Why Is There Mandatory Retirement?

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This paper offers an explanation of the use of mandatory-retirement clauses in labor contracts. It argues that the date of mandatory retirement is chosen to correspond to the date of voluntary retirement, but the nature of the optimal wage profile results in a discrepancy between spot wage and spot VMP (value of the worker's marginal product). This is because it is preferable to pay workers less than VMP when young and more than VMP when old. By doing so, the "agency" problem is solved, so the contract with mandatory retirement is Pareto efficient. A theory of agency is presented and empirical evidence which supports the hypothesis is provided.

Mandatory retirement has recently become an important issue. Congress has enacted legislation that extends coverage under the Age Discrimination in Employment Act to workers up to age 70 rather than to age 65 as it previously stood. This essentially outlaws the use of mandatory retirement at age 65, a common practice. Furthermore, Congress is considering the extension of the Age Discrimination Act such that exemption would be eliminated entirely. The current legislation already does this for federal workers. In order to understand whether or not legislation outlawing mandatory retirement would benefit society, it is first essential to ask why this institution exists. The primary task of this paper is to offer an analysis of that institution, with testable implications, and then to discuss policy proposals that are consistent with and implied by this analysis. As an outgrowth, a

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theory of agency is presented which provides insight on how to compensate an agent in a manner that creates a harmony of interest between the principal and the agent.

There are many defenses and explanations of mandatory retirement. Most rely on the notion that a worker's productivity declines significantly after some age, say 65, and that mandatory retirement is the employer's way to deal with this reduced productivity. Yet, there is a significant diversity of talent in the labor force. No one claims that only the most talented individuals are the ones who can find jobs. Instead, economists believe that differences in wage rates reflect differences in productivity. The same is true of older workers. If older workers are less productive than younger workers, employers in a competitive labor market would be forced to pay older workers a lower wage rate than they pay younger workers. There is no necessity to lay off the older workers simply because their productivity is not as high as the younger workers'. In fact, very young workers earn less than middle-aged workers as a reflection of their lower productivity. Yet, we do not find researchers arguing that the minimum age for employment should be 45. The correct question then is, Why does employment rather than wage adjust?

Some have argued that morale would be adversely affected by lowering the wages of older workers. But it is not obvious that terminating workers rather than lowering their wages will improve the morale of the remaining work force. A 60-year-old worker who is faced with approaching termination is not necessarily going to have a better attitude than one who knows his wage rate will be lowered 5 years from now. Another view often expressed is that one cannot judge the decrease in productivity so that it would be impossible to adjust wages accordingly. But laying off a worker adjusts his wage rate to zero. This is a poorer approximation of his true productivity decline than any smooth wage adjustment. Furthermore, employers face the problem of gauging productivity for all workers. There is nothing unique about 65-year-olds in this regard. Thus, a productivity decline is not a sufficient explanation for the existence of mandatory retirement. One must ask why the productivity decline is dealt with by terminating the worker rather than by reducing his wages.[1]

Another "explanation" is that a uniform retirement policy avoids the disadvantage of discrimination between employees. Two questions arise. First, there is nothing that requires that a uniform retirement policy be one that has a provision for mandatory retirement. One could easily set up a flexible retirement scheme, where payment varies with length of service, that is invariant across individuals but

[1] See Gordon (1960), Kreps (1961), National Industrial Conference Board (1964), and U.S. Department of Health, Education, and Welfare (1976) for some commonly offered explanations of mandatory retirement.

does not require mandatory retirement at any given age. The second problem is that employers discriminate between employees at every level: some are promoted, others are terminated, others experience wage gains while others do not, and the existence of differences between workers is dealt with in many ways. Why should employers or employees favor a system that reduces the ability of the employer to compensate workers differentially?

Another "explanation" is that mandatory retirement creates promotion possibilities for younger workers. This explanation ignores at least two factors: First, young workers know that they will become old workers at some date in the future. They care about the present value of some lifetime wage path rather than the present value of any segment of it. Although they would prefer to be promoted when young, they also would, if their retirement is truly mandatory, prefer to continue working when old. Second, promotion may be interpreted as an increase in one's wage rate (and perhaps a change in the accompanying job title) that occurs as one's productivity rises over the life cycle. The firm will, in competition, pay the worker his marginal product, no matter how old he is. Thus, there would be no incentive for a firm to mandatorily retire a worker whose marginal product was equal to or greater than his wage rate to "promote" a younger worker.

Needless to say, none of the so-called explanations satisfactorily describes why it is optimal to terminate a worker at a certain age rather than reduce his wages accordingly and in a continuous fashion. In fact, explanations of mandatory retirement suffer from the same drawback as explanations of layoffs. Economists have been puzzled by layoffs as an alternative to spot VMP payments as well. I suggest that the two phenomena are linked.

The purpose of this paper is to give a theoretical explanation for the existence of mandatory retirement that is consistent with economic theory and then to test this theory empirically. Before proceeding, it is important to make clear what is meant by "mandatory retirement." The phenomenon that we wish to explain has the following characteristics: First, there is a definite date when a contract (either explicit or implicit) ends. Second, at that date there will be some workers who will wish to remain with the firm at their previous wage rates, but whom the firm will not choose to employ at that wage.[2]

[2] Given this definition, the institution of term contracts with up-or-out employment arrangements (i.e., arrangements where the worker is either promoted or forced to leave the firm) is a form of mandatory-retirement contract. The model to be presented in this paper could be applied to the analysis of that problem as well. In a recent theoretical paper by S. Freeman (1977), retirement and promotion decisions are linked. His model will not, per se, yield mandatory retirement, however. The reason is that in his framework there is no reason to distinguish between lump sums at critical time points and smooth payment streams with the same present value. The former will not yield mandatory retirement as it is commonly used.

Thus, mandatory retirement has the characteristic that at some time T, the worker earned some wage $\overline{W}$. But at $T + \epsilon$, the firm is no longer willing to employ the worker at wage $\overline{W}$, nor is the firm's wage-offer function continuous at that point (i.e., it takes a discrete jump downward for some workers). This story, by definition, implies that at T the firm is paying some workers more than the value of their marginal products. This is a necessary condition for the firm to desire to terminate the worker, and this is the bottom line to virtually all explanations of mandatory retirement. The argument here will be that, for reasons discussed below, it will be optimal for firms and workers to have a payment scheme such that the worker receives less than his marginal product when young and more than his marginal product when old. This implies that there be some date at which the firm is no longer willing to pay the worker his current wage. He is, therefore, mandatorily retired.

In some recent work, Feldstein (1976) has employed the notion that a worker's commitment to the firm tends to be permanent. He presents evidence which reveals that a large proportion of total job separations consist of layoffs, and, further, that layoffs are, in large part, temporary. That is, the worker is reemployed by the same firm which has laid him off in the first place. The lifetime commitment to the firm is the starting point from which we attempt to explain the existence of mandatory retirement. A sketch of that explanation follows.

