is "vested") may lose the entire balance in his account.

6. Pensions are very often not "portable" from one employer to another.

7. Individual workers typically have no discretion over how much is deposited into their pension account.

While not every private pension plan has each of these features, they are quite typical. These aspects of pensions, all of which need explaining, have several fairly obvious implications.

First, items 1, 2, and 4 imply that saving in the pension fund is almost uniquely suited to retirement purposes. Pension wealth normally cannot be used for bequests (except for inter-spousal transfers), does not provide a precautionary balance that can be used for a "rainy day," and probably does not confer what might be called "King Midas benefits"--the power and psychological satisfaction that some people derive from accumulation of wealth. For these reasons and others, it is unlikely that private pension wealth is a perfect substitute for fungible wealth.

Second, items 5 and 6 imply that pensions create a cost of changing jobs that would not exist in their absence. They thereby reduce labor mobility, and probably not by accident.

Third, items 2 and 3 strongly suggest that a pension plan might distort the life-cycle pattern of labor supply, including the decision to retire.

Each of these suggestions will be considered at length in Sections 3 and 4. But, first, I conclude this section by comparing our public pension system--social security--with the list of stylized facts about private pensions.

1. Social security benefits also cannot be drawn before a certain age (either 62 or 65).

2. A worker does not have to leave his firm to collect benefits, but most workers will have to reduce their hours of work sharply in order to collect.

3. Social security is a defined benefit plan, similar to many private pensions.

4. Social security retirement benefits are paid strictly as annuities, though these are currently indexed annuities.

5. Social security benefits are vested after a minimum period in covered employment (now 10 years).

6. Social security pensions are completely portable within the covered sector (which by now encompasses the vast majority of the private sector).

7. Workers have absolutely no discretion over the level of "contributions" to social security.

Without trying to address the chicken-egg problem until later, I suggest that the main fact that emerges from this comparison is the similarity between social security and private pensions,

not the difference.

3. The Economic Theory of Pensions

Why are there private pensions, and why do they have the features that they have?

3.1 A Modigliani-Miller Theorem for Pensions

It is easy enough to see that in the frictionless and rather barren world of standard neoclassical economic theory, pensions would simply be irrelevant. That is, no worker would care how much (if any) of his earnings were deposited into the pension fund; for every dollar accumulated in the pension fund, the worker would simply reduce his private wealth holdings by $1; lifetime work patterns, and in particular the retirement decision, would be unaffected by pensions.

The "proof" of what might be called the neutrality of pensions follows rather simply from five assumptions.

A1: There is no uncertainty of any kind.

A2: There are no taxes, no governmentally-imposed pension system, and no laws regulating private pensions.

A3: Capital markets are perfect.

A4: Every worker is paid, in the form of explicit wages (w) plus contributions to his pension fund (p), an amount precisely equal to the value of his marginal product. (Implicit in this statement are the notions that pensions are defined contribution plans and that the labor market is a spot market.)

A5: No job has compulsory retirement; nor is it necessary to retire in order to receive pension benefits.

It is not hard to see why pensions are neutral in such a world. To the firm, \$1 in w and \$1 in p are obviously equivalent, for in one case it pays the \$1 to the worker while in the other it pays the \$1 into an account with the worker's name on it. It is irrelevant to the firm that the \$1 paid into the pension fund must remain there for some years, so long as it is certain that the worker eventually will get it. To the worker, if R is the age at which he will retire and t is his present age, each dollar of pension benefits paid on his behalf now will be worth $(1 + r)^{R-t}$ at retirement, where r is the rate of interest. With no uncertainty and perfect capital markets, the worker compares this with a dollar of wages by computing its present discounted value, which, of course, is precisely \$1.

Do pensions affect savings? No. Compare two workers who are identical in all respects except that worker A receives W_t in wages and has no pension, while worker B receives w_t in wages and p_t as a pension contribution. By assumption A4, $W_t = w_t + p_t$ each year. Because of the pension plan, worker B is forced to save a portion p_t of his earnings, while worker A is free to save as much or as little as he pleases. But this "coercion" cannot affect worker B's behavior if capital markets are perfect. So long as it is actuarially fair, the pension

fund simply redistributes a portion p_t of earnings at age t to income at age R without changing lifetime income. Such redistributions through time can have no effect on the desired pattern of consumption, which depends only on the present value of lifetime income.[1] If worker B has financial savings of his own, he can simply withdraw p_t from his bank account and put himself in precisely the same position as worker A. If he has no assets, he can borrow p_t (paying an interest rate r), and end up once again in the same position as worker A. For when he is age R, he will receive $p_t(1 + r)^{R-t}$ from his pension fund, which is precisely what he will need to repay the loan. Thus, non-pension saving must offset any pension saving on a dollar-for-dollar basis.

Neither can pensions affect work and retirement decisions. Utility maximization requires that the marginal rate of substitution between leisure and income be equated to the wage rate at the optimum.[2] As we have seen already, workers consider only the sum $w_t + p_t$, and are not concerned about its division. Hence their lifetime pattern of labor supply--including their plans for retirement, if any--cannot be affected by a pension which does not alter the lifetime profile of $w_t + p_t$.

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[1] This is the basic insight of the life cycle-permanent income theory of consumption.

[2] This is a familiar condition from static labor-leisure choice theory. Blinder and Weiss (1976) show that it holds equally well in a dynamic optimization model of the life cycle, if there is no human capital formation.

3.2 Reasons for the Nonexistence of Pensions

Now I begin to add some realistic ingredients, and stir the soup. The aspects of realism added in this section strongly suggest not only that pensions are not neutral, but that pensions should not exist! This may seem strange, since we know that private pensions do exist. But it is worth recalling that, for all practical purposes, private pensions were of minor importance in the days before social security.[1] A good theory should explain not only why pensions now exist (and have grown rapidly), but also why there were so few before World War II.

Imperfect Capital Markets

Under the assumptions of the irrelevance proposition, workers and firms are both indifferent among all combinations of w_t and p_t that keep $w_t + p_t$ constant. Graphically, firms and workers both have "indifference curves" that look like the straight line AB in Figure 1. There are many real-world complications that interfere with this simple picture. The first one I will consider is an imperfect capital market.

One type of imperfection is that the interest rate earned on lending may be less than that paid on borrowing. Another type is that a person whose assets are below some lower limit (possibly zero) may be denied credit. The basic point is that

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[1] For example, in 1939 there were only 659 qualified private pension plans. For comparison, in 1980 there were 616,642 such plans! See Kotlikoff and Smith (forthcoming). However, it seems likely that there were more pension plans in 1929 than in 1939. The Great Depression bankrupted many plans. On this, see Munnell (forthcoming, Ch. 2).

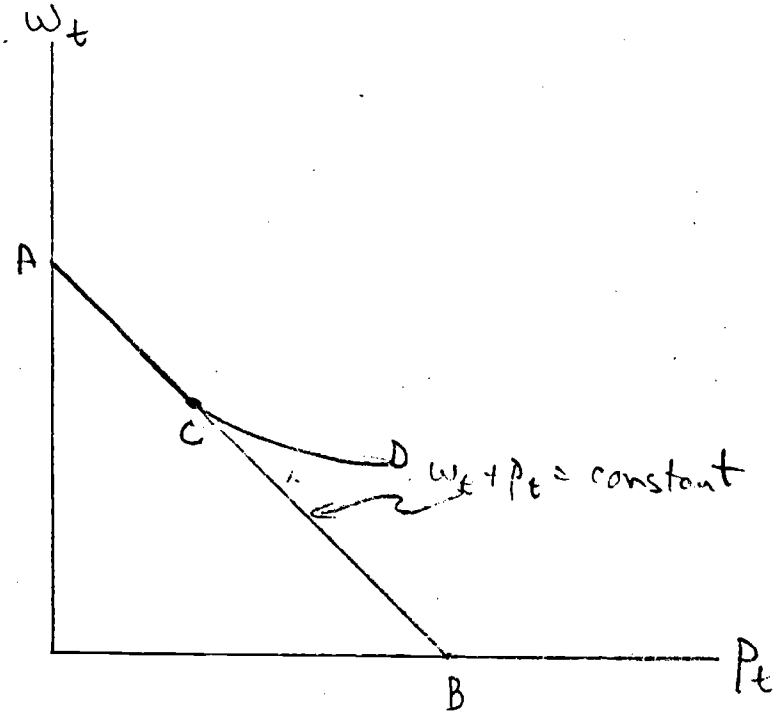

Figure 1

when capital markets are imperfect, pensions are no longer a perfect substitute for private financial assets.

To see why, consider the case of a worker who has p_t deposited into his pension fund and seeks to borrow against it. If he must pay an interest rate r', which is higher than the rate at which the pension fund is accumulating (r), he will owe $p_t(1 + r')^{R-t}$ when the loan comes due, but will receive only $p_t(1 + r)^{R-t}$ from the pension fund. He therefore cannot borrow enough to duplicate the consumption pattern of a worker who has no pension. In more extreme cases, he may not be able to borrow at all. Such a worker will not want a pension.

So capital market imperfections can destroy the neutrality of pensions. But this need not happen. First, capital market constraints may not be binding. If the forced pension savings are always less than what the worker would have saved on his own anyway, then the pension remains irrelevant. Curve ACD in Figure 1 is the indifference curve for a worker subject to borrowing constraints. To the left of C, the constraints are not binding. But as the pension grows bigger it creates more and more burdensome constraints on his consumption, and so becomes progressively less valuable. So "small" pensions remain neutral, but "big" ones are not.

Second, however, and more fundamentally, the size of the pension plan is a choice variable, negotiated between the worker and the firm. One would expect workers to shun pension plans that push them beyond point C. Third, we must balance these imperfections against the economies in transactions

costs and diversification that a pension fund can achieve for a worker-investor, and the fact that pension funds can purchase annuities on better terms than individuals can. These too are capital market imperfections, but they enhance, rather than detract from, the attractiveness of pensions. On balance, then, capital market imperfections may not be terribly important for some workers.

Uncertainty

The reader may have noticed that nothing in my specification of a frictionless world required that pensions be vested, portable, or funded; these characteristics are irrelevant under certainty. But vesting, funding, and mortality risk become quite important once uncertainty is introduced. To keep things simple at first, I ignore capital market imperfections and assume risk neutrality. Pension assets present three types of risk: the risk of death before benefits are received; the risk of bankruptcy before benefits are vested and funded; and the risk of quitting or being fired before benefits are vested. Because of these risks, the expected value to the worker of a $1 contribution to his pension fund is only some number $\lambda < 1$.

If workers and firms have the same expectations, this is also the firm's expected cost of a $1 pension contribution and uncertainty does not interfere with the neutrality proposition. The worker's

indifference curves and the firm's isocost curves would both be as shown by AE in Figure 2 instead of AB: pensions would be less valuable than straight wages to workers, but also less costly to firms.

But an important asymmetry enters if workers are risk averse while firms are risk neutral.[1] Then firms continue to view λ as the cost of a $1 pension contribution, but workers view the value as:

$$\lambda_w \equiv \theta\lambda$$

where $\theta < 1$ is a risk discount factor that probably gets deeper as the size of the pension grows.[2] If so, worker indifference curves will be convex, as in Figure 2; the contract curve will correspond to the vertical axis; and the "optimal pension" will be zero.[3]

An empirical point relevant to interpreting the time series data arises here. One of the outstanding facts of macroeconomic history is that the business cycle has been far tamer in the postwar period than in the prewar period. The risk of bankruptcy must therefore have been lower in the postwar period. It would

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[1] This is just a strong form of the eminently reasonable proposition that workers are more risk averse than firms.

[2] θ will depend, among other things, on the covariance between the return on the pension contribution and the returns on other risky assets held by the worker (including his human capital). If this covariance is negative enough (for example, if the major risk is that his wage in alternative employment might rise, inducing him to leave the firm before vesting), then θ could exceed unity. I assume that this is not the case in Figure 2, but the argument that follows does not rest on this assumption.

[3] Note that the source of the nonexistence of pensions here is not uncertainty, but an asymmetry arising from risk aversion. Asymmetry could arise for other reasons as well. For example, management could be more optimistic about the firm's prospects than workers. Or, if management fails to pierce the corporate veil, it may do its planning on the assumption that the firm will survive, whereas workers may not. There are moral hazard problems in that the firm can influence the probability of its own survival and both parties can influence the probability of a job separation prior to vesting.

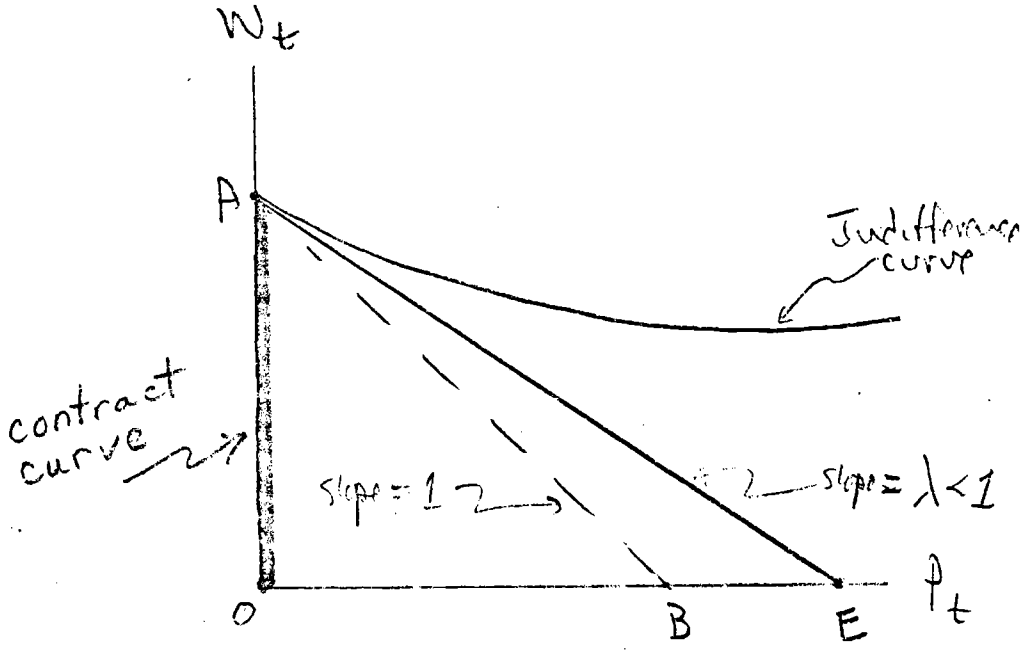
W_t
A
Indifference curve
contract curve
slope = 1
slope = $\lambda < 1$
O
B
E
P_t

Figure 1

not surprise me if perceived bankruptcy risk had fallen steadily over the period, say, from 1950 to 1974. If so, then θ was probably rising. If these surmises are correct, then the principle reason for not having a pension plan was growing weaker over time. This may be one factor contributing to the postwar growth of pensions.

3.3 Reasons for the Existence of Pensions

But surely we can do better than this, and isolate some affirmative reasons why workers and firms would want pensions. I start with the workers, and with some obvious tax incentives favoring pensions.

Tax Advantages

First, and most important, by placing a portion p_t of total compensation into a pension fund, the worker can defer taxes. Especially, for workers far from retirement, this deferral can amount to an enormous saving because assets in a pension fund accumulate at the tax-free rate of interest, r, while savings in standard financial assets accumulate at the after-tax rate of interest, $r(1-\tau)$. (Here τ is the income tax rate prior to retirement.) Specifically, \$1 of earnings that is taxed, and then placed in a bank account, grows to $(1-\tau)[1 + r(1-\tau)]^{R-t}$ at retirement. But \$1 that is placed in a pension fund and taxed (at rate τ') when

it is withdrawn grows to $(1-\tau')(1 + r)^{R-t}$.

Second, when the tax is finally paid at retirement, no payroll tax is due and most workers will be in lower tax brackets than they were during their major earnings years. So $\tau' < \tau$ for most workers and some of the tax is not merely deferred, but actually rescinded.

Table 1 indicates the tax savings from a pension fund for various values of r, τ , and R-t under the assumption that $\tau' = \tau - .10$. The tax advantage of pensions is often quite impressive.

Putting this factor into the context of the previous discussion, the worker's marginal valuation of a $1 pension contribution rises to:

$$\lambda_W = k\theta\lambda$$

where some sample values of k , the tax factor, are given in Table 1. Since k can be much greater than unity, / λ_W can now be larger than 1.0 for workers who are young or in high tax brackets; and it is certainly quite possible that $\lambda_W > \lambda$. A demand for pensions will arise whenever $k\theta > 1$, which will happen when workers are highly taxed and not too risk averse.[1]

Figure 3 shows how an optimal pension can be determined in this case. The worker's indifference curves, which looked like AD before the tax distortion entered, now look like AF instead. The optimal division of total compensation between w_t and p_t will now be defined by a tangency between an indifference curve like AF and an isocost line like AE.

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[1]The average age of employees has an ambiguous effect. On the one hand, young workers have higher k, ceteris paribus. But on the other hand they will be farther from the vesting and retirement ages and hence will have lower θ.