Workers care about the present value of their wage stream over the lifetime (i.e., their wealth), whereas firms care about the present value of the worker's marginal product over his lifetime. Other things equal, a worker would be indifferent between a wage path which paid him a constant dollar amount over his lifetime and another one which had the same present value but paid him less when he was young and more when he was old. Other things equal, the firm would be indifferent between paying the two streams. But other things are not equal. It will be shown that a wage profile which pays workers less when they are young and more when they are old will allow the worker and firm to behave in such a way as to raise the present value of marginal product over the lifetime. For example, by deferring payment a firm may induce a worker to perform at a higher level of effort. Both firm and worker may prefer this high wage/high effort combination to a lower wage/lower effort path that results from a payment scheme that creates incentives to shirk. Thus, it may pay the firm and worker to set up a scheme such that the worker is paid less than his marginal product when he is young and more than his marginal product when he is old to compensate.

The efficiency condition for retirement is that the value of the worker's marginal product is just equal to his reservation wage. This will determine the optimal date of retirement. But if workers are paid less than their marginal products when they are young and more when old, their wage rate at T (the optimal retirement date) will exceed VMP and, therefore, the reservation wage. Although this is the efficient and equilibrium date of retirement (the date such that the present value of the lifetime marginal product equals the present value of the lifetime wage payment), the worker will not voluntarily retire at this date because wage exceeds reservation wage. Wage exceeds reservation wage at this point because that payment scheme produces a superior lifetime profile which workers prefer ex ante. Therefore, mandatory retirement is required to induce them to leave the firm at the optimal date. Thus, the existence of mandatory retirement is optimal from the worker's point of view. The worker is actually better off as the result of a contract which specifies a mandatory termination date. This allows the worker's present value of marginal product to be higher than it would be in the absence of such a contract, and these "rents" will spill over to the worker.

I. The Model

Consider an individual who has a value of marginal product over his lifetime, $V^*(t)$, and a wage rate $W^*(t)$ as illustrated in figure 1. This worker is receiving an amount less than his VMP for $t < t^*$ and an amount greater than his marginal product for $t > t^*$. Let T be the point such that

$$V^*(T) = \tilde{W}(T), \tag{1}$$

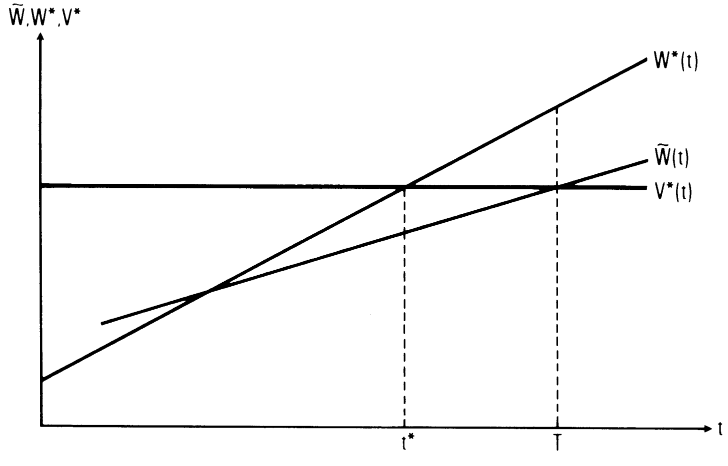

FIG. 1

where $\tilde{W}(t)$ is the individual's reservation wage at t. Any $W^*(t)$ path that satisfies the condition that

$$\int_0^T W^*(t)e^{-rt}dt = \int_0^T V^*(t)e^{-rt}dt \quad (2)$$

will be an equilibrium path.[3] That is, other things equal, a worker is indifferent between a path which pays him his spot VMP at each point in time and one which pays him a wage less than VMP initially and more than VMP later. As long as each path yields the same present value, workers have no preference. The argument in this paper, however, is that other things are not equal. A path which pays less than VMP when young and more than VMP when old may yield the worker a higher lifetime wealth. The reason is that a steeper path reduces the worker's incentive to cheat, shirk, and engage in malfeasant behavior. That is, it affects the amount of output per hour worked by altering the worker's incentive structure. This generates a preference for a path that has a wage greater than VMP at the date when VMP equals the reservation wage. Since this is the point when retirement should occur, and since workers would not voluntarily leave at this point (since $W^*[T] > \tilde{W}[T]$), "mandatory" retirement is a necessary consequence. But what is important here is that retirement is "mandatory" only in an ex post sense. It is negotiated in advance and is part of an optimal contractual arrangement which insures that firm-worker separation occurs at the appropriate time.[4]

A. *Incentives-induced Mandatory Retirement*

A steeper-than-VMP wage path is generated when we consider the notion of optimal effort, honesty, and malfeasance on the job.[5] These

[3] This assumes that the worker can borrow and lend at rate r. To the extent that this does not hold, a utility-maximizing framework must replace the wealth-maximizing one. The fundamental analysis and its conclusions, although somewhat more complex, remain essentially the same.

[4] That is, the worker is "mandatorily retired" at T. This is not the same as saying that the worker leaves the firm at T. He is retired from his old contract, but not necessarily from his old firm. For example, at age 65 many professors are mandatorily retired from their former contracts and renegotiate a new contract frequently called "emeritus." The wage rate changes, as do the working conditions. In this case, the worker stays with the former firm. In most cases, however, "mandatory retirement" will be coupled with firm-worker separation as well. The reason is that at T when renegotiation occurs, it is no longer necessarily the case that the worker-firm match and corresponding working conditions (hours, flexibility, effort, etc.) that were optimal between 0 and T will also be optimal between T and retirement (or death). For example, older workers may want shorter and more flexible hours with limited responsibility (or they may want zero hours of work, i.e., retirement). This is not necessarily the type of work conditions/wage trade-off that they would choose between 0 and T. If not, T will be characterized by a reshuffling of workers among firms. What is crucial is the termination of the former contract.

[5] Papers which have dealt with this issue are Becker and Stigler (1974) and Stiglitz (1975).

are treated symmetrically because performing at a level of effort lower than expected is merely a special type of worker "cheating."

Let a worker's marginal product at time t be given by $V^*(t)$; his reservation wage is $\tilde{W}(t)$, and the optimal wage path is $W^*(t)$ (as defined above). Worker "cheating" is assumed to be detectable immediately and the worker is dismissed when he cheats.[6] A worker will cheat when the present value of cheating exceeds the cost of cheating. The major cost of cheating is the loss of the current job which carries with it earnings greater than the individual's reservation wage. This immediately suggests that if wage paths are steeper than VMP paths (and reservation wage paths as the result), this will discourage cheating by workers since it raises the costs of termination. Stated otherwise, a firm which withholds payment until the end of an individual's work life is less likely to experience worker cheating than one that pays workers more at the beginning and less at the end of the worker's career. But if the former path discourages cheating, it results in a higher expected lifetime value of the marginal product. Thus, workers produce more and are paid more if their wage paths are steeper than VMP. But this implies that $W^*(T) > \tilde{W}(T)$. Given that, the worker would not choose to retire at T. Since his VMP is equal to his reservation wage at T, however, it is optimal for him to leave the firm. Therefore, both worker and firm will, at $t = 0$, agree on a "mandatory" retirement date of T. I reiterate that it is only mandatory in the sense that, once at T, the worker would prefer to continue working at $W^*(T)$ if it were available. It is not available because his VMP is less than $W^*(T)$, his reservation wage equals his VMP at that point, and he has been paid exactly the full present value of his lifetime VMP at point T. Time T is the date of ex post mandatory, but ex ante voluntary, retirement.

In order to determine the exact shape of the $W^*(t)$ path, it is necessary to formalize the model: To make the model completely general, we start out with the possibility not only of worker cheating, but of firm cheating as well. Firm "cheating" takes the form of promising a worker a stream $W^*(t)$ from 0 to T, but dismissing the honest worker at some $t < T$ and depriving him of the promised wage stream. The firm's cheating may be intentional or may be "unintentional," if, for example, the firm goes bankrupt before T.[7] Initially, let us assume that firm cheating is unintentional or exogenous and that the distribution of dates t at which the firm "cheats" on the worker is known

[6] This is a result rather than an assumption. It is true because any worker who finds it optimal to cheat at $t = t_0$ will cheat with certainty at $t > t_0$. Therefore, the firm gains by replacing him with a worker whose probability of cheating is less than one at that point.

[7] "Unintentional" is in quotes because the value of bankruptcy depends upon how much the firm owes workers and so is at least in part endogenous.

and given by $\tilde{g}(t)$. Exogeneity of $\tilde{g}(t)$ will be dropped below, but it is useful to adopt the assumption for comparison's sake.

Let the ith worker be assigned a $\theta_i \sim f(\theta_i)$, where θ is defined as the benefit that the worker derives from cheating. It may reflect the utility increase he derives when he works at a low effort level rather than the high effort level promised, or it may reflect something as tangible as revenue from the sale of stolen merchandise. For simplicity, assume that θ_i is constant over the worker's lifetime. If the worker "cheats," assume that he is caught with certainty and that as a result he is terminated. (The problem is complicated somewhat if there is a time lag for detection. As it turns out, that will necessitate pensions as part of the optimal wage path. For now this is ignored.)[8] The expected rent to a worker at time t is

$$R(t) = e^{rt} \int_t^T \Big\{ W^*(\tau) - \tilde{W}(\tau) - \tilde{g}(\tau) e^{r\tau} \int_\tau^T [W^*(\delta) - \tilde{W}(\delta)] e^{-r\delta} d\delta \Big\} e^{-r\tau} d\tau. \quad (3)$$

This rather complicated expression is the value in period t dollars of nominal rents to the worker $[W^*(t) - \tilde{W}(t)]$ minus the probability that the firm will cheat on the worker in the form of early termination $(\tilde{g}[\tau])$ times the cost to the worker of that cheating $(e^{r\tau} \int_\tau^T [W^*(\delta) - \tilde{W}(\delta)] e^{-r\delta} d\delta)$. The worker cheats at time t if $\theta_i > R(t)$. From this, $\tilde{f}(t)$, the probability of worker cheating at time t, is derived:

$$\tilde{f}(t) = \begin{cases} F[R(0)] & \text{for } t = 0, \\ f[R(t)][R'(t)] & \text{for } R' < 0 \text{ and } t > 0, \\ 0 & \text{for } R' > 0 \text{ and } t > 0, \end{cases} \quad (4)$$

where $F \equiv 1 - \int_{-\infty}^{R} f(\theta) d\theta$. That is, at $t = 0$, some individuals, $F[R(0)]$, will have $\theta > R(0)$ and will choose to cheat. If $R'(t) > 0$, then those who did not cheat at $t = 0$ are even less likely to do so now or $\tilde{f}(t) = 0$. If $R'(t) < 0$, some individuals who did not cheat at zero, namely, $f[R(t)]$ $[R'(t)]$, will now find it profitable to cheat, so $\tilde{f}(t) = f[R(t)]$ $[R'(t)]$.

The problem then for the firm is to choose T and $W^*(t)$ so as to maximize the payment to the worker subject to the constraints that lifetime earnings equal lifetime expected VMP and that T is efficient. This can be written:

[8] It is a trivial extension of the model to allow the worker a probability of detection less than one. In the terminology below, $R(t)$ is merely replaced by $R(t) \cdot P$, where P is the probability of detection.

maximize over T, $W^*(t)$

$$\text{wealth} = \int_0^T \Big\{ W^*(t) + \tilde{f}(t)\Big[\theta - e^{rt}\int_t^T W^*(\tau)e^{-r\tau}d\tau\Big] - \tilde{g}(t)e^{rt}\int_t^T W^*(\tau)e^{-r\tau}d\tau \Big\} e^{-rt}dt \tag{5}$$

subject to

$$\text{wealth} = \text{expected VMP} = \int_0^T \Big[V^*(t) - \tilde{f}(t)e^{rt}\int_t^T V^*(\tau)e^{-r\tau}d\tau - \tilde{f}(t)c(t) - \tilde{g}(t)e^{rt}\int_t^T V^*(\tau)e^{-r\tau}d\tau \Big] e^{-rt}dt - \xi, \tag{6}$$

where ξ are hiring costs and the boundary condition is

$$V^*(T) - \tilde{f}(T)c(T) = \tilde{W}(T). \tag{7}$$

Equation (5) says wealth is equal to the wage rate ($W^*[t]$) plus the probability of worker cheating, $f(t)$, times the gain from worker cheating to the worker (θ) minus the cost to the worker ($e^{rt} \int_t^T W^*[\tau]e^{-r\tau}d\tau$), minus the probability of firm cheating, $[\tilde{g}(t)]$, times the cost to the worker ($e^{rt} \int_t^T W^*[\tau]e^{-r\tau}d\tau$). Expected VMP consists of nominal VMP, $[V^*(t)]$, minus the costs imposed by worker cheating equal to the sum of the loss of his output between t and T ($e^{rt} \int_t^T V^*[\tau]e^{-r\tau}d\tau$), and exogenous costs imposed on the firm, $c(t)$,[9] times the probability that the worker cheats, $[\tilde{f}(t)]$, minus the probability that the firm cheats, $[\tilde{g}(t)]$, times the effect on marginal product ($e^{rt} \int_t^T V^*[\tau]e^{-r\tau}d\tau$), minus hiring costs, ξ. Equation (7) says that net VMP at T must equal the reservation wage $\tilde{W}(t)$ for efficiency. The complete solution to the problem is complicated and relegated to an appendix.[10] We merely sketch the solution here.