Table 1

Accumulated Value at Retirement of $1 Saved in a Pension Fund

Relative to that of $1 Saved Outside a Pension Fund*

Tax Rate / Years to Retirement	r = 4%		r = 8%		r = 12%	
	τ = .20	τ = .40	τ = .20	τ = .40	τ = .20	τ = .20
10	1.22	1.36	1.31	1.58		
20	1.32	1.59	1.52	2.12		
30	1.42	1.86	1.76	2.87		
40	1.53	2.17	2.05	3.89		

* Computed as $\left[\frac{1-\tau+0.1}{1-\tau}\right]\left[\frac{1+r}{1+r(1-\tau)}\right]^{R-t}$.

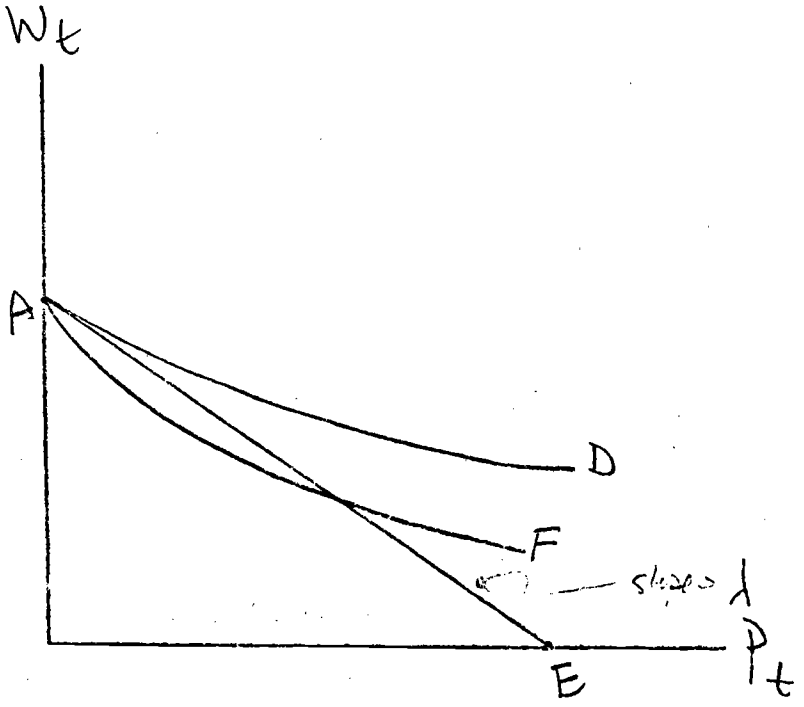

Figure 3

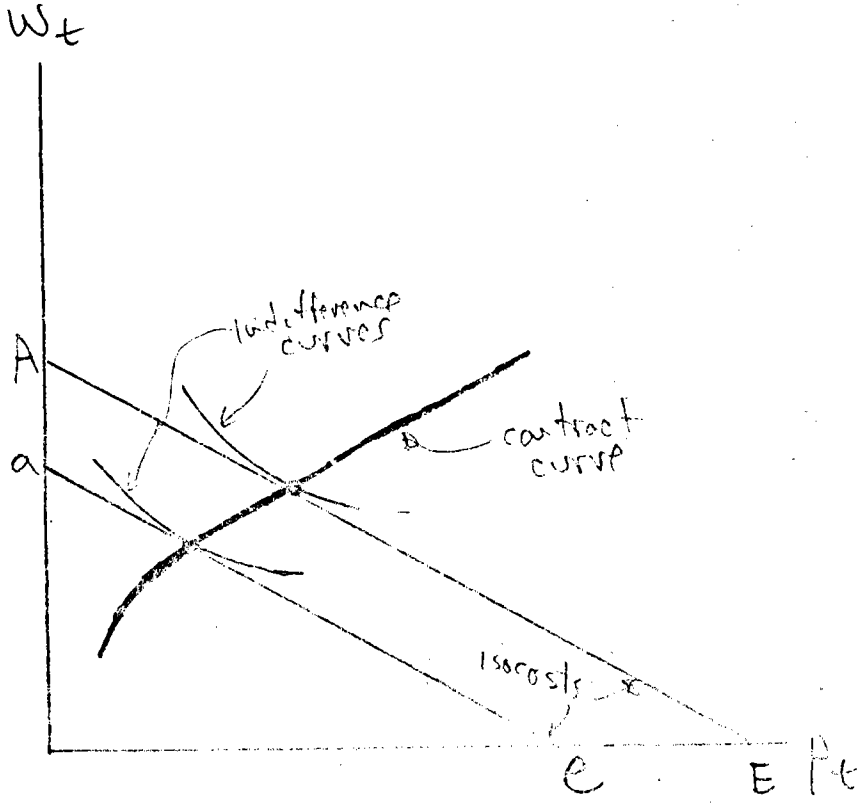

Figure 4

Figure 4 shows what the resulting "contract curve" might look like. It no longer lies along the vertical axis.

Once again, some pertinent empirical observations can be made. Except for very high income workers, the tax distortions favoring pensions over straight wages were negligible prior to World War II simply because the income tax was negligible. This is a major difference between the prewar and postwar periods which helps explain why pensions were absent before World War II and blossomed thereafter.[1] In addition, typical marginal income and payroll tax rates on earnings have increased over the postwar period, thus exacerbating the tax advantage. More importantly, nominal interest rates have increased phenomenally. You can see in Table 1 that the tax advantage of pensions is greater at higher nominal interest rates. Finally, it is fascinating to observe that the growth in private pensions seems to have slowed during the second half of the 1970s--just about the time that Individual Retirement Accounts (IRA's) enabled workers to avail themselves of the same tax benefits without formal pensions.[2]

Pensions and Labor Turnover

The tax structure can explain why workers might demand pension plans. There are also, however, motives for firms to

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[1] In addition, 1942 amendments to the Internal Revenue Code clarified the conditions under which pension contributions were tax deductible business expenses to firms despite not being taxed as personal income. This led to a spurt in the rate at which new pension plans were being established. See Mamnell (forthcoming, p. 10).

[2] I would not want to push this point too hard, though. ERISA, with its higher fiduciary standards and burdensome administrative requirements, came in about the same time. Growth of real wages also ended at about this time. We have more explanations than we know what to do with.

supply pension plans, that is, factors which effectively reduce the marginal cost of pension contributions below λ .

The basic premise is that firms have strong incentives to discourage labor turnover, especially among experienced workers. There are many justifications for this premise. For example:

1. Transactions costs in recruitment and hiring make it desirable to have low quit rates.

2. Firms may have difficulty in estimating the ability of workers outside the firm. Since employers have greater knowledge about their own workers than about prospective workers, there is a cost saving in keeping workers attached to the firm.[1]

3. Some jobs involve fiduciary or other types of responsibility. One way to increase the incentives for a worker to be honest (and not to shirk) is to set aside part of his wages in a pension, to be paid only if the worker stays on the job long enough.[2]

4. Firms may invest in workers, teaching them skills that are specific to the firm. Workers must then be induced to remain with the firm long enough for the firm to recoup its investment costs.

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[1] On this, see Stiglitz (1975) and Lazear (1979).

[2] On this, see Becker and Stigler (1974).

Each of these phenomena leads to essentially the same conclusion: every worker represents a piece of (human) capital owned by the firm; if he quits, he destroys some of the firm's capital.[1] Firms will therefore have an incentive to draw up a compensation scheme that reduces mobility; and pensions are a convenient way of doing this.

For the sake of concreteness, I will adopt the fourth item on the preceding list, and assume that firms want to reduce labor mobility because experienced workers have <u>specific human capital</u> that is valuable within the firm but not outside it. As has been well-known since Becker (1964), the worker cannot be expected to bear the costs of these investments in human capital. Instead, the firm must bear the costs by paying the worker a total compensation W_t that exceeds his marginal product MP_t at young ages. This is shown in Figure 5, where the W_t profile is above the MP_t profile from age 0 to age t_0.

In order to recoup these costs, the firm must assure itself that it will have the services of the worker for a good number of years. Since long-term labor contracts are unenforceable (and sometimes illegal), the firm must provide a financial incentive to persuade the worker to remain on the job. One way to "buy" the desired insurance from the worker is to pay

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[1] Much the same can be said the other way around. Because of transactions costs, search costs, etc., a firm imposes a capital levy on a worker if it fires him.

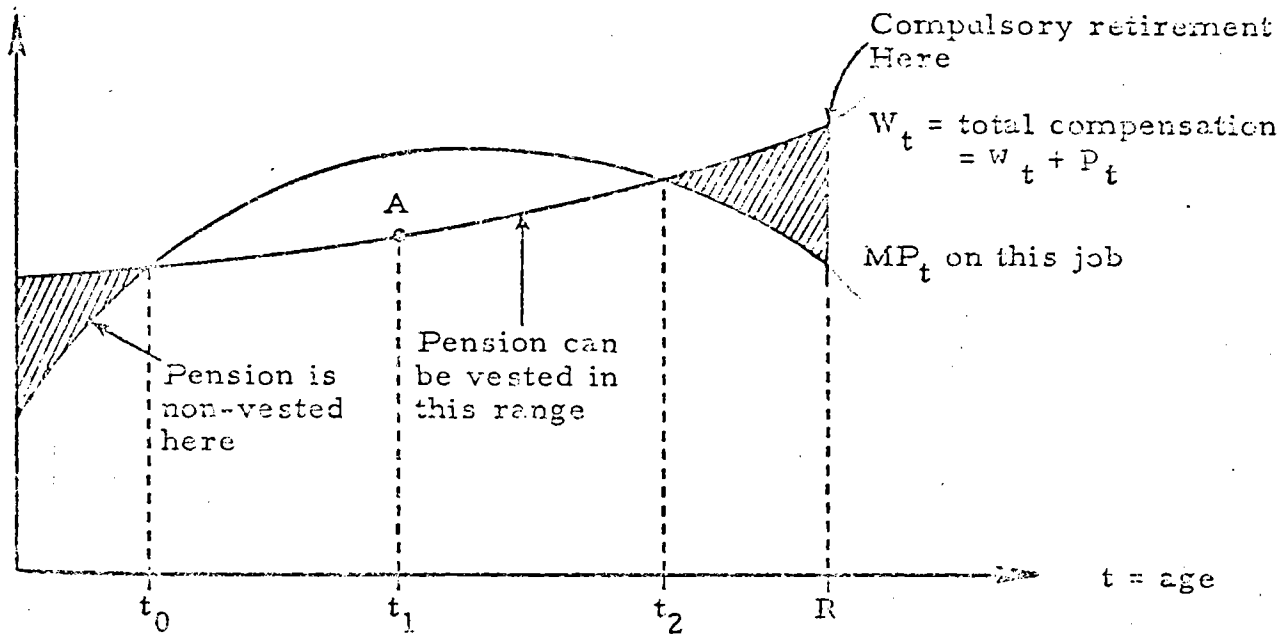
Compulsory retirement Here
W_t = total compensation
$= w_t + P_t$
A
MP_t on this job
Pension is non-vested here
Pension can be vested in this range
t = age
t_0
t_1
t_2
R

Figure 5

part of the worker's total compensation, p_t, into a pension fund which remains non-vested at least until the firm has recouped its investment costs, that is, until the age t_1 at which:[1]

$$\int_0^{t_1} (W_t - MP_t)e^{-rt}dt = 0 .$$

At this point the firm could vest the pension, and start to pay the worker his marginal product (that is, follow profile W_t up to point A, and then jump to profile MP_t), effectively converting the labor contract into a spot market for labor. But there are strong incentives on both sides not to do this. Since the trained worker is worth more inside the firm than outside it, there is a rent that can be gained (and shared) by keeping the worker in the firm. The firm still wants to buy insurance against quits to protect its capital. The worker may also want to buy insurance against being fired, because his marginal product outside the firm is probably far lower than his marginal product within the firm.

The gap between the worker's marginal product within the firm and his marginal product elsewhere opens up the possibility for the following sort of bargain. The worker essentially "posts a bond" that he will not quit by accepting a total compensation rate, $W_t = w_t + p_t$, which is less than MP_t in return for a promise that the firm will pay

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[1] Nothing that has been said here determines by how much W_t exceeds MP_t up until t_0 nor by how much MP_t exceeds W_t between t_0 and t_1, so long as this integral constraint is satisfied. On simpleminded views of the specific human capital problem, any paths that satisfy the constraint will do. However, Hashimoto (1981) argues that uncertainty and asymmetric information (the firms knows the worker's productivity in the firm, the worker knows his alternative wage) can remove this indeterminacy.

him more than MP_t later in his career. (Thus, in Figure 5, compensation is below MP_t until age t_2 and above MP_t thereafter.) Workers are encouraged to stick to the bargain because their wage in alternative employment is even lower than W_t. Firms, once they have received this loan from the worker, have a financial incentive to renege on the bargain. But workers can easily be protected by seniority rules that prevent the firing of experienced workers except in the direst of emergencies. Besides, firms that want to write long-term labor contracts in the future will not want to acquire a bad reputation.

There is one further important aspect of this compensation plan. Under competition, the present discounted value of the "overpayments" that the firm makes after age t_2 must be exactly equal to the present value of the "underpayments" it makes between t_1 and t_2. That is, if R is the age at which the worker retires:

$$\int_{t_1}^{R} (W_t - MP_t)e^{-rt}dt = 0 .$$

But a problem arises in enforcing this equality: the worker may not want to retire at age R. (Recall that he is being paid more than his marginal product.) If firms allowed workers to stay on beyond R, they would lose money; so some mechanism must be found to induce retirement at R (or earlier). The simplest way to do this is to include a compulsory retirement

clause in the contract. A slightly more subtle way is to make receipt of pension benefits contingent on leaving the job, and not offer actuarial increases in benefits to those who stay at work beyond age R.

To summarize this story, I visualize an implicit long-term labor contract in which the firm agrees to "overpay" the worker in his early years, "underpay" him during his most productive years, and then once again "overpay" him in his later years. The firm keeps the overpaid young workers on the job by paying part of their wage into a non-vested pension. In mid-career pensions become vested, but "underpaid" workers stay with the firm because (a) their specific skills are not transferable outside the firm, and (b) the firm makes an implicit promise to overpay them again later. Finally, the firm must terminate workers at some point so as not to pay lifetime wages that exceed lifetime marginal product.

Notice how this rather plausible story violates several of the stipulations of our Modigliani-Miller theorem. First, uncertainties about quitting or being fired are central to the argument. Second, W_t often diverges from MP_t. Third, there is either compulsory retirement or the worker must leave the job in order to collect his pension.

What makes this all work

is the underlying supposition that a long-term contract such as depicted in Figure 5 raises labor productivity. In terms of our earlier discussion of optimal tradeoffs between pension contributions and straight wages, we can conceptualize this

effect as a reduction in costs. If, as seems reasonable, there are diminishing returns, the firm's isocost curves will now be concave, as shown by AF in Figure 6. (AE is the old isocost.) The optimal pension size will now be determined by a tangency such as point B, where the slope of AF (henceforth called λ_F) is equal to λ_W. Presumably, the optimal pension is bigger on account of the productivity effect (compare points G and B).

The model makes one other interesting prediction about the nature of pension plans. During the interval between t_2 and R in Figure 5, the firm is paying workers more than their marginal product. It would like them to leave, but cannot fire them because of seniority rules or for fear of damaging its reputation. One thing the firm can do is offer workers an incentive to retire early by putting an early retirement provision into the pension plan which reduces benefits by less than the actuarially fair amount.

Empirical Evidence

How does this scenario hold up empirically? Very well, I think. For one thing, private pension plans generally make workers stay with the firm for a considerable period --sometimes as long as 20 years-- before vesting their pension rights, or rather did so before ERISA established maximum vesting periods of 5/ or 10 years. Thus pensions traditionally have been used to reduce labor turnover. Furthermore, if investment in specific human capital is the major motivation for reducing turnover (as I have

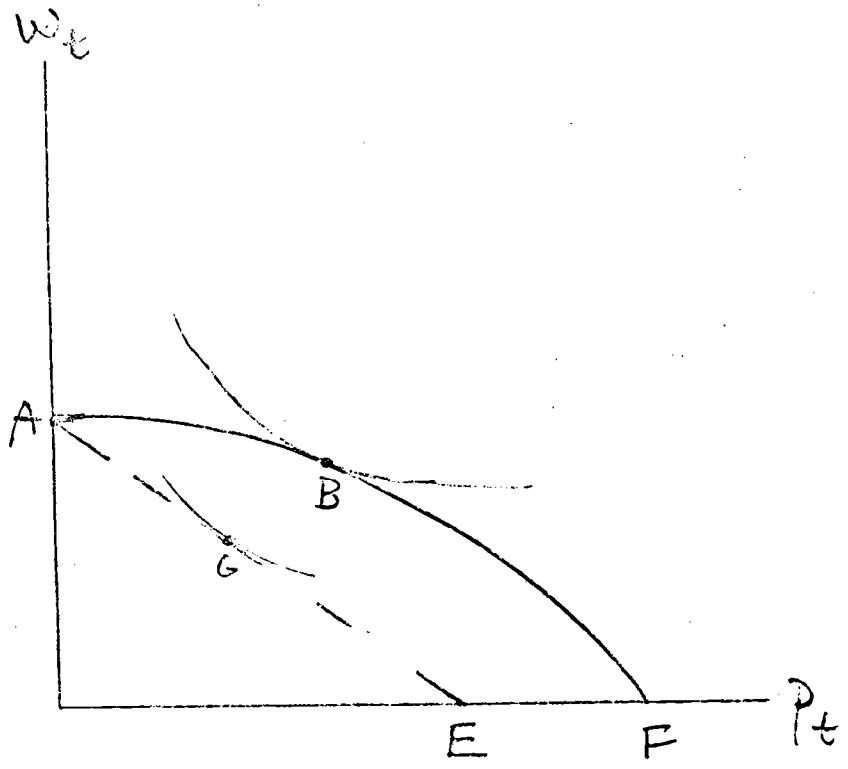

Figure 6

supposed), it is difficult to imagine the investment period (t_0 in Figure 5) being more than a year or perhaps two. If this is so, then time t_1 in the model should be no more than 2-4 years. Yet it had been common to make workers wait 10-20 years or more before vesting. Thus the vesting age exceeds t_1, as suggested by the model.