If $\tilde{g}(t)$ is exogenous, that is, the probability of the firm cheating on the worker is independent of $W^*(t)$, the solution boils down to choosing $W^*(t)$ so as to set $\tilde{f}(t) = 0$, that is, completely eliminating worker cheating. Payment should be weighted sufficiently toward the end of the career so that at every point t it does not pay for the worker to cheat. The exact form of the solution depends upon the distribution of θ_i. In the simplest case, where all workers have $\theta_i = \bar{\theta}$, the solution is indeterminate, but it has the characteristic that at $W^*(T)$, $W^*(T) - \tilde{W}(T) \geq \bar{\theta}$, and that $V^*(T) = \tilde{W}(T)$.[11] The intuition behind this solution

[9] The $c(t)$ may be zero or positive. One example is the loss suffered when the worker takes customers with him upon his departure.

[10] Available from author upon request.

[11] The Becker-Stigler (1974) solution is a special case of this general form.

is clear: If the worker cheats, he imposes cost $c(t)$ on the firm, but receives $\bar{\theta}$. Therefore, the cheating lifetime net VMP and wealth is

$$\int_0^T V^*(t)e^{-rt}dt + [\bar{\theta} - c(t^*)]e^{-rt^*}$$

if the worker cheats at t^*. If he never cheats, his lifetime VMP and wealth is simply $\int_0^T V^*(t)e^{-rt}dt$. As long as $c(t) > \bar{\theta}$, the cost imposed on the firm by worker cheating exceeds the value of cheating to the worker (stolen machines sell at a price less than the replacement cost to the firm) and the zero-cheating path will be preferred. The zero-cheating equilibrium is produced by paths having $R(t) > \theta$ for all t.

Figure 2 illustrates some possible $W^*(t)$ paths. One path is ABP. Here the worker receives a constant amount less than his VMP over his lifetime, but receives a large lump sum at T to set present values of payment and marginal products equal. There is no worker cheating because $R(t)$ is always greater than $\bar{\theta}$; it never pays to cheat. Another possibility is the more conventional LQ curve. Again, there is no worker cheating, and at T the worker receives more than his marginal product. Again, of course, present values of lifetime earnings and marginal products are equal. Another possibility is $LKHQ$. This is the Becker-Stigler (1974) solution where the worker posts a "bond" equal to LM, is paid interest on it (KM), and gets back the principal at T ($HQ = LM$). A fourth possibility is $LHNX$. Here the worker is paid less than his VMP initially, more at T, and receives a pension equal to NX. As long as the present value of remaining rent exceeds $\bar{\theta}$ and the present

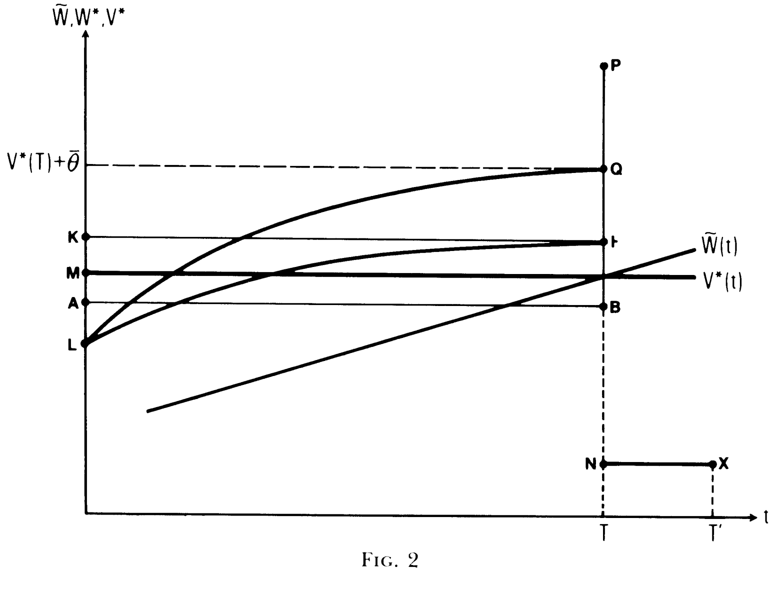

FIG. 2

value of earnings equals present value of payments, this will be an optimal path. This path is probably the most typical.

The important point that comes out of the above analysis is that in all these cases, $W^*(T) > \tilde{W}(T)$. That is, if the worker could continue to earn $W^*(T)$, he would not choose to retire. If he were paid $V^*(T)$, on the other hand, he would choose to retire. Mandatory retirement is warranted because it is optimal for the worker to retire at T, but paying him a wage that would induce him to do so voluntarily would result in more than the optimal amount of cheating. Thus, a path that is optimal from a cheating point of view coupled with mandatory retirement is superior for both worker and firm.

Without going into the details of the analysis, suffice it to say that when $\tilde{g}(t)$, the probability of firm cheating, is endogenous and influenced by the amount owed to the worker, the indeterminacy disappears (as it does for certain distributions of θ_i). The complete analysis is contained in an appendix.[12] The sense of the main result is this: As the amount owed to the worker above his marginal product increases, the gains to the firm from cheating on the worker increase. Therefore, minimizing the sum of cheating costs (which is essentially what [5] does) will trade off reduced worker cheating against increased firm cheating as $W^*(t)$ becomes more end weighted. This eliminates the indeterminacy and tends to reduce the end weighting of the payment stream. Mandatory retirement will still be required, however, since $W^*(T) > \tilde{W}(T)$.

As an aside, it is interesting to ask whether or not $\tilde{g}(t)$ is endogenous. That is, does the firm have a greater incentive to cheat when it owes the worker more? In a world of perfect (or unbiased)[13] information and infinitely lived firms, the answer appears to be "No." In that case, any cheating by the firm would affect the next generation of workers' assessments of $\tilde{g}(t)$. This would raise the wage that the firm has to pay to attract workers, and this cost should just offset the benefit. However, if either of these assumptions is dropped, $\tilde{g}(t)$ may well become endogenous.[14]

A second result is that as firm cheating becomes more profitable and $\tilde{g}(t)$ increases, T declines. That is, mandatory retirement should occur at earlier ages in industries where the incentive for firms to cheat on their workers is higher. This is because the left-hand side of equation (7) is reduced as $\tilde{f}(t)$ increases and less end weighting of the wage path produces a higher $\tilde{f}(t)$.

[12] Again, available from the author upon request.

[13] See Fama (1978) on this point.

[14] This suggests that a firm with an unanticipated decrease in its horizon will be more likely to cheat on workers. Thus, one may expect to find that the incidence of pension default and early termination is higher in declining industries.

One final and important implication results from the analysis: Other things constant (including education, ability, etc.), workers who have steeper profiles are more likely to have entered a long-term contract designed to prevent cheating. A necessary consequence of this contract is mandatory retirement. Therefore, individuals whose lifetime wage growth rate is higher than anticipated are more likely to have mandatory retirement. This somewhat counterintuitive implication that the high-performing, honest workers, with high wage growth rates, are more likely to have mandatory retirement is tested in the empirical section. The prediction is unequivocally supported by that evidence.

Note that pensions are a possibility, but not a necessity up to this point. Path *LHNX* in figure 2, for example, is one possible path. Two added considerations make pensions part of the optimal determinate wage path. The first, and most obvious, is a progressive income tax structure which makes a lump-sum payment at T less desirable than a smooth pension flow from T to T'. The second is relaxation of the assumption that cheating is observed immediately. If there were a lag time required for detection, then it would be optimal to withhold some payment until after T, or until the results were in, as it were. Pensions would act as such a holdback. This argument is somewhat less compelling than the first, however, because it requires that firms be allowed to terminate pension payments after they have already begun to make them. As an empirical phenomenon, the significance of midstream termination is doubtful.[15]

B. *Stochastic Variation*

Another consideration is important. There is a potential inefficiency in this model which is tied to the question of early retirement. One observes that individuals sometimes leave the firm before T, the date of mandatory retirement. Does this suggest a mistake or inefficiency implicit in the lifetime contract? The answer is no. Consider figure 3.

Suppose that we introduce a stochastic component to the analysis such that at time t^*, the worker receives an unexpected offer of $\tilde{W}_{t^*}$ from another firm. Under these circumstances, the worker would not leave the original firm, because $W^*(t^*) > \tilde{W}_{t^*}$. However, if $\tilde{W}_{t^*}$ mea-

[15] An alternative justification for a wage profile which rises more steeply than VMP is risk aversion coupled with uncertainty about VMP. If some workers will have low VMPs in the future relative to others, but neither workers nor firms can identify these workers initially, workers will prefer to buy "insurance" from the firm. This notion, which is described in detail in an earlier version of this paper, is related to the insurance ideas of Baily (1974), Azariadis (1975), Grossman (1977), and the self-selection analyses of Rothschild and Stiglitz (1976) and Salop and Salop (1976). The empirical evidence, however, is at odds with this view and so I only mention it in passing.

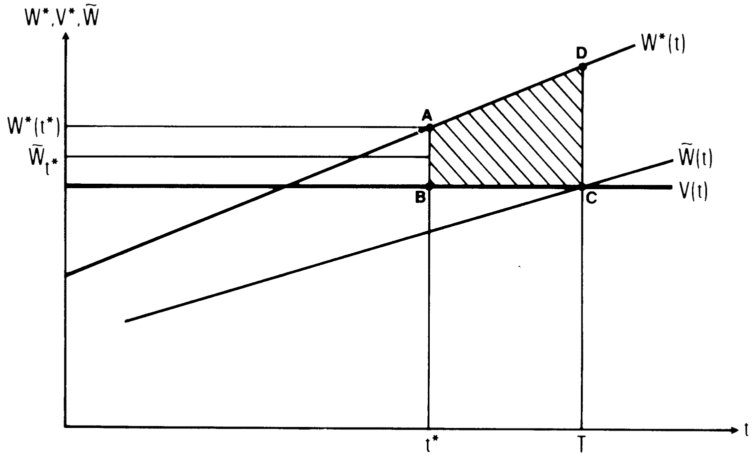

FIG. 3

sures his VMP in the alternative firm, it is inefficient for him to remain with the original firm since $\tilde{W}_{t*} > V(t^*)$. That is, his social value is greater at the alternative firm, yet he remains with the original firm only because his wage rate is higher there. This is clearly inefficient, and it is unnecessary. An appropriate severance payment will eliminate the inefficiency which seems at first glance to be a necessary consequence of long-term contracts. At t^*, the original firm still "owes" the worker area *ABCD* as payment (with interest) for service rendered between 0 and t_0. If the firm were to make a lump-sum payment to the worker at t^* equal to area *ABCD* in t^* dollars, the firm would have paid out over the worker's lifetime an amount exactly equal to the present value of his marginal product. This is the equilibrium condition for the firm's payment through T, so the firm suffers no loss by allowing the worker to quit at t^* with severance pay. The worker, however, is better off. As the result of taking the job at the alternative firm and receiving severance pay, he will receive the present value of $W(t)$ from 0 to T plus the present value of the difference $\tilde{W}(t^*) - V(t)$ from t^* to T. That is,

$$\text{the present value of earnings} = \int_0^{t^*} W^*(\tau)e^{-r\tau}d\tau + \int_{t^*}^{T} [W^*(\tau) - V^*(\tau)]e^{-r\tau} + \int_{t^*}^{T} \tilde{W}(t^*)e^{-r\tau}d\tau$$

$$= \int_0^{T} W^*(\tau)e^{-r\tau}d\tau - \int_{t^*}^{T} V^*(\tau)e^{-r\tau}d\tau + \int_{t^*}^{T} \tilde{W}(t^*)e^{-r\tau}d\tau$$

$$= \int_0^{T} W^*(\tau)e^{-r\tau}d\tau + \int_{t^*}^{T} [\tilde{W}(t^*) - V^*(\tau)]e^{-r\tau}d\tau,$$

which exceeds his earnings at the original firm $\left[= \int_0^T W^*(\tau)e^{-r\tau}d\tau\right]$ by the difference between $\tilde{W}(t^*)$ and V^* for the appropriate period. Thus, the worker and firm behave efficiently as long as severance pay is permitted.

One form that the severence-pay arrangement may take is increased pension benefits. Thus, we expect that workers who retire early would receive a larger expected pension than those who work through T. This is a characteristic of many pension plans (as will be discussed below).

The qualification raised in the last few paragraphs is an important one because it reconciles the phenomenon of early retirement with the lifetime payment scheme suggested earlier. It is also important because it means that unexpected changes either in the alternative use of time (as another employment offer or a change in the value of leisure, say, due to poor health) or in the value of the marginal product at the original firm (say, due to business-cycle conditions) do not result in an inefficiency. This long-term contract carries no immobility costs as long as severance pay (or pension adjustment) is permitted.

C. *The Choice of* T

The past few pages have argued that mandatory retirement is the necessary consequence of an optimal wage scheme which makes both workers and firms better off. There, the existence of some T or date of mandatory retirement was determined optimal. But one important issue remains: The formal model presented in Section A yields a solution for T given the parameters. However, one observes that the actual distribution of T is not as smooth as one might expect from that model. That is, the reservation wage functions are likely to be smooth, and this would imply a smooth distribution of T. The real world seems to be characterized by a set of T's that take particular values. One source (Banker's Trust 1975), which sampled firms which employed a total of 8.4 million workers (about 10 percent of the civilian labor force) in 1970–75, reports that of firms which stated an age of mandatory retirement, over 87 percent had that age equal to 65. This suggests that there is some exogenous factor which pulls T to age 65. An obvious candidate for prime mover is the social security provision which becomes available at age 65. Consider the reservation wage function in figures 1 and 2. If at 65 an individual becomes eligible for a social security subsidy to leisure, the reservation wage $\tilde{W}(t)$ is likely to take a discrete jump upward at 65. This means that voluntary retirement takes a discrete jump at age 65 as well, which implies that the choice of T such that age equals 65 is most likely. An implication of this argument is that before social security, the distribution of mandatory-retirement ages among firms with mandatory retirement would have been more dispersed. Unfortunately, no data are available on this point.