Another fundamental precept of the model is that the wages of experienced workers are far higher in the firm than on the outside. In a detailed empirical study of the wages of older men, Gordon and I (1980) found strong evidence in support of this notion. We had a large longitudinal sample of white men, which, after some cleaning up of the data, offered almost 16,000 observations on men between the ages of 58 and 67 in the years 1969, 1971, and 1973. Of these, about 10,000 cases were working men (and hence gave wage information) while 6,000 cases were retirees. We made an econometric correction for the selectivity bias inherent in the problem,[1] which turned out to be important, and estimated that a worker would suffer a substantial wage loss if he changed jobs late in life. The following example is indicative of our results. Consider an industrial worker with a 45-year work history, the last 20 of which have been spent with his current employer. According to

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[1]Specifically, workers that randomly draw "good" wages will tend to stay at work longer. Hence, as the sample ages, wage rates for the working population tend to grow relative to potential wages among retirees.

our estimates, if he changed jobs today his wage rate would decline about 24% (assuming neither job had a pension). Interestingly, if he was covered by a pension plan on his current job and switched to a job without a pension, the corresponding loss of wages would be 43%. These are large wage losses which create strong incentives to stay with the current employer.

Another crucial part of our story is the hypothesis that wages exceed marginal products late in life--and probably by increasing amounts in older ages. Here, our empirical efforts were less supportive. While our estimates ratified the basic qualitative conclusion, we obtained a rather small quantitative effect. Specifically, we guessed that, in jobs with mandatory retirement, the second crossing point in Figure 5 (age t_2) came 10 years prior to the mandatory retirement age (age R)--an arbitrary choice needed to define an empirical variable. We then presumed (a) that the variables in our equation (experience, education, occupation, etc.) measured MP_t, (b) that $W_t = MP_t$ at age t_2, and (c) that the divergence of W_t from MP_t subsequent to age t_2 was linear. Our econometric specification offered an estimate of the rate at which the two paths diverge, which turned out to be only 0.33% per year (with standard error 0.15%).[1] This would lead to a mere 3.3% gap between W_t and MP_t at retirement age--a rather small difference.

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[1]The ordinary least squares estimate was about 0.5% per year.

However, there is lots of casual evidence suggesting that firms want to encourage older workers to leave the job. For example, virtually every private pension requires that the worker leave his job if he wants to collect benefits. For workers who elect to stay on the job anyway, few private pension plans offer fair actuarial increases in future benefits as compensation for the loss of current benefits. Often there is no increase at all. Lest this financial incentive not prove sufficiently strong, about 60% of pension plans have a compulsory retirement provision.[1] Thus staying on the job past age R is either prohibited or discouraged, as the theory suggests.

On the other hand, most private pension plans allow early retirement.[2] Indeed, plans typically encourage early retirement by not reducing benefits actuarially for those who opt for early retirement. Consequently, the present discounted value of pension benefits is often decreased by staying at work.[3] This is just what we would expect firms to do if W_t exceeds MP_t for older workers, as in Figure 5.

4. The Economic Effects of Pensions

Section 3 began with a frictionless world in which the existence or nonexistence of private pensions was only a bookkeeping

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[1] See Skolnik (1976).

[2] Specifically, in 1977, 64% of all plans, covering 82% of all workers with pensions, had some provision for early retirement--generally at age 55 or 60. See Kotlikoff and Smith (forthcoming).

[3] For example, Lazear (1981) found that this was true in a study of the provisions of 244 of the largest pension plans in the country. He gave this fact, however, a different interpretation.

detail. Pensions were neutral. But once we brought such factors as uncertainty, risk aversion, capital market imperfections, taxation, and specific human capital into the model, reasons for having pensions appeared. Pension benefits became imperfect substitutes for straight wages, forced pension saving became an imperfect substitute for voluntary private saving, and pensions could alter the lifetime profile of labor supply.

4.1 The Use and Abuse of the Envelope Theorem

But something seems amiss here. Pensions are voluntary arrangements entered into by mutual agreement of workers and firms. How, then, can a pension alter anyone's saving and labor supply decisions? Pensions should be "optimized out" and hence incapable of "affecting" any other endogenous variable. Saying that a private pension "affects" an individual's savings seems, on the surface, about as meaningful as saying that a person's purchases of pastrami affect his purchases of sauerkraut. In particular, if we make the following assumption:

A6: Jobs vary in the mix between straight wages and pension contributions, and also in the nature of the pension plans; but there is a full range of choice for every worker.

then the Modigliani-Miller theorem for pensions still holds at the margin even when all the previous assumptions (A1-A5) are relaxed. If A6 holds, then pension plans will be adjusted to make $\lambda_W = \lambda_P = 1$ as shown in Figure 7; hence pensions will be irrelevant (at the margin) once again.

It is easy to see that this is so. Suppose there is a continuum of firms that offer the same total compensation per hour, W_t, but that package it differently between straight wages, w_t, and pension contributions, p_t. In such a market, workers will assign themselves to the firms whose wage-pension packages coincide precisely with their own preferences. Optimal sorting means that every worker locates himself in a firm with a pension plan that makes the marginal dollar of p_t precisely equivalent (to him) to the marginal dollar of w_t (i.e. $\lambda_W = 1$). He will see to it that his p_t stream is not so large that it makes him subject to binding capital market constraints that force him to curtail consumption early in life, and he will select a firm whose compulsory retirement date (if any) corresponds to his own preferred retirement date. Thus in full equilibrium $\lambda_W = \lambda_F = 1$.

If all the important provisions of the pension plan (benefit levels, retirement date, etc.) can be chosen optimally by the worker subject only to actuarial fairness constraints imposed by the firms, then the pension plan will be irrelevant to other decisions since, at the margin, there will be no difference between pension contributions and straight wages. Self selection by workers will insure that $\lambda_W = 1$ for all workers, and free bargaining will insure that $\lambda_W = \lambda_F$ for all workers and firms who contract with each other.

The importance of assumption A6 then, is quite clear. But we should not be seduced by the envelope theorem. The fact is that A6 is not a good approximation to the choices

actually available to workers. Workers do not have complete freedom to choose their pension plans for several obvious reasons:

1. Heterogeneity: Both workers and firms differ in ways that make their optimal pension plans differ. Some workers are more risk averse than others. Some want to save more for their old age than others. Marginal tax rates and age obviously differ. Expectations are heterogeneous among workers and among firms, and may differ between a worker and his employer. Firms differ in the amount of specific human capital they require, and in other respects listed on page 17. The list could go on and on. Clearly, each worker and each firm will have a different concept of the optimal pension.

2. Transactions Costs: Real resources are involved in setting up and administering a pension plan. These costs are largely fixed costs. Therefore, it is simply impractical to tailor a pension plan to every worker's specific needs. Furthermore, if pension funds are to avail themselves of the advantages of portfolio diversification and economies of scale in purchasing annuities, they will have to be of substantial size.

These aspects of the real world, which are so often lost sight of in economic theory, imply that any particular worker will have only a finite number of choices. Only by luck will his own optimal pension plan be among these. Most workers will have to choose among plans that are suboptimal in one or more respects. For example, the best available plan may require him to save a bit more than he wants to or to retire a little earlier than he

would like to. Any such departure from his optimal plan implies that $\lambda_W \neq 1$ for him, and exacts a cost in terms of attainable lifetime utility.[1] Yet the worker may still prefer to accept the pension plan rather than reject it (if he has that choice) because of the infra-marginal benefits from the plan. That is, the worker may be better off with the plan than without it, even though a different plan would be better still.

For example, consider the worker whose indifference curves have the shape indicated by II in Figure 7. Find the point (W in the diagram) where the slope of the indifference curve is unity. This worker would like to find a firm whose technology gives it an isocost curve that looks like AF. But maybe none exists. Or, even if one does, it may offer the pension indicated by points B or C instead. At B, the worker's $\lambda_W > 1$, so he would like a bigger pension. But he still prefers B to A (no pension). Similarly, at C he would prefer a smaller pension since $\lambda_W < 1$, but may still prefer C to A. He therefore accepts the firm's pension plan as given.

In this sense, the characteristics of a pension plan--while apparently open to free choice--retain some aspects of exogeneity to most workers. Loosely speaking, each firm will attract a labor force such that the λ_W of its median worker[2] is equal to its own λ_F. This means that some workers will have $\lambda_W > \lambda_F$ and others will have $\lambda_W < \lambda_F$. Workers close to the median worker, however, should have approximately optimal pensions ($\lambda_W \approx \lambda_F \approx 1$).

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[1] The recent development of so-called "cafeteria plans," which allow workers to choose some of the characteristics of their pension, can be seen as a response to this problem. However, my impression is that such plans are not yet prevalent.

[2] It is not strictly the median worker that calls the tune because intensity of preferences also matters.

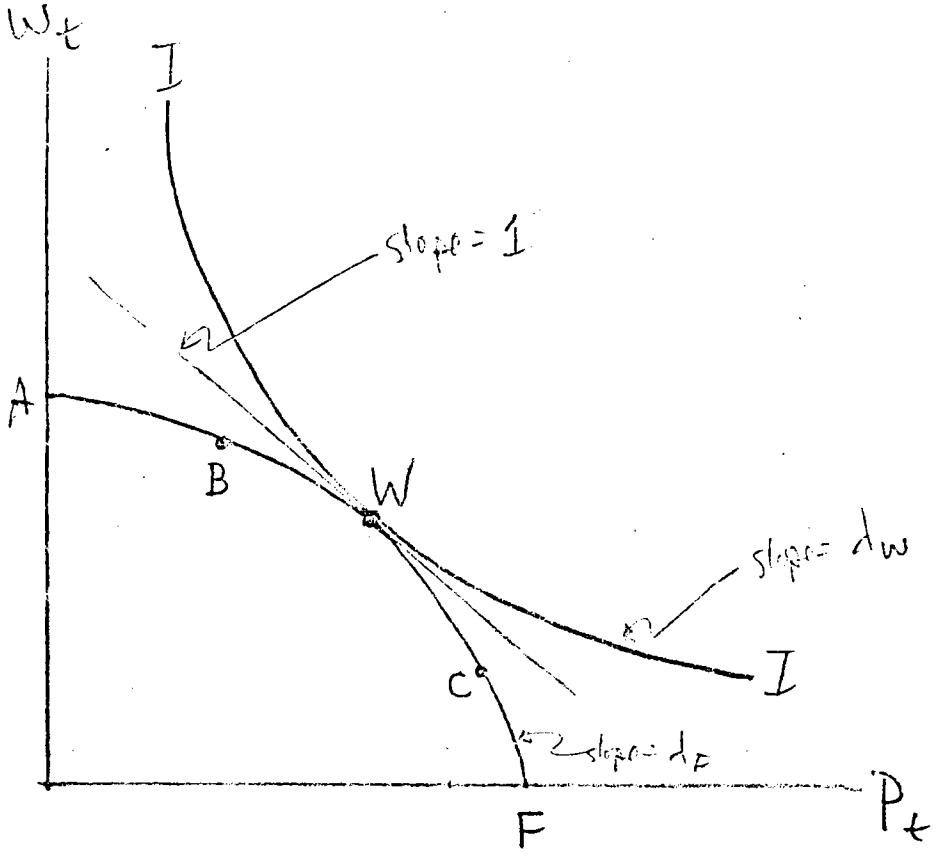

Figure 7

However, even this limited amount of optimality evaporates once we recognize that the pension plan is only one of many attributes of a job, and may be far from the most important of these. In addition to the wage and pension, workers care about such factors as fringe benefits, the nature of the tasks to be performed, flexibility of hours, geographical location, and many, many more. Given that workers and firms are heterogeneous, and transactions costs of various kinds exist, the worker cannot optimize over every dimension of the job choice, but must choose among a small number of discrete alternatives such as B and C in Figure 7. Therefore, he may find that his optimal job does not even have the pension that comes closest to being optimal for him (because, for example, he prefers a job with an inadequate pension that involves less commuting time). In extreme cases, it is even possible for a worker to accept a job where the pension plan does him more harm than good. In this more complicated (and realistic) world, even the median worker in each firm may not achieve an optimal pension ($\lambda_W \neq 1$), and firms may not be able to balance pension benefits and wages precisely ($\lambda_F \neq 1$).

The result of all this is that when we look at data from the real world, we are seeing a market equilibrium[1] in which some workers are on jobs in which they would like to see the pension

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[1] If labor markets are not in equilibrium, as they certainly are not at any particular time, things are more complicated still. Many workers will not even be on the job that is best for them when all aspects of job choice are considered.

raised because for them $\lambda_W > \lambda_F$; other workers are on jobs in which they would like to see the pension reduced because for them $\lambda_W < \lambda_F$; only a few workers are on jobs in which the pension plan is approximately right for them ($\lambda_W = \lambda_F$); and λ_F may depart from unity in many firms. These harsh realities tell us that the value of λ_W cannot be deduced from economic theory (whereas it must always be 1 in the frictionless world), but must be estimated empirically.

Our empirical work suggests that these notions of transactions costs, heterogeneity, and discrete choice may be important.

First, our estimated wage equation took the form:

$$\log(w_{it} + \lambda_W p_{it}) = f(X_{it};\beta) + \varepsilon_{it}$$

where λ_W is the marginal valuation parameter just discussed, X_{it} is a vector of determinants of marginal product (like age, education, experience, etc.), β is a vector of parameters, and ε_{it} is a stochastic error term. Our empirical estimate of λ_W was only 0.52 (with standard error 0.11)--a surprisingly low number in a sample of men aged 58 and older.[1] It really suggests that workers do not succeed in "optimizing out" their pension plans.

Other interesting findings suggest, however, that some considerable sorting does go on. According to our empirical

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[1] There is, of course, the possibility that errors-in-variables bias is severe in this case. We had to estimate p_t for each individual from data that were sometimes fragmentary.

wage equation, workers with pensions have substantially higher wages than workers on jobs without pensions, even after all the obvious determinants of wages (education, age, occupation, health, etc.) are controlled for. In addition, our empirically-estimated reservation wage equation implied that workers with pensions differed systematically from workers without pensions in their labor-leisure preferences. Having a pension seemed to serve as a proxy for a propensity to want to retire around age 65. Workers with pensions really seem different in some unmeasured way.[1]

The tentative conclusion--and here I really do want to be tentative--is that the optimal sorting process that brings the envelope theorem into play probably is operative in the real world; but it is nowhere near complete. Hence most workers end up with "sub-optimal" pensions which may, therefore, affect their saving or labor supply decisions. It is to these decisions that I turn next.

4.2 Pensions and Saving Decisions

I begin my analysis of the saving decision in the simple case where the Modigliani-Miller theorem holds, and build from there. Thus assume initially that pensions do not affect the lifetime pattern of earnings in any way (including the retirement decision), that there are no capital market constraints or tax distortions, and that saving is motivated solely by the desire

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[1] James Morgan informs me that people in the Panel Study of Income Dynamics who have pensions are more likely to plan for retirement.

to finance retirement consumption. It is easy to see, under these circumstances, that each dollar of pension savings must displace exactly $1 of fungible saving. Hence private (funded) pension plans have no effect on national saving: the worker saves in the pension fund and dissaves outside it. But social security, because it is unfunded, will reduce national saving on a dollar-for-dollar basis.

Figure 8 tells the simple story. Line BB is a budget line for a consumer who lives two periods. Point E_1 is his endowment point, corresponding to earning y_0 in period 0 ("youth") and y_1 in period 1 ("old age"). Point E_2 is the endowment point in the presence of a pension which withholds y_0-x_0 and earns the market interest rate, r. Clearly, the individual's optimum point, A, and hence his consumption in each period, c_0 and c_1, cannot be changed by the pension.

Now for some complications. First consider a constraint on borrowing that makes points on BB to the right of the endowment point unobtainable. There are two possibilities. Figure 8 depicts a case in which pension savings are <u>inframarginal</u>. The worker does not want to locate to the right of E_2, and so the capital market imperfection is irrelevant. For such individuals, the simple story remains intact. Consumption decisions and utility are unchanged by the pension.

But Figure 9 shows a case in which the pension imposes a binding capital market constraint. The individual's optimum point moves from A (an interior maximum) to E_2 (a corner), as a result of the pension. Notice that total saving increases

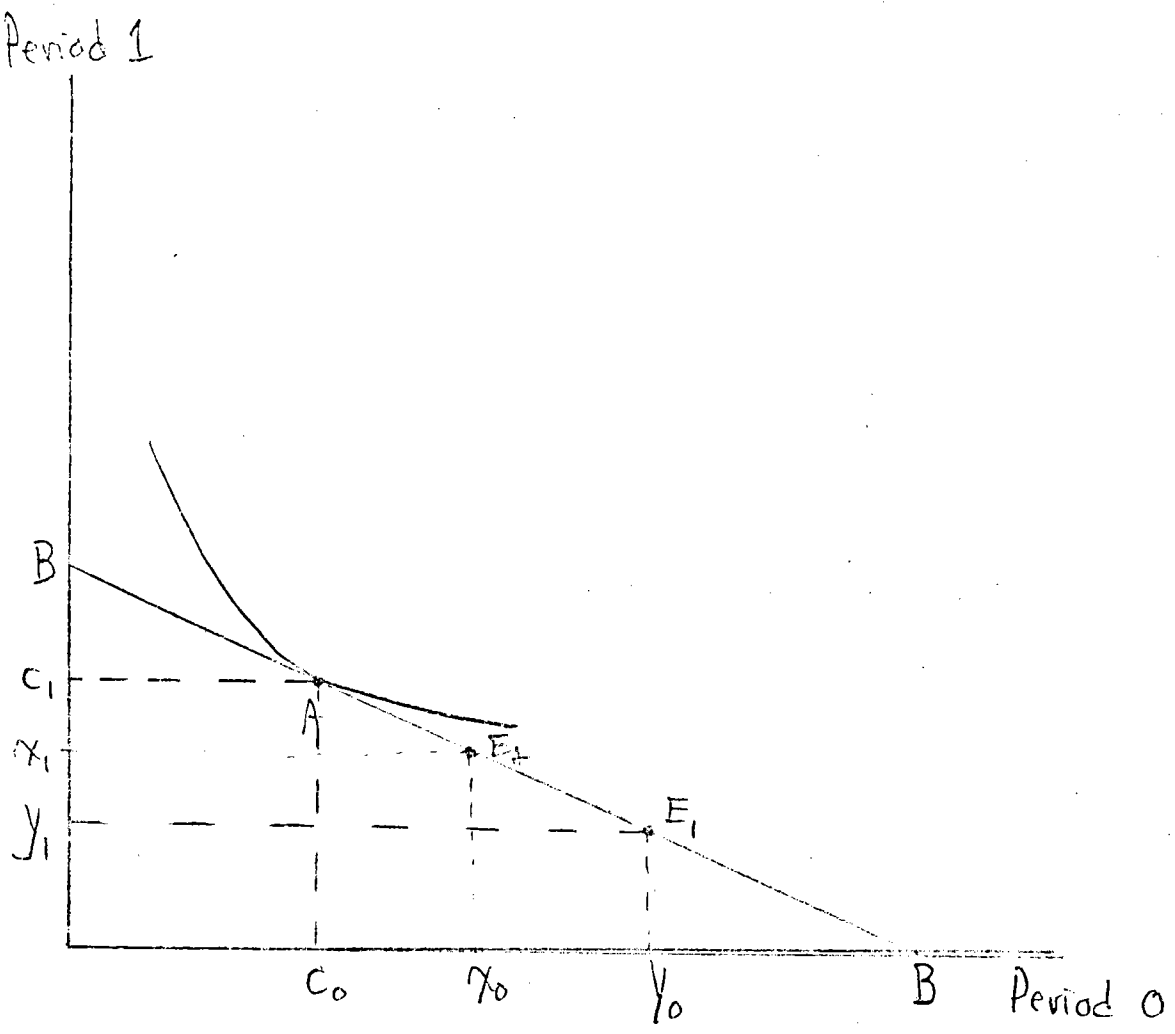
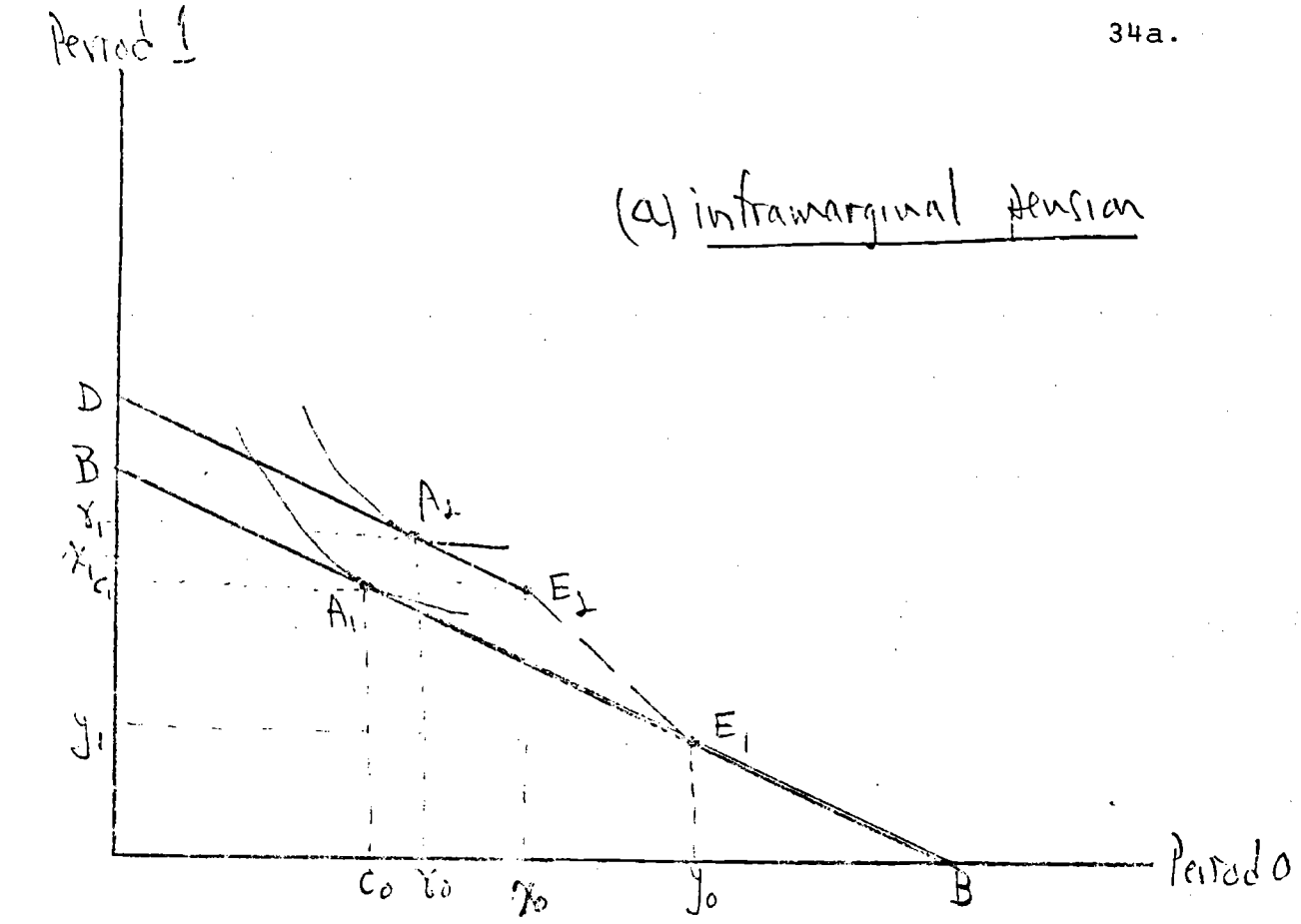


Figure 8


Period 1
(a) intramarginal tension
D
B
Y_1
$X_1 C_1$
A_2
E_2
A_1
E_1
y_1
C_0 Y_0 X_0 y_0 B
Period 0

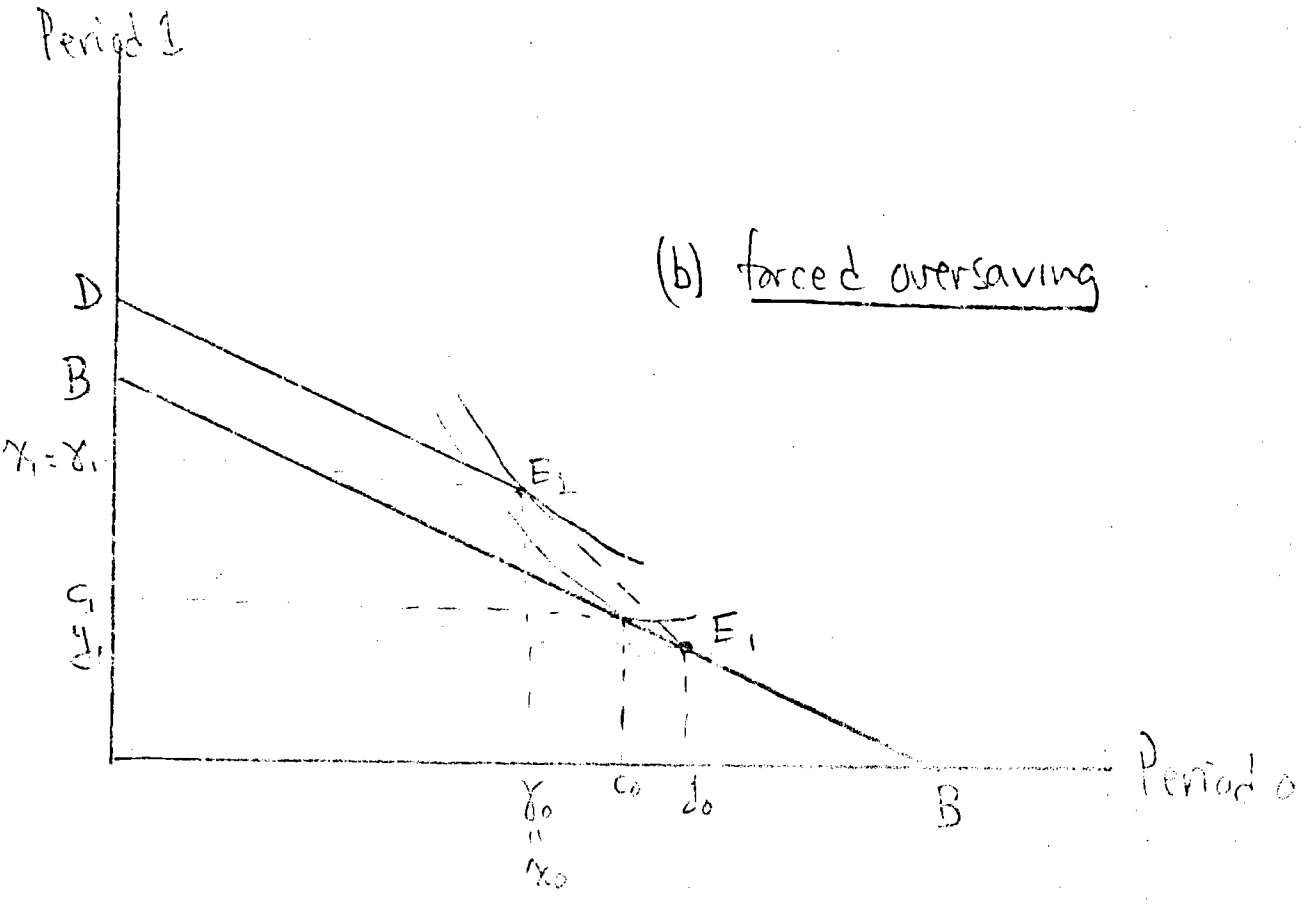

Period 1
(b) forced oversaving
D
B
$X_1 = Y_1$
E_2
C_1
y_1
E_1
Y_0
X_0
C_0 d_0 B
Period 0

Figure 10

Nonetheless, retirement consumption still rises owing to what is, in effect, a lumpsum payment equal to DB in the figure.

Panel (b) portrays the corner solution where the pension forces the individual to save more than he otherwise would. This time, c_0 falls to γ_0 and saving rises. c_1 rises to γ_1, but utility may rise or fall, depending on how large the pension is. (In the diagram, utility rises.)[1] The critical thing to notice is that if the pension contribution were \$1 bigger, c_0 would be exactly \$1 smaller; that is, private fungible saving (which is constrained to zero) cannot change, so each dollar of additional pension saving translates into an additional dollar of total private saving. Expansions in private pensions, then, raise national saving while expansions in social security have no effect on national saving.

Thus even before bringing in some other interesting possibilities--that pensions might change the retirement age, that some saving might be for bequests or for precautionary motives, etc.--we see that theory cannot resolve the issue. The impact of both private pensions and social security on national savings is an empirical issue. Several points are worth noting in this context:

1. The presence of a governmentally-imposed social security system makes it that much more likely that the forced savings inherent in private pensions might not be inframarginal, and might subject workers to binding capital market constraints.

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[1] This illustrates an earlier point. A worker may gain from a pension plan that is suboptimal.

Thus full displacement (at the margin) of private fungible savings by either public or private pension contributions is made less likely by a large social security program.

2. Social security wealth is quite large for the typical individual. Gordon, Wise, and I (1981a) found that, for a typical white man aged 60-65 in 1971, social security wealth amounted to about 7% of lifetime earnings. By comparison, private pension wealth amounted to only about 1¼% of lifetime earnings, and all financial assets (including life insurance) averaged about 3½% of lifetime earnings. Thus social security wealth was, on average, twice as large as financial wealth.

3. The tax distortion favoring pension savings is quite large (as Table 1 showed), suggesting an income effect which is hostile to saving (Figure 10a).

Now for some further complications. First, a pension plan might induce the worker to retire earlier than he otherwise would. I have already suggested in Section 3 that private pensions are likely to have this effect. If so, workers will put away more money for retirement. Many people have also claimed that social security induces early retirement. My reasons for doubting this claim are explained in the next section. On balance, however, this possibility militates against displacement of private savings by pensions.

Second, there is the bequest motive for saving. If pensions entail an income effect, as I have suggested they do, workers with a bequest motive may be induced to raise their desired bequest, and hence to reduce their private fungible saving by

less than the previous analysis suggests. As is well known, Barro (1974) has argued that this effect is so strong that social security has no net effect on national saving. We need not take the argument to extremes, however, to realize that it, too, militates against full displacement.

Third, in a world of uncertainty in which a need for financial assets may suddenly arise and borrowing possibilities are limited and expensive, illiquid pension wealth may be a very poor substitute for private fungible wealth. This again leads us to expect that $1 in pension wealth offsets less than $1 in fungible wealth. In the case of social security, however, there is at least one factor that points in the opposite direction: social security provides indexed annuities, which are virtually impossible to buy on the private market. For this reason, $1 of social security wealth may be "worth" more than $1 in private retirement savings.

For all these reasons, and others I have not mentioned, theory will tell us little about how much private fungible wealth "should be" displaced by $1 of social security wealth or $1 of private pension wealth. But we should not be surprised if displacement is rather small.

Before considering the econometric evidence that we have obtained, it is worth looking at the stylized facts. Comprehensive nationwide data on private pension contributions by employers are available in the national income accounts for the years 1948-1979.

as a fraction of disposable income
and are depicted/in Figure 11. This was a period of great change. In 1948, pension contributions constituted only 11% of personal saving. By 1979, they accounted for 64%. Yet over this 30-year period the ratio of personal saving to disposable income (DI) showed no trend. Over the first five years of the period (1948-1952) it averaged 6.02%; over the last five years (1975-1979), it averaged 6.33%. As the ratio of private pension contributions to DI rose from 0.84% to 2.94%, the ratio of private nonpension savings fell from 5.18% to 3.39%. This crude look at the data certainly makes us think seriously about dollar-for-dollar displacement as a serious possibility.

contributions (excluding Medicare)
Social security/also expanded rapidly over this period, rising from 0.9% of DI in 1948 to 6.4 % of DI in 1979. Yet, private savings did not fall. At least at the level of crude empiricism, social security does not appear to have displaced private saving to any great extent.[1]

Now the previous two paragraphs hardly constitute a serious empirical look at the displacement issue. Gordon, Wise, and myself (1981a) set out to see what could be learned about the displacement of nonpension savings by private and public pension saving from a large cross-sectional sample of people near retirement age. But, the task turned out to be far more difficult than we

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[1]This would appear to contradict the well-known time series results of Feldstein (1974, 1980). In fact, Feldstein's results are open to serious question (see Leimer and Lesnoy (1980, 1981)). And not even Feldstein has purported to find displacement in the postwar period.