Social security is one possible determinant of T. There may be others as well. Social security payments do not affect all individuals in the same way. High-wage workers, for example, may find the social security subsidy to leisure relatively less attractive than do low-wage workers. As a result, ages of mandatory retirement might vary by the characteristics of the workers. An obvious determinant of retirement date is education. If education increases the value of work by more than the value of leisure, one would expect more educated workers to retire later (Bowen and Finegan [1969] find this positive relationship). If, as this paper claims, mandatory retirement is the outgrowth of an optimal long-term contract, we might then expect that conditional upon having mandatory retirement, education and the age of mandatory retirement will be positively correlated. This is explored in the empirical analysis below. In addition, anything that affects $\tilde{f}(t)$ and $\tilde{g}(t)$ will affect the choice of T. If either probability of cheating is higher, T will be lower. Thus, the age of mandatory retirement will be negatively related to the probability of early termination.

II. Some Implications of the Model

In the previous section, a model was presented which has implications for the incidence of mandatory retirement by job and demographic characteristics. In this section I will explore these implications in greater detail and outline the empirical tests which will be discussed in the next section.

The first and most important implication of the model is that mandatory retirement is more likely to be found where job tenure is long. That is, we portray mandatory retirement as the consequence of an optimal long-term contract between a worker and firm. If contracts are short term, say week by week or even year by year, profiles where wages are below VMP early in life and above VMP late in life are infeasible. Mandatory retirement is only useful in a long-term context.

Another implication, already discussed, is that unanticipated wage growth and the existence of mandatory retirement should be positively correlated. This, too, can be tested easily. By looking at an individual's work history and corresponding wage growth one can see how it relates to mandatory retirement. The argument on wage growth relates to the part that is unobservable at $t = 0$. Some differences are anticipated. We know, for example, from the outset that more educated workers learn more rapidly than the less educated. We therefore want to compare two individuals with the same observable characteristics.[16] The one with the most rapid wage growth, given these characteristics, is then the one with the higher probability of mandatory retirement under the incentives view. We therefore expect the probability of mandatory retirement to be positively related to the difference between actual wage growth and predicted (at time $t = 0$) wage growth.

Wage growth and job tenure are not exogenous variables. They are themselves the result of a choice process that is based on lifetime optimization. This suggests that mandatory retirement will be correlated with those variables that underlie wage growth and job tenure determination. That is, a reduced form, as well as structural approach, may prove interesting. For example, to the extent that whites have longer job tenure than nonwhites, whites should have a higher incidence of mandatory retirement. Similarly, if males enjoy longer job tenure than females, they will experience more mandatory retirement. Similarly, union workers, who have longer job tenure than nonunion workers (see Medoff 1976), should be more likely to experience mandatory retirement. It should be noted that these implications are the opposite of those derived from a queue or discrimination theory. If mandatory retirement were a way to reduce the labor force and make room for the younger, more desirable workers, one would expect that blacks, females, and the poorly educated would be the most affected. (They are the workers who suffer most from layoffs—the phenomenon that queue theory was formulated to explain.) The hypothesis in this paper, where mandatory retirement is viewed as the result of optimal lifetime contracting, suggests that it is the more favored rather than least favored workers who face mandatory retirement.[17]

Pensions are one way to compensate the worker at T. It was argued above that if there is a progressive tax structure which taxes lump-sum payments at a higher rate than it does pensions, or if cheating is detected with a lag, pensions will be part of the optimal path. Thus, pensions should be positively correlated with mandatory retirement since they both are manifestations of the same contractual arrangement. Also important is that it is necessary to have some type of severance pay in order to avoid the inefficiencies of a long-term contract. As argued above, paying higher pensions to those who retire

[16] What is observable to the economist may be much more limited than that which is observable to the employer. It is the latter that is relevant. We are, unfortunately, restricted to the former.

[17] It has been suggested that this view explicitly characterizes the Japanese labor market. Mandatory retirement takes place at age 55 after a long-term contract with the firm has been completed. Often, renegotiation takes place and the worker remains with the firm after 55 (see, e.g., Hashimoto [1977]).

before T is one such arrangement. Burkhauser (1976) finds that workers who leave the firm before the normal retirement date receive a pension, the actuarial value of which is a monotonic increasing function of the years to normal retirement. This is strong support for the long-term contract view.

This model reinforces the implication of many firm-specific labor models that older workers, if laid off, will have a difficult time finding another job at the same wage. If wage exceeds VMP for older workers, a new firm will be unwilling to pick this worker up at his previous wage.

An additional implication comes from considering types of compensation. Since the steep wage path which necessitates mandatory retirement is seen as the result of an agency problem, piece-rate workers are unlikely to experience mandatory retirement. Mandatory retirement was the necessary consequence of a payment scheme which induced workers to perform optimally. A piece-rate compensation scheme is a substitute. Under this type of payment scheme, workers always have an incentive to reveal their true ability or effort.[18]

The explanation of mandatory retirement provided in this paper also suggests a particular life-cycle pattern of preference for mandatory retirement. In this scheme workers at $t = 0$ prefer the payment arrangement that implies mandatory retirement. Firms prefer this arrangement as well. At time T, however, given that the worker and firm have followed the mandatory-retirement plan, firms favor mandatory retirement for the old worker, but the worker may oppose it vehemently, even though he favored it when he was young. That is, his lifetime wealth is higher with the mandatory-retirement scheme than without it, but given the wage path, his wealth would be even higher if he could continue to work at $W^*(T)$ beyond T. Thus, firms will oppose laws that restrict the use of mandatory-retirement contracts (explicit or implicit). Labor, in general, will also oppose these laws. Old workers, however, will push for legislation that makes mandatory retirement illegal since they can increase their wealth levels by doing so, given that they enjoyed wage paths $W^*(t)$ from $t = 0$ to $t = T$. This closely parallels the demographic breakdown of support of revisions to the Age Discrimination in Employment Act. Both business and organized labor opposed raising the age of exemption to 70. Major support, however, came from lobbying groups which represent the interests of the elderly.[19]

[18] Unfortunately, data on piece-rate vs. time-rate compensation are very difficult to obtain. They are unavailable in the data set used below in this study.

[19] It should be pointed out, however, that there are many other models of mandatory retirement which generate the same structure of preferences. On the other hand, Ehrenberg (1978) finds that firefighters and policemen who have mandatory-retirement provisions also obtain higher wages. This is consistent with this model.