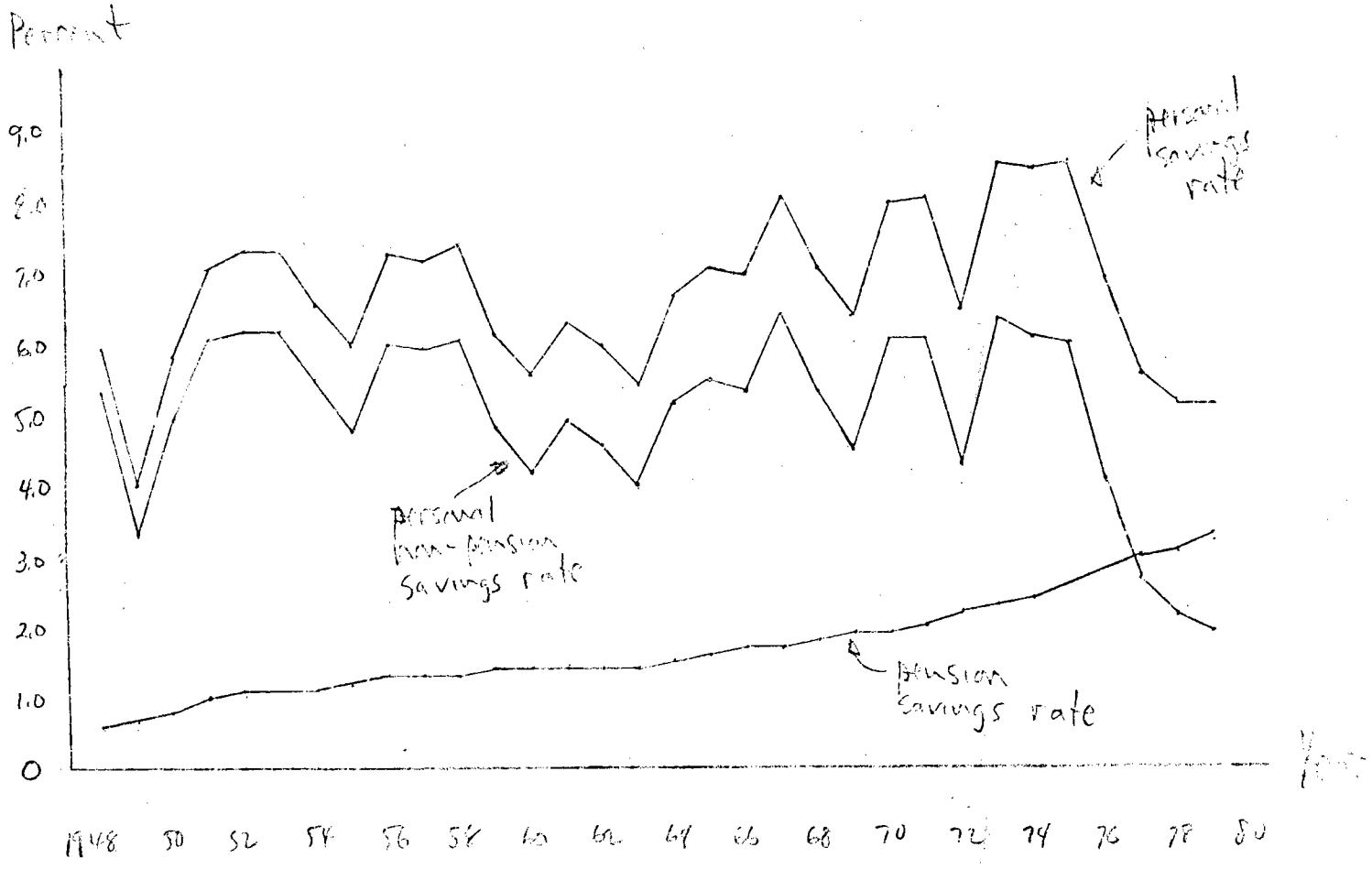
Percent
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
Personal savings rate
Personal non-pension savings rate
Pension savings rate
1948
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
80

Figure 11

imagined. Frankly, I think we failed to measure the effects we were interested in. But the reasons for our failure are instructive.

Our vehicle for investigating individual savings behavior was the life-cycle hypothesis (LCH) of Modigliani and Brumberg (1954). Under certain simplifying (but quite standard) assumptions, this model can be written as:

$$(4.1)\quad \frac{(A_t+Y_t)(1+r)^{-t}}{(A_0+Y_0)} = \frac{\sum_{i=t}^{T}(1+\mu)^i N_i + B}{\sum_{i=0}^{T}(1+\mu)^i N_i + B},$$

where t is age, A_t is assets, Y_t is the discounted present value of earnings from age t <u>forward</u> (human wealth), N_t is the number of adult equivalents in the household when the head is age t, B is the number of adult equivalent years of consumption planned for the bequest (assumed to depend on the number of children, but not to vary with t), and μ is a constant embodying both discounting and any desired growth trend in consumption over the life cycle.

The interpretation of (4.1) is straightforward. The lefthand side is the fraction of original lifetime resources that remain available at age t. The denominator of the righthand side is the number of adult equivalent years of consumption (properly discounted and embodying any desired trend) in the family's entire life cycle; and the numerator is the corresponding concept from age t forward. Thus (4.1) is just a statement of optimal lifetime planning.

Our original idea was to investigate the effects of private and public pension wealth on private fungible wealth by disaggregating A_t into financial wealth (A'_t), private pension wealth (PPW_t), social security wealth (SSW_t), and net holdings of real estate (RE_t), and then estimate the displacement parameters λ_1 and λ_2 in:

$$(4.2)\quad A'_t + Y_t = \left[\frac{\sum_{i=t}^{T}(1+\mu)^{i}N_i + B}{\sum_{i=0}^{T}(1+\mu)^{i}N_i + B}\right](A_0+Y_0)(1+r)^t - \lambda_1 SSW_t - \lambda_2 PPW_t - \lambda_3 RE_t$$

Our experience in trying to estimate (4.2) was sobering.

First, we learned that the likelihood function was amazingly flat considering that our sample had over 4100 observations and that there was plenty of variance in all the independent variables. The data had very little ability to pin down the parameters of the life cycle theory, even though the theory was very tightly parameterized, leaving few coefficients to be estimated.

Second, the ability of the estimated model to account for cross-sectional differences in asset accumulation was trivial, as indicated by the large standard error of the regression and the miniscule R^2 .

Third, we allowed for the possibility that--contrary to what would be expected from the LCH--the planned consumption path declined abruptly in old age. We did this by replacing N_i in the <u>numerator</u> of the ratio in (4.2) by γN_i , where γ was a

parameter to be estimated. The point estimate of γ was 0.45 (with standard error 0.19), suggesting either that the marginal utility of consumption shifts down sharply in old age or that people are not saving enough to finance their utility-maximizing consumption streams. Frankly, I lean toward the latter interpretation.

In brief, instead of using the LCH as the maintained hypothesis and learning about the effects of pensions on private saving, our results cast serious doubts on the validity and usefulness of the LCH itself. It may be that economists have accepted this theory too readily.

I have not yet mentioned the point estimates of λ_1 and λ_2. We estimated $\lambda_1 = 0.39$, meaning that each \$1 of social security wealth displaces 39¢ of private wealth, and so increases the individual's total wealth by 61¢. (But national savings falls by 39¢, because social security is not funded.) But the standard error of this estimate was a whopping 0.45, making it easy to resist any temptation to draw inferences about social security. This imprecision was further evidenced by the fact that minor variations on the basic model led to wildly different estimates of λ_1. The parameter is simply not well pinned down.

The estimate of λ_2, the displacement parameter for private pensions, was even worse. The point estimate was -0.30 (standard error = 0.54), meaning that each \$1 of private pension wealth leads to 30¢ more in private fungible wealth. The λ_3 parameter for real estate wealth also obtained the wrong sign.

It is worth dwelling on these perverse findings for a minute. We certainly do not believe that, holding everything else constant, a rise in pension wealth or in the value of real estate leads to a rise in financial asset holdings. The problem is that, try as we may, we cannot hold everything else constant. There are pervasive positive correlations among all assets in a cross section of individuals. Econometric techniques try to break these simple correlations by partialling out pertinent variables. Chief among these is lifetime resources, and our proxy for this elusive variable was better than most. But even ours may not have been good enough (for example: we had no data on inherited wealth).

A second unmeasured variable is the "taste for saving," which probably differs substantially across individuals. Even holding lifetime resources constant, people with a high taste for saving will have high A'_t and high PPW_t and high RE_t, leading to negative estimated λ_2 and λ_3 in econometric models. We are not the first empirical investigators to bump our heads against the wall over this problem. And we will not be the last.

On balance, we found very little evidence to suggest important displacement of private nonpension saving by either public or private pensions. But, far more significantly, our research raises questions about whether economists have been posing this question in the appropriate way. It may well be that the life-cycle theory, for all its appeal, is not what governs individual savings decisions. Saving for bequests

for
or insurance against unforeseen contingencies seem to be the leading competing hypotheses, and they deserve a fuller airing.

4.3 Pensions and Retirement Decisions

I have already noted reasons why a private pension plan might alter a worker's life-cycle pattern of labor supply and, in particular, his retirement date. The same arguments would seem to apply, with even greater force, to governmentally-imposed pensions like social security. In this section I consider what simple economic theory has to say about the retirement decision in the presence of public and private pensions, and summarize some of our empirical findings.

Retirement Decisions with No Pensions

To highlight the effects of pensions, I begin with a case in which there is no pension. Figure 12 is a standard labor-leisure choice diagram with only one wrinkle, which I add for greater realism. I assume that the individual has only limited ability to vary his hours, so that points on the dotted portions of what we normally think of as his budget constraint (AD) are not available.[1] The height a_t represents the annuity-equivalent of the worker's assets; and the slope of BC is the after-tax wage, W_t. Several indifference curves are shown in the diagram; I assume that higher letters indicate older ages.

Three things may happen as the individual ages. First, aging may cause the indifference map to shift in a way that is

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[1] In fact, his choices are probably even more limited than this. He may be able to choose among only a few isolated points on BC.

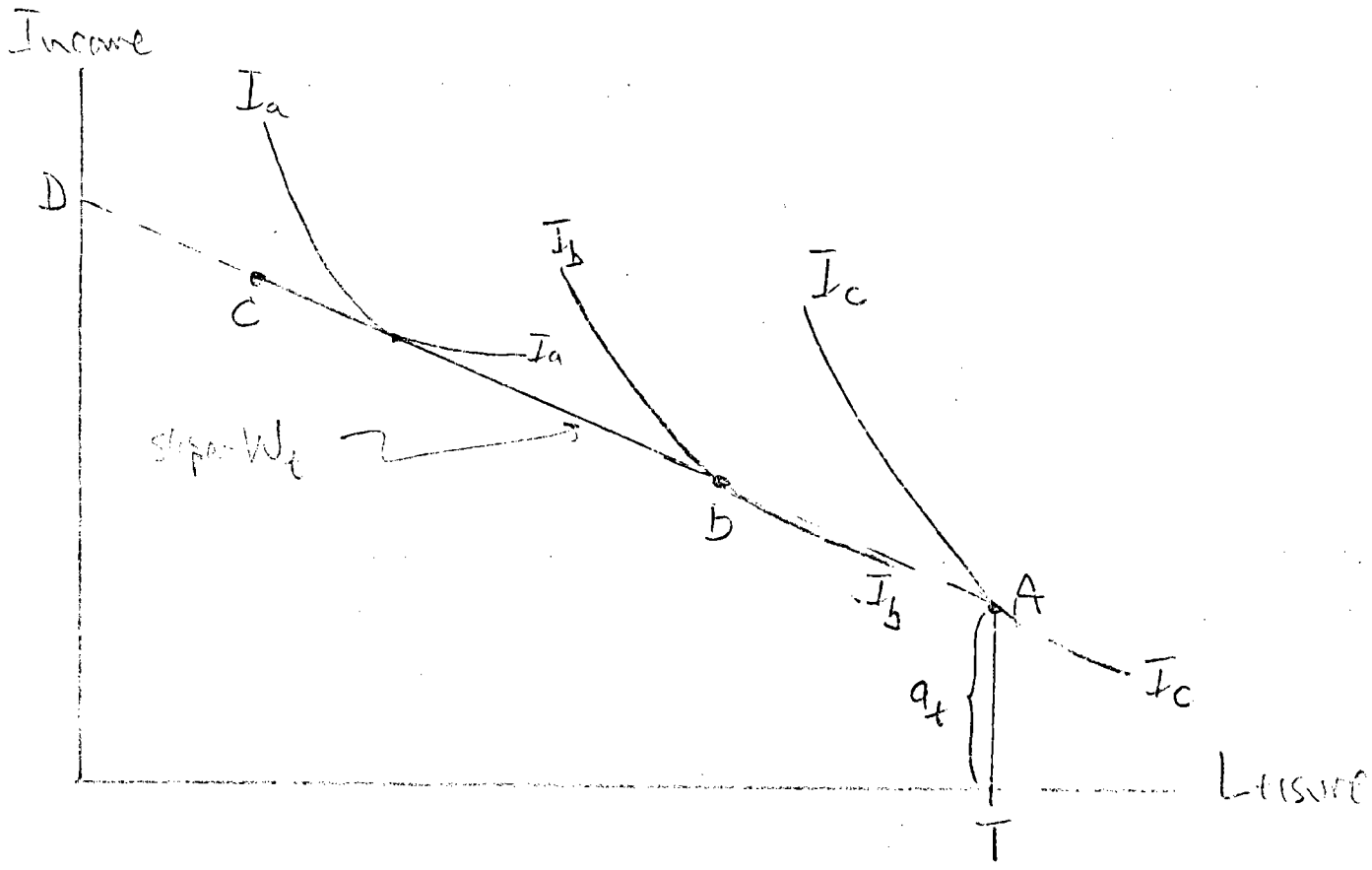

Figure 12

unfavorable to work, as shown in the figure.[1] Second, a_t probably rises over time.[2] Third, W_t may fall. Each of these factors shifts the worker's optimal choice toward shorter hours. Eventually, some workers find that the best choice is to jump abruptly to point A, that is, to retire (see indifference curve I_cI_c).

This analysis is quite simpleminded. So are its observable implications. It leads us to expect that workers are more likely to retire if they are older, sicker, have more assets, or have lower wages. It also implies that retirement will probably come later in jobs in which wages do not fall late in life (professionals?) and hours of work are more flexible (i.e., point B is further to the right). You probably did not need a diagram to convince you of any of these.

Private Pensions

Things get slightly more interesting when we add a private pension. First assume that, once the worker reaches the age of eligibility, the pension plan offers a fixed annuity, b. Figure 13 shows the budget constraint that becomes applicable on the day of eligibility. If he stays on his main job, he does not receive the pension benefit b. So his budget constraint is the relevant portions of TAD. To collect b, he must leave his main job, but need not retire from the labor force. I assume that the alternative job available late in life offers the option of working fewer hours, but pays a lower wage, w_t. This is indicated by

[1]This need not be true for all workers. Some never retire. I am dealing here with those that do.

[2]Because a_t is an equivalent annuity, it will rise with age even if the worker saves nothing.

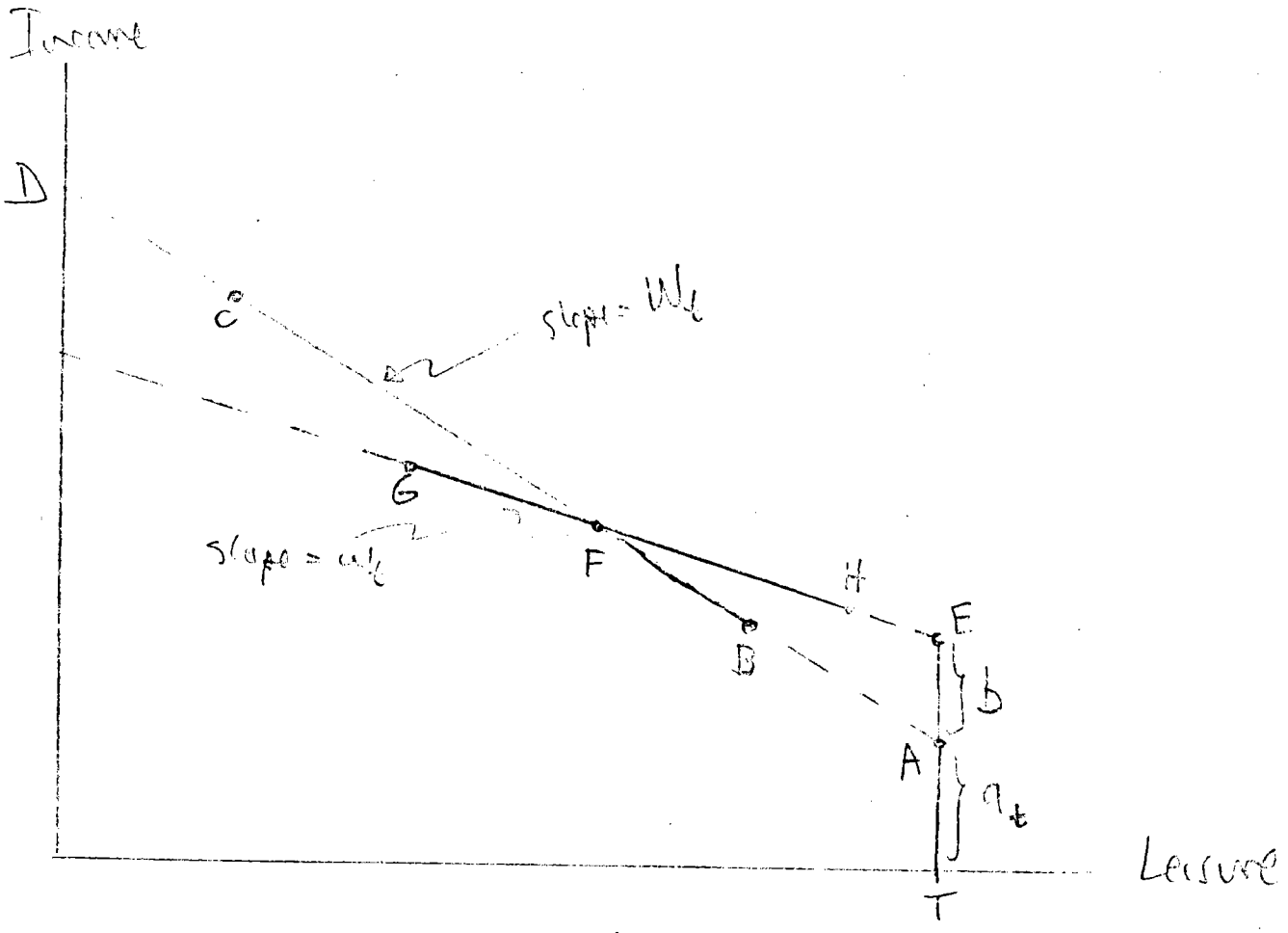

Figure 13

the relevant portions of TEHG. The effective composite budget constraint is CFH plus the isolated point E.

As the indifference curves shift through time (and a_t rises), the individual may, depending on the position of GH and the wage w, step down to a lower paying job and work shorter hours (an optimum on segment FH). Or he may retire from the labor force completely (point E). Clearly, complete retirement is more likely (a) the larger the pension, (b) the larger the gap between W and w, and (c) the higher the minimum hours of work on the secondary job (the further to the left is H).

Now let us complicate the nature of the pension plan. In many plans, an additional year of service raises the pension benefit. Thus a worker eligible to draw an annuity b_t today may face a choice between continuing to draw b_t forever if he retires today or drawing some higher annuity, b_{t+1}, if he works another year. In that case, he gains b_t but loses the actuarial present value of the annuity $b_{t+1}-b_t$ beginning next period if he retires today. If $b_{t+1}-b_t$ is big enough, there is an incentive to stay at work.

In other pension plans, b_{t+1} may not depend only on whether you work today, but also on how much you work. For example, some defined benefit plans fix the annuity as a fraction of average earnings over the last, say, 5 years. In this case, the marginal return to work effort is increased by the pension,

and the incentive to remain at work rises commensurately. Figure 14 offers an example of what the budget line for such a pension might look like. In the figure, it is assumed that benefits are based on earnings in the best five years of the worker's career and that year t becomes one of the best five years when leisure falls below L* . The effective budget constraint becomes CKFH and point E . Compared to Figure 13, this change in the budget constraint obviously encourages more work.

Figures 13 and 14 make clear that we have quite a few possibilities, depending on the precise nature of the worker's indifference curves and the exact wages and hours available on the two jobs. We cannot even tell whether, other things equal, a worker with a pension will retire earlier or later than a worker without a pension. In situations like Figure 13, pensions encourage retirement. In situations like Figure 14, pensions discourage retirement.

But here we should recall our earlier analysis of pensions (Section 3). An employer concerned with labor turnover, I argued, is likely to design a pension plan that discourages retirement that comes "too early" (say, while the worker's marginal product is still above his wage) but encourages retirement later (once the worker's wage has risen above his marginal product). Hence workers may find that their pension plan confronts them with a situation like Figure 14 at first (so they stay on the job and work longer hours) and like Figure 13 subsequently (so they

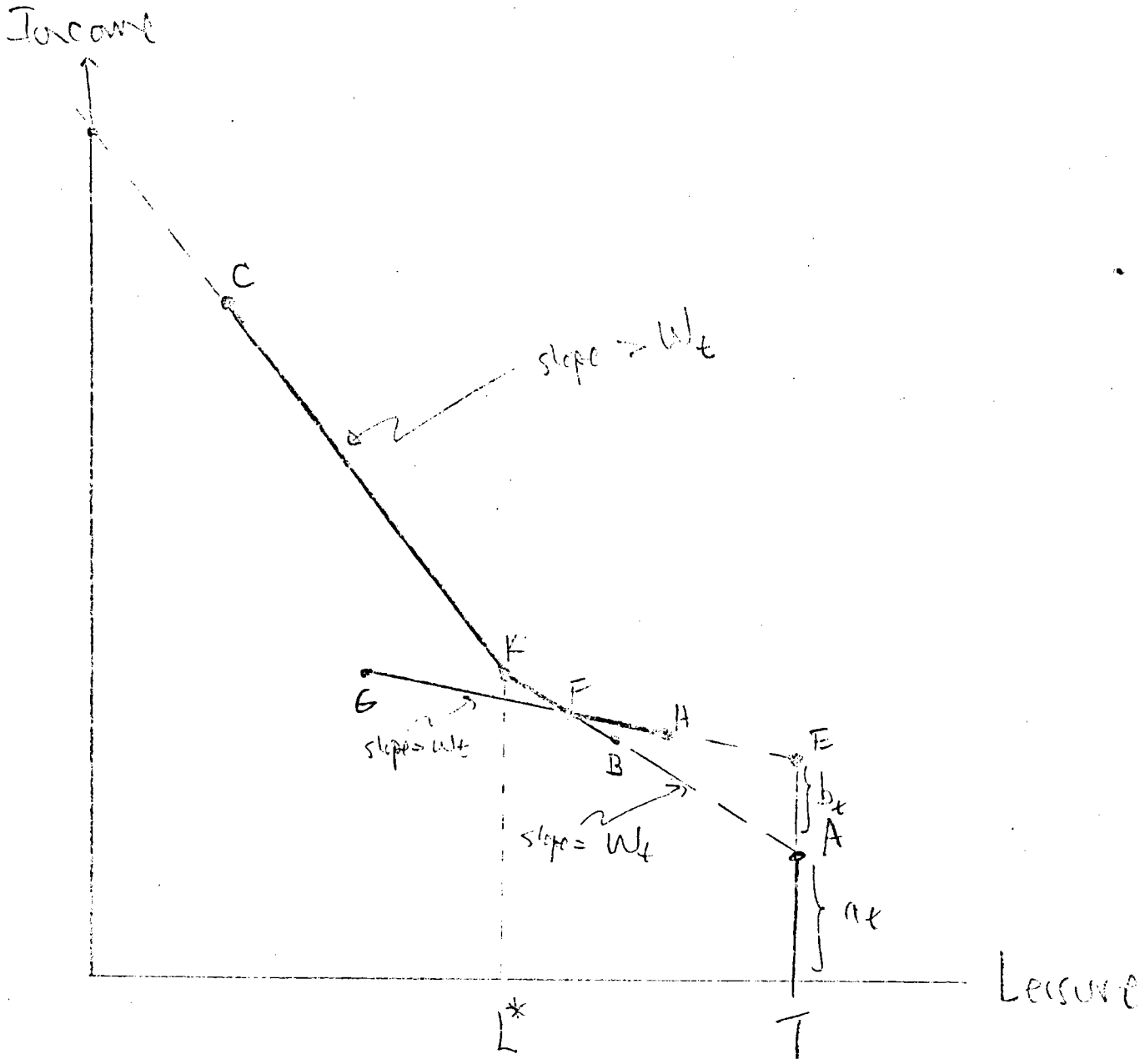

Figure 14

retire). An example of such a plan would be one that bases benefits on earnings between the age of vesting and t_2 (refer back to Figure 5 on page 18a) and then offers no actuarial compensation for postponing retirement beyond t_2. This would seem, by the way, to be an efficient employment arrangement in that it induces greater labor supply during the years when MP_t is higher.

Social Security

In adding social security to the analysis, I first deal with a worker who has no private pension. Later I bring both pieces of the puzzle together.

It is often stated, and widely believed, that social security provides strong work disincentives for workers over 62 years of age. But Gordon, Wise and I (1980b), in studying the actual budget constraint created by the law, discovered that this conventional view is almost totally wrong. Let me explain.

The conventional view that social security discourages the work effort of older workers is based on two perceived problems with the law. First, benefits are subject to an earnings test which implicitly taxes earnings beyond an exempt amount at a 50 percent marginal rate. Second, actuarial adjustments for those who defer benefits are believed to be insufficient, so the expected present value of social security benefits declines the longer one stays at work. According to the conventional view, the social security law sets up a budget constraint like that in Figure 15. Here TABD is the budget constraint without social

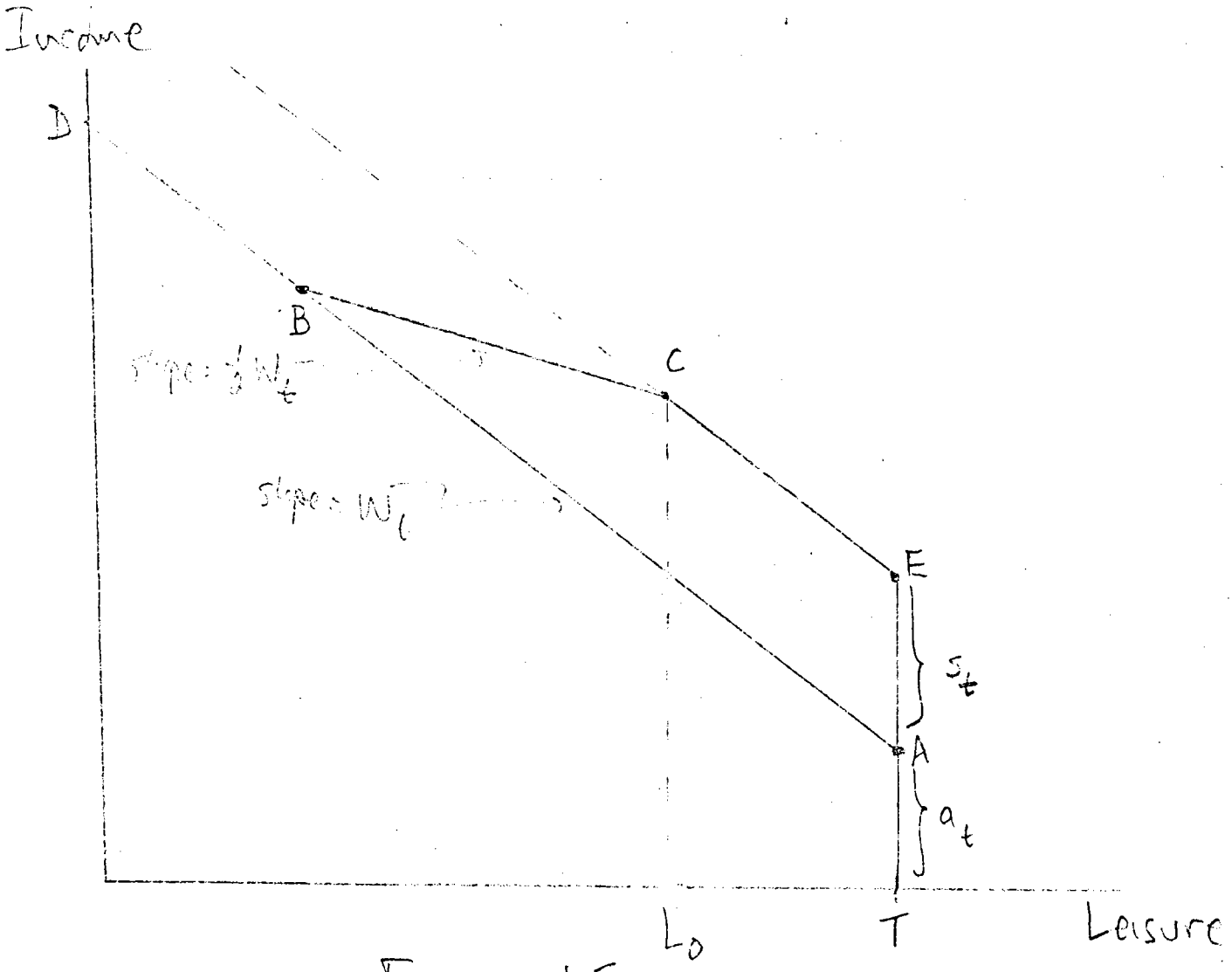

Figure 15

security. Distance s_t is the potential social security benefit, which can be received as long as hours of work do not exceed $T-L_0$. (The law exempts a fixed amount of earnings, X, so L_0 is X/W_t.) At higher hours of work effort, the earnings test becomes operative, making the putative net wage only $\frac{1}{2}W_t$ (segment BC). Finally, beyond point B, earnings are so high that all social security benefits are foregone and the effective budget constraint reverts to BD.

If TECBD really were the budget constraint, social security would provide work disincentives for many workers. But it is not.

What's wrong with this conventional view? First of all, those who work to the left of point C, and hence lose benefits to the earnings test, are given compensation in the form of higher potential benefits in later years. Legend has it that this compensation for deferring benefits is less than actuarially fair. For workers between the ages of 65 and 72, this is true.[1] But for workers between the ages of 62 and 65, the current law often provides compensation which is more than actuarially fair. That is, those who defer accepting benefits are given in compensation a real annuity which has an internal rate of return above the real interest rate.[2] Notice that precisely fair actuarial correction would mean that the effective budget constraint would continue

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[1]Those over 72 are not subject to the earnings test, and so the issue does not arise.

[2]Prior to the 1977 amendments, actuarial compensation took the form of a nominal annuity indexed. As a consequence, the effective real rate of return depended on the nominal interest rate--it was more than actuarially fair when nominal rates were low, but less than actuarially fair when nominal rates were high. For further details, see Blinder, Gordon, and Wise (1980b,1981b).

beyond point C, as indicated by the dotted line in Figure 15, because benefits reduced by the earnings test would be given back in subsequent years. With such a budget line, social security provides an income effect hostile to work--but only to the extent that lifetime benefits exceed lifetime taxes. (While this has obtained until now, it is unlikely to remain true for very long.) More important is the observation that social security creates no substitution effect, and hence no tax distortion.

Now consider the other aspect in which the conventional view errs. Students of the system have failed to appreciate that, from its early days, the social security benefit formula had much in common with the private defined benefit plan depicted in Figure 14. Specifically, one's entitlement to social security benefits has always depended on covered earnings in some particular years. For example, in recent decades the earnings base has been defined as the best N of the previous $N+5$ years, where the value of N has varied from year to year, but has been as low as $1\frac{1}{2}$ and was 22 in 1981.

That this effect sets up a convex kink as in Figure 14 is easy to see. Suppose Y_{0t} is the lowest earnings figure now included in your earnings base. Once your current hours of work exceed Y_{0t}/W_t, each additional hour of work pays an <u>additional</u> return in the form of higher <u>future</u> social security benefits because it raises the earnings base. Gordon, Wise and I (1980b) computed this implicit wage subsidy for a sample of men who

reached age 65 in 1975. At a 1% real interest rate, the subsidy averaged 54% of the wage rate for a married man with a spouse benefit, or 26% for a man alone. The 1977 amendments reduced this effect somewhat by indexing old earnings figures. Gordon, Wise, and I estimated that if our sample of 65 year olds in 1975 had been subject to the post-1977 law, the average percentage wage subsidy would have been 36% for those with spouse benefits and 16% for those without.

Thus, for a worker between his 62nd and 65th birthdays, the typical budget constraint does not look anything at all like Figure 15. Instead, it probably looks like TEFG in Figure 16. (Figure 16 assumes, for simplicity, that actuarial correction is exactly fair.) Once hours of work pass $\frac{Y_{0t}}{w_t}$, the effective wage rate jumps abruptly.