III. An Empirical Model

In this section, the implications discussed above will be given specific functional form and will be tested empirically. Let MR be a dummy which equals one if the individual in question has a mandatory retirement provision on his current job, and zero otherwise.[20] Let E be the number of years that the worker has been employed with his current firm. Let AWG be the average level of wage growth over the individual's lifetime. Then the theory above predicts that

$$\text{prob}\ (MR = 1) = \frac{1}{1 + \exp\{-[\alpha_0 + \alpha_1 E + \alpha_2(AWG - \hat{AWG})]\}}, \quad (9)$$

where $\hat{AWG}$ is the predicted level of wage growth from a wage growth regression. Further, there will be equations for the determination of E and AWG as well:

$$E = \beta_0 + \beta_1\ \text{Male} + \beta_2\ \text{White} + \beta_3\ \text{Ed} + \beta_4\ \text{Urban} + \beta_5\ \text{Married} + \beta_6\ AFJ, \quad (10)$$

where Male, White, Urban, and Married are zero-one dummies, and Ed is the years of schooling completed; AFJ is the age of first job. (This corrects for vintage and inflation effects.)

$$AWG = \gamma_0 + \gamma_1\text{Male} + \gamma_2\ \text{White} + \gamma_3\ \text{Ed} + \gamma_4\ \text{Urban} + \gamma_5\ \text{Married} + \gamma_6\ AFJ. \quad (11)$$

Alternatively, one can specify the following reduced-form equation:

$$\text{prob}\ (MR = 1) = 1/\{1 + \exp[-(\eta_0 + \eta_1\text{Male} + \eta_2\text{White} + \eta_3\text{Ed} + \eta_4\text{Urban} + \eta_5\text{Married} + \eta_6 AFJ)]\}. \quad (12)$$

The signs of the coefficients in (14) should be the same as the product of the sign on the corresponding variable in (12). This is because α_1 is positive and because $AWG - \hat{AWG}$ should not vary with any of these variables if (13) is specified correctly.

The same set of equations can be estimated with MR replaced by PP, where PP is a dummy equal to one if there is a pension plan. Thus,

$$\text{prob}\ (PP = 1) = \frac{1}{1 + \exp\{-[\delta_0 + \delta_1\text{Ed} + \delta_2(AWG - \hat{AWG})]\}}. \quad (13)$$

[20] This variable actually understates the true incidence of mandatory retirement. Some retirement is mandatory as a result of pension schemes which essentially prevent anyone from continuing to work past 65. For example, mandatory retirement is likely to be unnecessary in a firm that offers no pension to individuals who leave the firm after age 65, and a full salary pension to those who leave at 65. This points out that the mandatory-retirement response is itself a function of price. Some attempt to deal with response bias is made below.

If δ_1 and δ_2 have the same signs as α_1 and α_2, we might expect a positive simple correlation between *PP* and *MR*.

The data used in this analysis came from the Longitudinal Retirement History Survey, 1969–71. This is a panel study of about 11,000 individuals who were 58–63 years old in 1969. A follow-up survey was done in 1971, and the data used in this analysis are derived from that wave. Only those working in 1971 were used so that data on wages could be obtained.

All were asked whether or not their firm had a mandatory-retirement provision which applied to them. An affirmative answer to this question was coded as $MR = 1$. The wage rate, W, is the hourly (actual or derived) wage rate on the current job. The measure of job tenure used, E, is the difference between the question date and the date at which the individual reports to have started his current job. Average wage growth, AWG, is constructed as follows: Individuals were asked what their wage rates were on their first full-time jobs. (The starting wage on their current job was not reported.) They also reported the age at which they took this job. Thus, define

$$AWG \equiv \frac{W_t - W_{t_0}}{t - t_0}, \qquad (14)$$

where t_0 is the age of first job and t is the individual's current age. All other variables were defined above.

IV. Results

First and most important, it should be noted that both job tenure and wage growth affect mandatory retirement positively. This is seen in equation (9) in table 1. Individuals who have longer job tenure and more rapid unanticipated wage growth are the ones who are most likely to face mandatory retirement. This finding, although consistent with the theory of this paper, is hard to reconcile in terms of queue or discrimination theories of mandatory retirement. Note that the effect of $AWG - \widehat{AWG}$ is positive and substantial. This is consistent with the incentives or agency view of mandatory retirement. Second, note that the reduced-form coefficients in equation (12) go in the direction predicted by this theory but seem inconsistent with theories of discrimination. Note in particular that males and highly educated workers are the ones most likely to have mandatory retirement.[21]

It is interesting that the pension-plan equation (13) and the mandatory-retirement equation (9) are very similar and that the reduced-form versions are not very different. The theory related to

[21] The reversal in signs on the urban variable may reflect the fact that information is easier to obtain in small towns and there is, therefore, less need for payment schemes which require mandatory retirement.

TABLE 1

Logit and OLS Results

	Eq. (9): MR			Eq. (10): E	Eq. (11): AWG	Eq. (12): MR			Eq. (13): PP			PP		
	Logit	$\frac{\partial \bar{MR}}{\partial X_i} \cdot \frac{X_i}{\bar{MR}}$	$\frac{\partial \bar{MR}}{\partial X_i}$	OLS	OLS	Logit	$\frac{\partial \bar{MR}}{\partial X_i} \cdot \frac{X_i}{\bar{MR}}$	$\frac{\partial \bar{MR}}{\partial X_i}$	Logit	$\frac{\partial \bar{PP}}{\partial X_i} \cdot \frac{X_i}{\bar{PP}}$	$\frac{\partial PP}{\partial X_i}$	Logit	$\frac{\partial PP}{\partial X_i} \cdot \frac{X_i}{\bar{PP}}$	$\frac{\partial PP}{\partial X_i}$
E	.02727	.31	.006	...	...	...	...	...	.02958	.28	.007	...	...	...
	(.00249)								(.00249)					
$AWG–A\hat{W}G$	2.8992	*	.661	...	...	...	...	...	5.8557	*	1.46	...	...	...
	(.502)								(.5791)					
Male	...	...	...	2.25	.0640	.2268	†	.051	...	...	...	.3451	†	.086
				(.87)	(.0135)	(.1398)						(.1345)		
White	...	...	...	1.00	.0118	.0757	†	.017	...	...	...	.2650	†	.066
				(.77)	(.0119)	(.1299)						(.1231)		
Ed	...	...	...	.153	.0084	.0963	.655	.021	...	...	...	.0945	.51	.023
				(.062)	(.0009)	(.0100)						(.0097)		
Urban	...	...	...	−.289	.0183	.2254	†	.051	...	...	...	.3492	†	.087
				(.423)	(.0065)	(.0672)						(.0652)		
Married	...	...	...	1.015	−.0201	−.0244	†	−.007	...	...	...	.0221	†	.006
				(.769)	(.0118)	(.1230)						(.1185)		
AFJ	...	...	...	−.174	.0014	.0011	.014	.0002	...	...	...	−.0129	−.14	−.003
				(.030)	(.0004)	(.0049)						(.0048)		
DMR	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Constant	−1.1067	...	...	16.1	−.0833	−1.9852	...	...	−.5582	...	...	−1.4727	...	...
	(.057)			(1.2)	(.0194)	(.2105)			(.0545)			(.200)		
SEE	...	...	...	13.27	.205	...	...	...	...	...	...	...	...	...
N	4,123	...	...	4,123	4,123	4,123	...	...	4,123	...	...	4,123	...	...
$-2 \log \lambda$	186.7	...	...	...	...	119.9	...	...	324.9	...	...	180.7	...	...
R^2	...	...	...	.025	.029	...	...	...	...	...	...	...	...	...