For workers over age 65 things are more complicated since actuarial correction, while no longer trivial since the 1977 amendments, is certainly less than fair. Figure 17 shows two possibilities, depending on whether Y_{0t} is above or below the amount of exempt earnings, X. If Y_{0t} is below X, the effective budget constraint is TEFGHI. Apart from income effects, it is hard to see where work disincentives might arise. The only segment on which social security <u>might</u> lower the effective wage is GH, and even here things could go the other way. If Y_{0t} is above X, then the effective budget constraint is TECfhi, on which there definitely is a range (segment Cf) in which the earnings test lowers the net wage. All in all, however, the

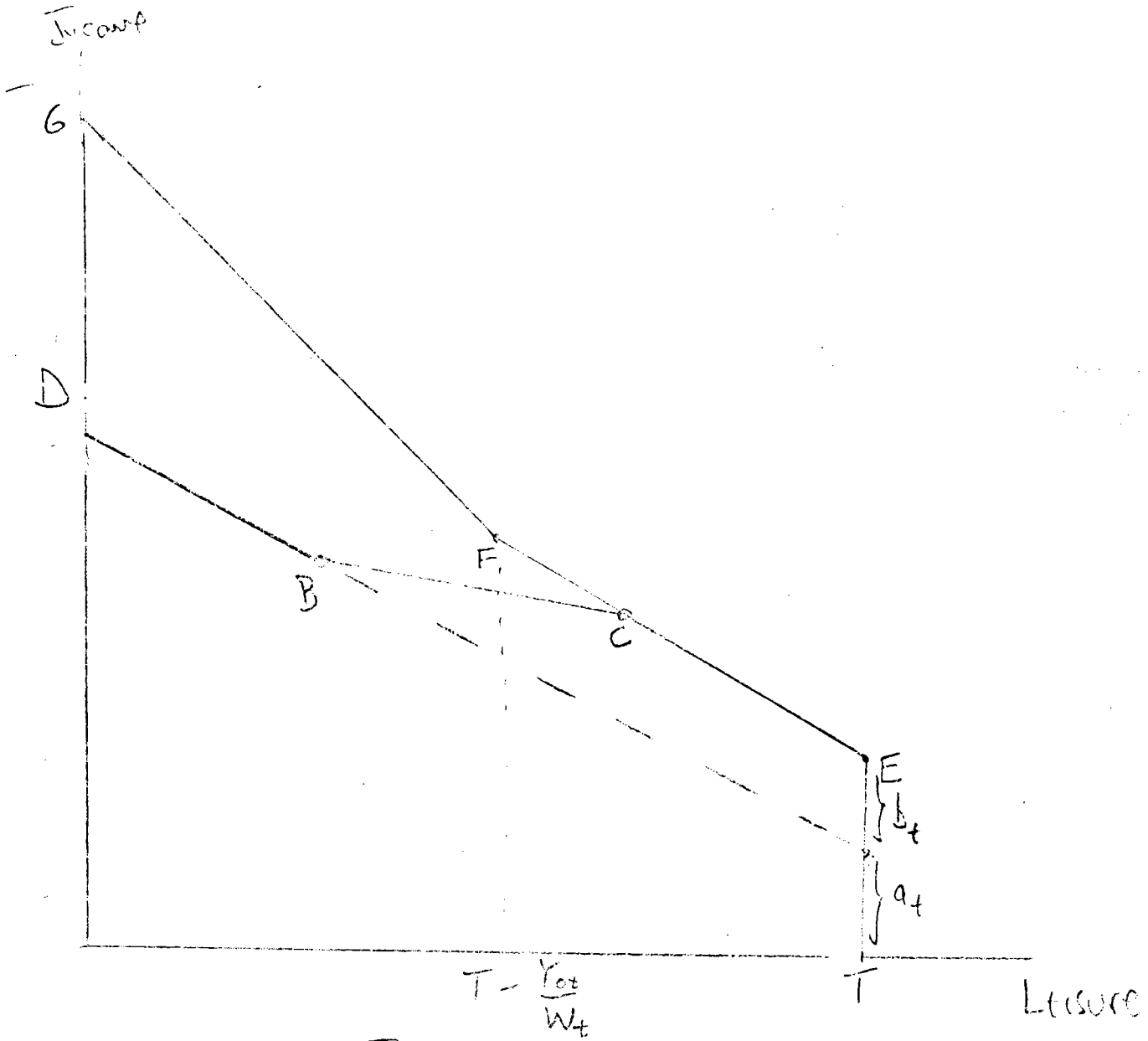

Figure 16

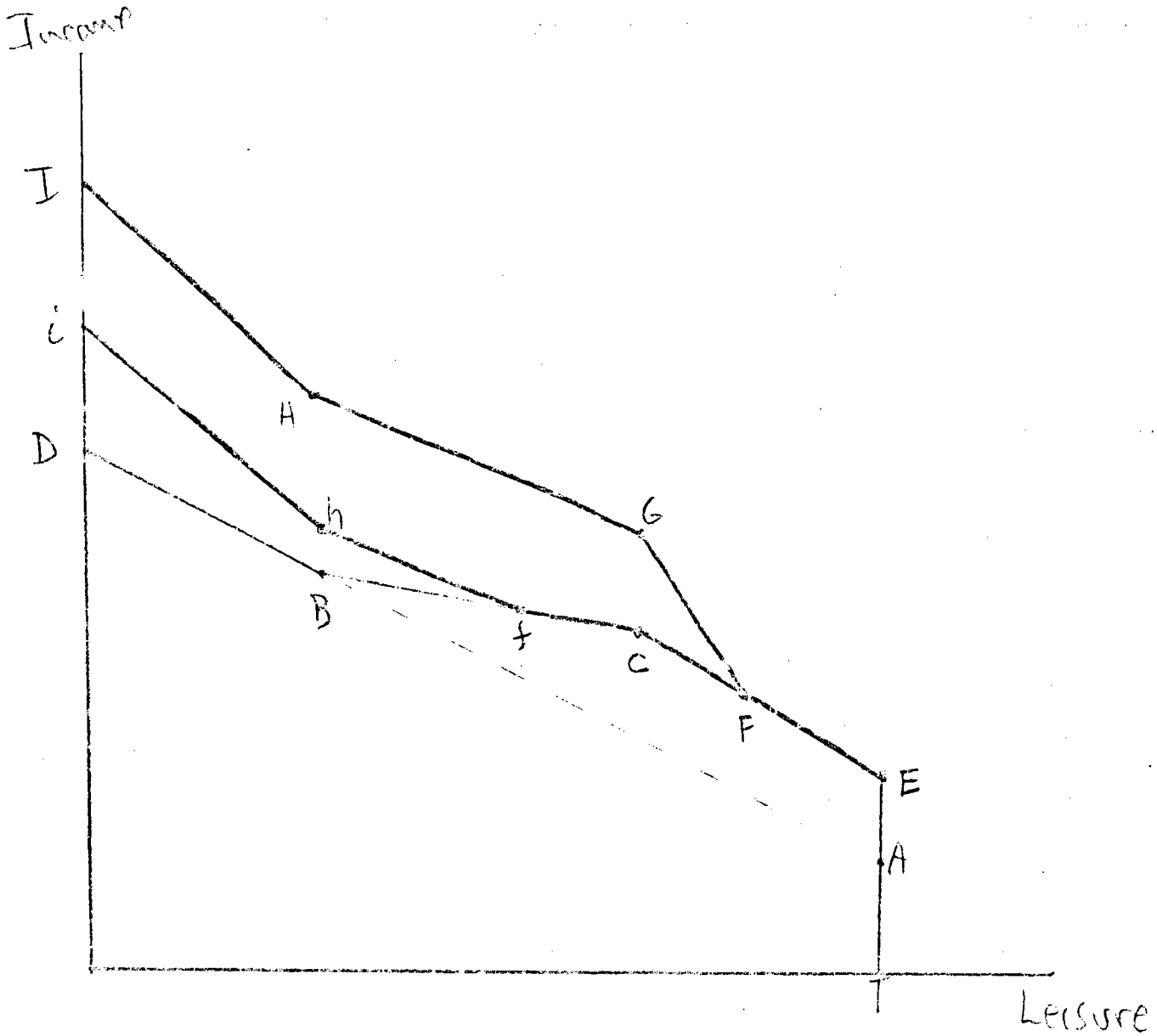

Figure 17

possibilities for substitution effects hostile to work effort seem quite limited.

Social Security with Private Pensions

By now you have probably read enough to shy away from a complete taxanomy of the variety of possibilities that arise for a worker with both a private pension and social security. I certainly shrink from the task, and so will deal with just one case that I think is of considerable importance. Think of a worker between 62 and 65, whose private pension looks like the simple one in Figure 13. (His boss wants him to quit.) Then the budget constraint created by social security for him if he stays on his main job is TAFG, in Figure 18a. If he quits to take a secondary job, his budget constraint will be TEfg instead. Because w_t is lower than W_t, the slope of Ef is less than the slope of AF and point F must come at lower hours of work than point f. (Each is the point where the exempt amount of earnings is achieved.) This leaves two possibilities, as shown in Figures 18a and 18b. Figure 18a is meant to represent a "small" private pension; the two budget lines cross (point Q) somewhere on segment AF. The composite budget constraint facing the worker is therefore TEQFG and the worker has these possibilities:

(a) a corner solution at E--full retirement;

(b) a tangency on segment QE--partial retirement on a secondary job;

(c) a tangency to the left of point Q--remaining on his present job.

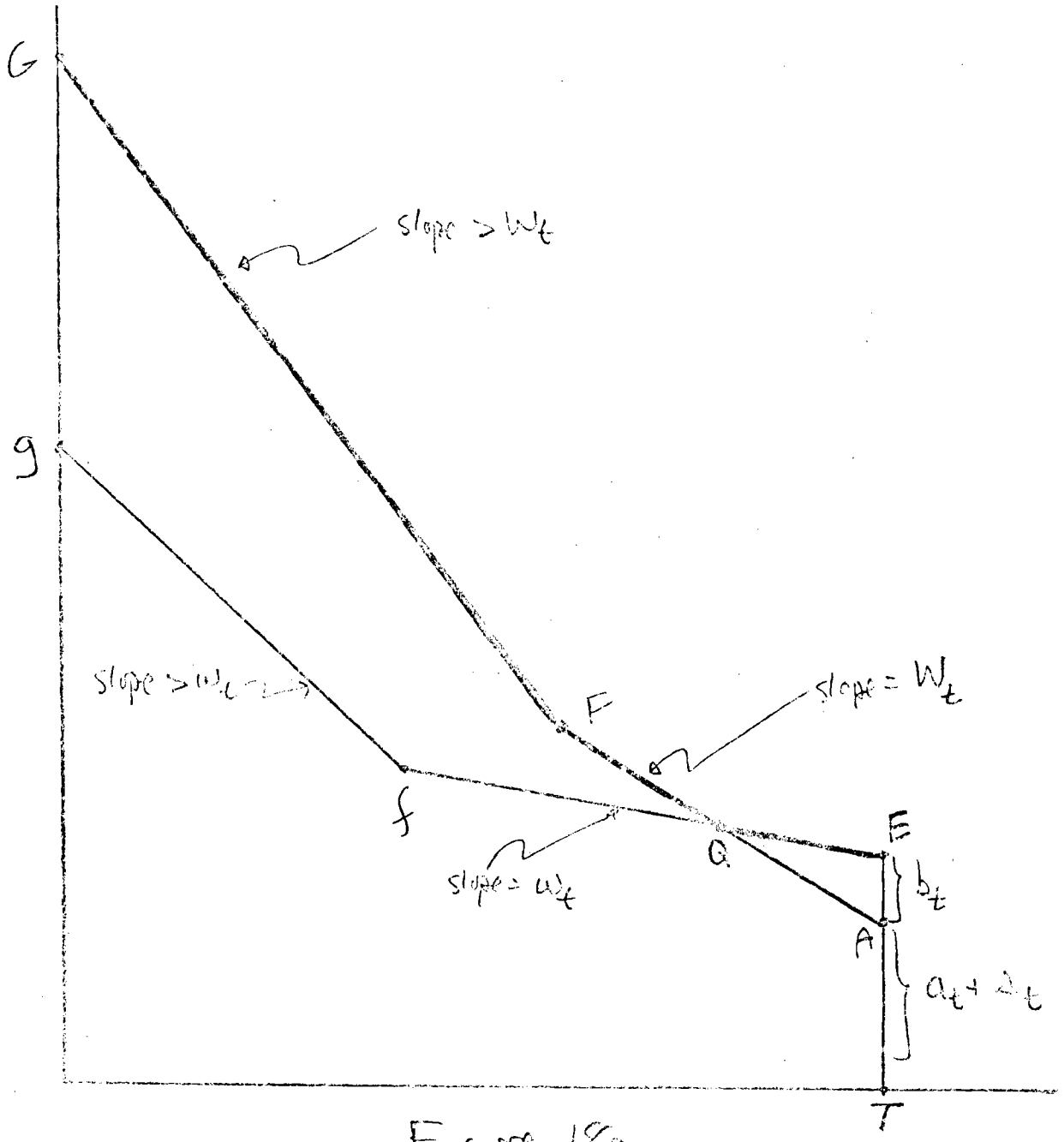

Figure 18a

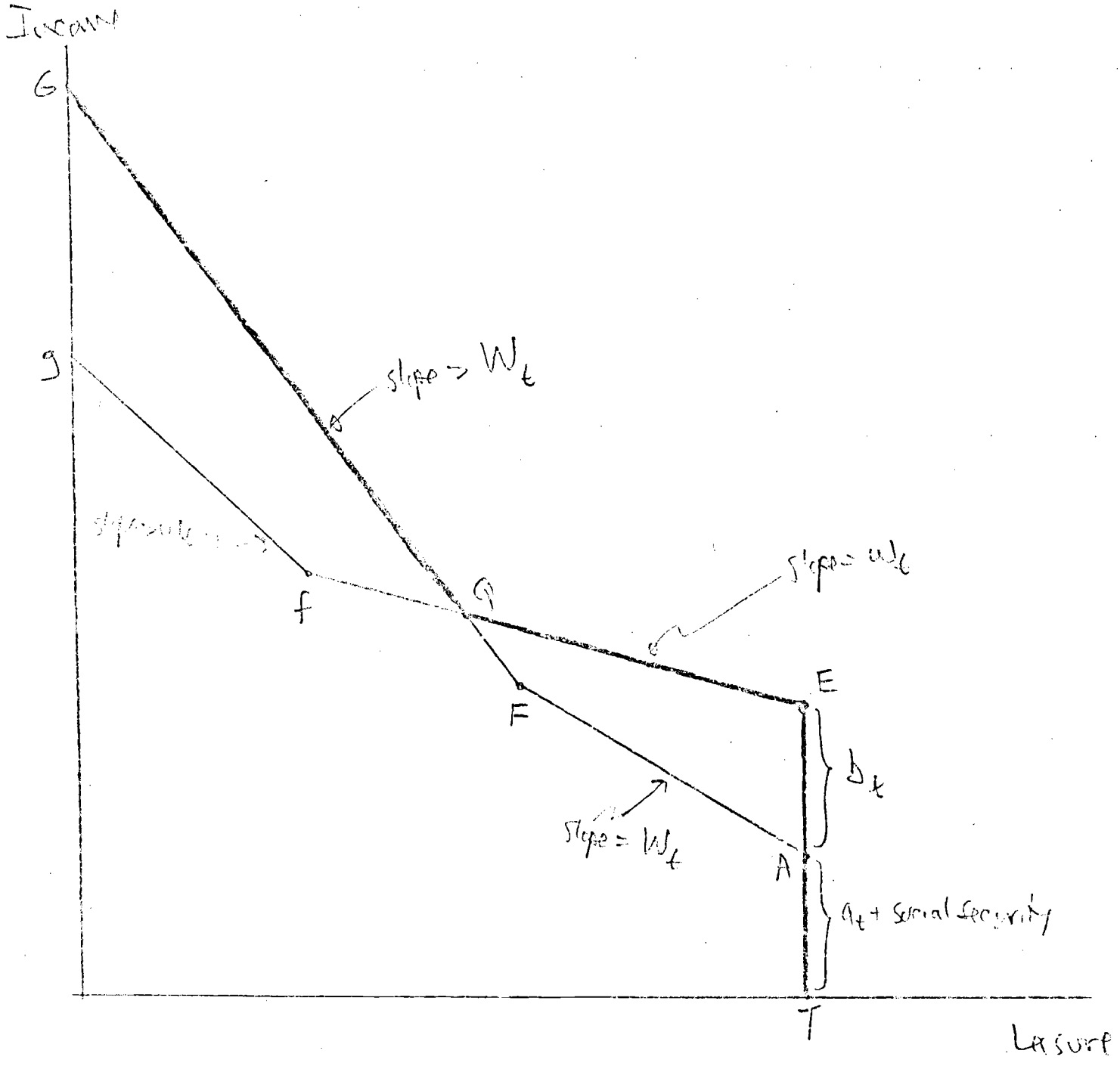
Income
G
J
slope = W_t
f
g
slope = w_t
E
F
b_t
slope = W_t
A
a_t + Social Security
T
Leisure

Figure 18b

Look at this diagram, and think about what indifference curves in this space might look like. It seems quite plausible that a worker might jump at some age from a tangency on GF ("fulltime work") directly to point E (complete retirement) without ever spending time on FQ or QE. Certainly, tangencies "near" F or Q are ruled out if indifference curves are convex.

The other possibility is that the pension is so "big" that the two budget lines cross somewhere on segment GF. This case is shown in Figure 18b. The composite budget constraint in this case is TEQG. It would appear that jumping from fulltime work directly to retirement is even more likely in this case. Notice that at point Q the wage drops from well over W_t to w_t. Since w_t is likely to be quite a bit lower than W_t, this could easily represent a halving of the wage rate.

But, of course, Figure 18b represents only one of a variety of possible composite budget constraints. The nature of the social security budget constraint depends on family structure, the earnings history, age, and other factors. Private pension provisions vary enormously. The real lesson of this section is that, for workers covered by private pension plans, we have no hope of analyzing their labor supply decision by appropriate econometric techniques until we know some of the details of their plan (how are benefits defined? what is the age of eligibility? are there actuarial rewards or penalties for postponing retirement? etc.) Just knowing that the worker has a pension does not even tell us whether he is more or less likely to retire, though for many plans there is a hint that

retirement would be less likely until some age (perhaps the normal retirement age) and more likely thereafter.

Empirical Evidence

This theoretical discussion provides the background for the empirical work on the retirement decision that Gordon and I (1980) did. Here are some of the lessons we took from the theory, and which guided the design of our empirical work:

1. Private pensions are quite likely to encourage retirement at or before the normal retirement age. Some will discourage early retirement; others will encourage it.

2. At least to some extent, workers self-select into jobs with pensions that suit their preferences, and hence voluntarily subject themselves to the incentive structures set up by these plans. There is thus reason to suspect that people with and without private pensions have different tastes.

3. Social security creates a complex multi-armed budget constraint (especially when it interacts with a private pension) which distorts labor-leisure choices in many ways. However, if the worker is free to vary his hours, these distortions are very unlikely to encourage complete retirement if the worker understands the complexities of the law. For this reason, we decided to concentrate on the retirement decision, leaving the more difficult hours-of-work decision to more intrepid econometricians.[1]

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[1] In an early stage of our work, we did take a stab at the hours decision. See Blinder, Gordon and Wise (1978). Subsequently, discretion overwhelmed valor.

4. People are more likely to retire completely from the labor force than to step down to a secondary job when the gap between their current wage, W_t, and their alternative wage, w_t, is large. As noted earlier, we estimated this gap to be quite large. We think this helps explain why, in our sample of men aged 62-67 in 1973, 60% were fully retired, 34% were working fulltime (35 hours per week or more), and only 6% were working short hours.

5. Firm-specific human capital provides one important reason why $W_t - w_t$ might be large. It also provides one important rationale for pensions. Thus we expect $W_t - w_t$ to be particularly large on jobs with pensions. Our empirical work verified this supposition.

The model we estimated was a frictionless utility-maximization model,[1] in which utility functions differed across individuals (though all were CES) and social security was assumed to be irrelevant to the retirement decision. We then added to this model some ad hoc variables meant to "pick up" any effects of social security that we might have ignored.

The model was quite successful in separating retirees from workers. The sample itself (all white men) ranged in age from 58 to 67 and was nicely divided between workers (about 10,000 observations) and retirees (about 6,000 observations). The

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[1] In the "if-I-had-it-to-do-over-again" department, one thing I regret is assuming--contrary to Figures 13 and 14--that the individual can work as few hours as he pleases. It is a convenient assumption, since it enabled us to translate the utility function into a reservation wage function and then simply compare the reservation wage to the market wage. However, I have grave doubts about its realism.

model assigned a probability of being retired, P_i, to each observation. We defined a retiree as "correctly classified" if $P_i \geq .60$, as "incorrectly classified" if $P_i \leq .40$, and as "not classified" if $.40 \leq P_i \leq .60$. Similarly, a worker was "correctly classified" if $P_i \leq .40$ and "incorrectly classified" if $P_i \geq .60$. By this criterion, the model correctly classified 77% of the observations and misclassified only 12%--even when data on actual wage rates (which are available only for workers) were ignored.

The main social security variable that we added to the model was the ratio of social security wealth to lifetime earnings. The idea was that some workers who would like to retire might be liquidity constrained and forced to postpone retirement until they reached 62. At that point, the availability of social security benefits would "induce" retirement. (Note that if this story is correct, social security actually made these workers postpone retirement.) This liquidity effect should be strongest for those whose social security wealth is largest relative to their lifetime earnings. The empirical variable obtained the theoretically correct sign, but an economically unimportant magnitude.

The other way we "looked for" hidden social security effects was to allow the utility function to shift (for no good reason) at ages 62 and 65, the ages of eligibility for partial and full benefits. In fact, the data did not want to put in a shift at age 62, but did put in a small one (a 6% jump in the reservation wage) at age 65. This might be a social security

effect at age 65. However, it is worth pointing out that the one bad mistake made by our model was that it "retired" many 65-67 year olds who were still at work. Missing important work disincentives from social security would have led to the opposite error--keeping at work those who actually retired.

All things considered, the empirical work did not give us any reason to reject the theoretical supposition that social security does not encourage early retirement.

Estimated retirement effects of private pensions were more interesting. We used our model to compare a worker with a private pension to an otherwise identical worker without a pension. The estimates suggested that a worker with a pension (but no mandatory retirement clause) is very slightly less likely to be retired at ages 58-60, slightly more likely to be retired at ages 62-64, and much more likely to be retired at ages 65-67. These findings seem to conform with the underlying theory of pensions outlined in this paper.

Several other findings of the model bear on issues raised by the theory. First, the estimated consumption-leisure indifference curves were very flat, suggesting a huge wage elasticity to the retirement decision.[1] Second, and quite surprising to us, the estimated income effect on labor supply was quite small. This throws cold water on what had previously been my personal favorite explanation of the trend toward earlier

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[1] It also suggests a huge elasticity of hours of work with respect to wage rates. Flat indifference curves are consistent with the fact--noted on page 5--that the vast majority of workers either works fulltime or not at all. Note, however, that data on hours of work played no role in the estimation!

retirement: the income effect of rising real wages. I am not yet ready to dismiss this explanation because other evidence does support a strong income effect on labor supply. But it must be admitted that the early returns are not encouraging.

5. Why Government Intervention?

So far in this paper I have developed some positive economics of pensions. In this concluding section, I turn briefly to some normative questions. What, if anything, does the theory have to say about the many ways in which the government intervenes in the pension system? Can these interventions be rationalized? I start with two important provisions of ERISA.

5.1 Why Impose Funding Requirements?

ERISA enforces minimum funding requirements for private pension plans. This may seem strange since several finance specialists have pointed out that there is a tax advantage that encourages overfunding of pensions.[1] In fact, many large corporations apparently have overfunded their pensions.[2] Why, then, would the government bother with minimum funding requirements?

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[1] See Black (1980) and Tepper (1981).

[2] See Bulow (1979).

The answer, I think, is obvious. A number of firms had either gone bankrupt, leaving insufficient assets to pay off their unfunded pension liabilities, or had otherwise reneged on their pension obligations. This prompted Congress to act.[1] Indeed, since there is a tax advantage to overfunding, one does suspect that underfunders may be seriously contemplating running out on their pension liabilities. Thus we can think of funding requirements as a type of consumer protection legislation, and with this advantage: for "honest" firms, the legislative constraint will be nonbinding, and hence costless. Not a bad policy, it would seem.

Of course, the usual economist's response to consumer protection legislation can be invoked here: why not just require firms with unfunded pensions to label them as risky assets ("Warning: This pension may be hazardous to your financial health.") and let the market take care of the rest?[2] The question carries its own answer: anyone who is not an economist finds this suggestion utterly absurd!

5.2 Why Impose Vesting Requirements?

ERISA also imposed maximum periods of time that can elapse before vesting. It is much harder to defend this provision. The model presented in Section 3 assigns an important and useful role to pensions which are not vested immediately. If firms must

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[1] For some background on this, and a sample of horror stories, see Munnell (forthcoming, pages 131-134).

[2] Of course, a true free-marketeer would not even mandate the labelling requirements. The market can take care of that, too.

pay for specific human capital formation, then a nonvested pension is a way to tie the worker to the firm long enough for the latter to recoup its investment. Banning such arrangements will interfere with specific human capital formation and harm economic efficiency.

5.3 Why Limit Mandatory Retirement?

The Age Discrimination in Employment Act limited the right of firms to impose mandatory retirement ages for their workers, and there has been discussion of banning mandatory retirement entirely. Everything I have just said about vesting applies with equal force here. I argued in Section 3 that mandatory retirement may be an integral part of an optimal labor contract. Disallowing such a provision may make the whole optimal compensation scheme unravel.[1]

The vesting and mandatory retirement issues are related to the "time inconsistency" problem so much discussed in recent macroeconomics.[2] At the beginning of the contract, workers and firms might both agree that a period without vesting and/or a mandatory retirement age are part of a Pareto optimal compensation package. After some time has elapsed, however, the worker may be able to reap a windfall gain by immediate vesting or by abrogating the mandatory

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[1]For a different model leading to the same conclusion, see Lazear (1979). Two observations temper this conclusion. First (as I have already noted), other mechanisms (such as the pension plan) can be used to induce retirement if mandatory retirement is banned. Second, the mandatory retirement constraint may be binding only for a minority of workers

[2]The seminal paper was Kydland and Prescott (1977).

retirement clause. The standard way out of time inconsistency problems is "precommitment," and recent legislation has interfered with the freedom to write contracts with precommitment.

5.4 Why Have Social Security?

The private economy is perfectly capable of generating pension plans, and does. There are no apparent externalities involved in having a pension.[1] Why, then, should we have a publicly-imposed pension scheme?

I would like to begin by suggesting two good reasons having to do with redistribution of income. The first pertains to redistribution across generations. We must not forget that the social security system was a child of the Great Depression. If we conceptualize the Great Depression as a terrible random event that severely damaged the economic well-being of several generations, then it makes sense to transfer income from generations yet unborn to the generations that were damaged by the Depression. One way to do this was to start an unfunded social security system.

The people who retired in the early years of the social security system (say, those who reached age 65 in 1940) were 54 or so when the Depression began. For them, the Depression represented a huge and irreparable loss of lifetime income. It is not something they could have been expected to have prepared

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[1] But see Arnott and Stiglitz (1991), where a kind of externality relating to labor turnover is identified and analyzed.

for, nor subsequently made up for. The social security system made huge transfers to these people, who had contributed very little but drew substantial benefits. It thus transferred some of their Depression losses to unborn generations. Was this bad social policy?

Moving down a generation or so, people who reached 65 in, say, 1960 were 34 when the Depression started--just entering their peak earning years. They too suffered huge losses of lifetime income, and received huge transfers from social security.

It takes a long time for the "start up" period of a social security system to end. Even the cohorts that reached age 65 as late as 1970-1975 were victims of the Great Depression to a significant degree. These people were only 19-24 years old when the recession began, but were 29-34 when it ended. The incidence of unemployment must have been particularly severe for them, depriving them of work experience that would have been valuable in their subsequent careers. Most of these people also received large income transfers from social security. Only when the system is fully mature will intergenerational transfers stop.[1] By this time, most of the people damaged by the Great Depression will have died, having received a lifetime wealth increment from social security.

Thus compensation for the Depression <u>can</u> provide an intellectually defensible case for a <u>public</u> pension system and, in particular, for an <u>unfunded</u> public pension system. Whether

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[1]But every time a substantial increase in benefits is made, it is as if a new "mini system" is "born." The part of the system that started with the huge increases in benefits in 1972 will not "mature" until after the year 2020.

this rationale actually had much to do with the establishment of our social security system is more debatable. A plausible view is that it contributes to the explanation of why social security began when it did, but not to the explanation of why social security exists at all. However, I think the redistribution-across-generations argument goes a long way toward explaining why the system is not funded.

The second reason for having social security has to do with redistribution within an age cohort. It is well-known that the social security benefit formula is redistributive--people with lower lifetime income earn higher marginal (and average) returns on their social security contributions. Though the benefit formula has changed many times, this redistributive aspect has been present from the earliest days of the system.

I need not outline the case for equalizing redistribution of income. No one who now opposes redistribution will thereby be persuaded to change his mind. But if redistribution is accepted as a legitimate function of government, as I think it should be, then a rationale for a public pension system appears. Surely, we cannot expect private pensions to redistribute income. But why use pensions at all? Why not redistribute by programs like progressive taxation and transfer payments, and make social security distributionally neutral?

There are two answers to this question. First, people from lower economic strata have worse mortality experience. Since they do not live as long, on average, lower income groups have to be given a bigger annuity per dollar of "contribution" just to make the system actuarially fair. Second, social

the
security is virtually/only mechanism we have to redistribute lifetime income. All other redistributive devices, at least in part, take from the transitorily rich and give to the transitorily poor. While current income and lifetime income are surely positively correlated, that correlation is far from perfect. If we take it for granted that what we want to redistribute is lifetime income, then a redistributive social security system has much to recommend it.[1]

Of course, this view of how social security redistributes income sees only the silver lining and ignores the cloud. For one thing, the income concept redistributed by social security--earnings in covered employment--is far from ideal and leads to certain distributional anamolies (for example, "double dippers" who are rich in a lifetime sense may nonetheless take much more from the system than they contribute). Another problem is that social security does more than just redistribute from those with high earnings to those with low earnings, it also redistributes across demographic lines in ways that some people view as capricious. (For example, it subsidizes one-earner families through the spouse benefit.) Many of these redistributions would not necessarily be applauded by a concave social welfare function.

A third argument for social security has nothing to do with redistribution, but rests on the idea that pensions are a desirable, but highly risky, asset. According to this argument, workers would like to rid themselves of the risk of poverty due to longevity. But a private pension plan organized by the employer only allows the worker to trade this risk for another risk: the risk that

[1]We would really like to redistribute lifetime utility. Lifetime income is an imperfect proxy for lifetime utility for several reasons, including imperfections in the capital market. However, lifetime income is probably a better proxy than current income.

the firm will go bankrupt. A public pension scheme eliminates these firm-specific risks and provides a safe asset.

This rationale for social security may not be very persuasive, however. First, if the company funds the pension plan completely, hires an insurance company to administer it, and vests benefits promptly, then the worker's pension benefits are well insured against the risk of bankruptcy. Second, even if these steps are not taken, the risk argument provides an argument for publicly-supported pension insurance, not for mandatory public pensions.

A fourth argument for social security is that a mandatory public pension scheme might correct what otherwise would be a market failure. An ingenious argument to this effect has recently been made by Eckstein, Eichenbaum, and Peled (1982). In the context of an overlapping generations model in which individuals have private information about their survival probabilities, they establish, first, that a free market in annuities need not lead to a Pareto optimal outcome and, second, that the market equilibrium with a mandatory social security system may Pareto-dominate the free-market solution. This argument thus provides a potential rationale for social security based solely on efficiency considerations.

Finally, I come to the rationale for social security that I imagine is most important in the public arena, but that economists have so much trouble with: paternalism, pure and simple. One reason for the establishment of a mandatory, public pension system was the political judgment that people were not providing "enough" for their own retirement. That this statement is inconsistent with the theory of revealed preference has not diminished its force in the world of affairs.

6. Summary

I began this paper with an ambitious list of questions to which I promised tentative answers. Here, as tersely as I can put them, are the answers suggested by the theory of pensions developed here:

1. Why are there private pensions? Because of tax advantages, and because pensions are a useful device for reducing labor turnover.

2. Why have they grown so much in recent decades? Because the tax advantages are a postwar phenomena, and have increased over time, while the risk of pension fund bankruptcy has declined.

3. Why do they have the features that they do? Many of the salient features of private pensions can be rationalized as part of an optimal long-term labor contract in an uncertain world in which labor turnover is costly (for example, because firm-specific human capital is important).

4. How can private pensions "affect" other economic decisions? Because--owing to heterogeneity, transactions costs, and discrete choice--many workers cannot optimize their pension plan. This makes the pension at least partly exogenous.

5. What are the effects of pensions on savings and retirement? Theory does not necessarily support the obvious supposition that pensions lead to early retirement; it suggests that private pensions are more likely to have this effect than social security. Nor does theory tell us how much displacement of private fungible savings by public and private pension we should expect.

6. Have recent public-policy interventions in the private and other fiduciary pension systems made sense? Minimum funding requirements can be rationalized on grounds of consumer protection. But limitations on the vesting and mandatory retirement provisions that may arise from free bargaining probably impede the ability of workers and firms to formulate optimal labor contracts.

7. Why do we have a mandatory social security system? To transfer income to the generations damaged by the Great Depression; to redistribute lifetime income within an age cohort; to provide a safer vehicle for retirement savings; and because Congress (paternalistically) decided that people were not saving enough for their own retirement.

In closing, I would like to call attention to an important stylized fact and pose one more question. The fact is a simple and compelling one: prior to the advent of social security, the private pension system in this country was negligible; for one reason or another the private market had not produced pensions. The question is a profound one: Was the nonexistence of private pensions a case of market failure, which the social security system then corrected? Or is the whole private pension system the product of a tax distortion that became important only after World War II? I suggest that the answer to this question is terribly important to our attitudes toward the pension system. But I do not pretend to know the answer.

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