Note.—Standard errors are in parentheses.

*$AWG - A\hat{W}G = 0$ by construction; $\overline{AWG} = .088$.

†Dummy variables; $\bar{MR} = .352$, $\bar{PP} = .485$.

lifetime labor force contracts predicts that this would be the case (note that the mean value of MR is .35 and the mean value of PP is .49). The exogenous variables seem to have virtually the same effect on the existence of mandatory retirement as they do on the existence of pension plans. Furthermore, the correlation between mandatory retirement and pension plans in a simple sense is extremely high. In this sample, 62 percent of those with a pension plan have mandatory retirement. Further, 86 percent of those who have mandatory retirement also have a pension plan. This finding is important. It is strong support for the coupling of mandatory retirement and pensions. The theory above suggests that they should be linked directly as each is the outcome of the same optimal contract. That is, in a world where the tax rate is higher on a lump-sum payment than on a smooth flow of income with the same present value, or in a world where cheating is detected with a lag, all wage paths that have mandatory retirement will also have pensions.

As mentioned above, there may be reporting bias associated with the MR variables. New workers, for example, may be less aware of the rules of the firm and less likely to report the existence of mandatory retirement. To treat this, individuals with tenure levels in the twentieth percentile were separated from the rest of the sample, and the estimation contained in table 1 was repeated for each group separately. (The low-tenure group had $0 \leqslant E \leqslant 4.3$; the high-tenure group had $4.3 \leqslant E \leqslant 59.0$.) The results, only summarized here for the sake of brevity, reveal the same basic story as table 1. Deletion of the low-tenure individuals leaves the results for the top 80 percent essentially unchanged. In addition, the results for the low-tenure group were similar to those for the high-tenure group. The only notable difference is that for this group, married workers were less likely to face mandatory retirement than unmarried ones.

Some empirical evidence can be obtained on variations in T, the age of mandatory retirement, across individuals. Earlier it was suggested that more highly educated individuals would have optimal dates of retirement later in their lifetimes. If the skills which they acquired in school were relatively more useful in the labor market, then they would have an incentive to continue working longer than less educated workers. It follows, then, that if mandatory retirement is a manifestation of an optimal long-term contract, more educated workers should have older ages of mandatory retirement.

In table 2, a regression is presented in which the age of mandatory retirement is regressed on demographic variables, education, and job tenure. The sample contains only those who face mandatory retirement. The first point is that education has an important (in size and precision of estimate) effect on the age of mandatory retirement. It

TABLE 2

REGRESSION AND LOGIT RESULTS

	MR Age OLS
Male	−.093
	(.256)
White	−.387
	(.246)
Ed	.118
	(.017)
Urban	−.133
	(.120)
Married	.198
	(.225)
AFJ	−.005
	(.009)
E	−.032
	(.004)
Constant	66.4
	(.4)
R^2	.066
N	1,429
SEE	2.25

NOTE.—Standard errors are in parentheses.

appears as though more educated workers make contracts which end at a later point in their life cycles. This is consistent with the notion that they choose to retire later voluntarily as well.

Second, note that job tenure has a negative effect on the age of mandatory retirement. In the context of this sample of old workers, all of whom are about the same age, job tenure is a proxy for the date at which the employment contract was made. Holding age about constant, those workers with fewer years of job tenure also have more recently made a "contract" with the employer than those with longer tenure. The results suggest that more recent contracts specify a later age of mandatory retirement. Individuals who have made more recent contracts may have done so either because the value of their leisure did not rise as rapidly as they expected ($\tilde{W}[t]$ is flatter than had been anticipated) or because they ended up being more productive in the labor force than expected ($V^*[t]$ is higher than anticipated). In either case, it is optimal for them to be "bought out" of their previous contract (through severance pay or early pensions) and to negotiate a new one. The new one will have a later date of mandatory retirement because, as equation (6) shows, the higher is $V^*(t)$ or the flatter is $\tilde{W}(t)$, the later will be the date of mandatory retirement.

Third, the coefficient on White is negative. Other things constant, whites have earlier ages of mandatory retirement than blacks. Although the explanation of this phenomenon is not obvious, let us conjecture. Even holding education and urbanization constant, whites have substantially higher income than blacks. This is especially true of nonwage income. Thus, if the education effect captures most of the wage variation, the white variable may well proxy higher property income. Since the income effect on leisure is positive, holding education constant yields an increase in the demand for leisure via income effects, so whites are richer individuals with the same wage rate. As such, whites prefer to work less and therefore set up contracts with earlier retirement dates.

V. Summary and Conclusions

This paper provides an explanation of the institution of mandatory retirement that is derived from optimizing behavior on the part of both workers and firms. The theory, simply stated, is that it pays both parties to agree to a long-term wage stream which pays workers less than their VMPs when young and more than the VMPs when old. By using this payment schedule, the worker's lifetime VMP is higher than it would be in the absence of that scheme because this provides valuable incentives to the worker which would otherwise be lost to moral hazard. A necessary consequence of this payment schedule is mandatory retirement, that is, a date at which the contract is terminated and the worker is no longer entitled to receive a wage greater than his VMP. Its mandatory nature is illusory, however. The date of mandatory retirement is the social and private optimum date of retirement.

This theory has some perhaps counterintuitive implications. It suggests that the long-tenured and most able workers will face mandatory retirement rather than the least tenured. It predicts that the highly educated, white, male workers are the ones most likely to be mandatorily retired. These predictions are borne out in the empirical section.

The most important implication of this theory is that workers and firms all benefit from the existence of mandatory retirement. Although older workers may be unhappy about this provision when the retirement day draws near, their lifetime wealth levels are increased as the result of being able to enter into these kinds of contracts. What they lose by being mandatorily retired is more than offset by what they have gained during working years as the result. As mandatory retirement is made illegal before age 70 and the social security payment age is not raised accordingly, there will be an efficiency loss as voluntary and mandatory retirement ages diverge. If the ability to enter into mandatory-retirement contracts is eliminated through legislation, this analysis argues that current older workers will enjoy a small once-and-for-all gain at the expense of a much larger and continuing efficiency loss that affects all workers and firms adversely.

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