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ABSTRACT

In Lazear's (1979) model of efficient long-term incentive contracts, employers impose involuntary retirement based on age. This model implies that age discrimination laws, which bar involuntary terminations based on age, discourage the use of such contracts and reduce efficiency. Alternatively, by making it costly for firms to dismiss older workers paid in excess of their marginal product, such laws may serve as precommitment devices that make credible the long-term commitment to workers that firms must make under Lazear contracts. Given that employers remain able to use financial incentives to induce retirement, age discrimination laws may instead strengthen the bonds between workers and firms and encourage efficient Lazear contracts.

We assess evidence on these alternative interpretations of age discrimination laws by estimating the effects of such laws on the steepness of age-earnings profiles. If long-term incentive contracts are strengthened or become more prevalent, average age-earnings profiles should steepen for workers who enter the labor market after age discrimination laws are passed, and vice versa. The empirical analysis uses decennial Censuses of Population and state-level variation in age discrimination laws induced by state and federal legislation. The evidence indicates that age discrimination laws lead to steeper age-earnings profiles for cohorts entering the labor market, suggesting that these laws encourage the use of Lazear contracts, and increase efficiency.

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I. Introduction

The Age Discrimination in Employment Act (ADEA) was originally enacted by Congress in 1968, to "promote employment of older persons based on their ability rather than age; to prohibit arbitrary age discrimination in employment; to help employers and workers find ways of meeting problems arising from the impact of age on employment." Although the stated intent of the ADEA was the prohibition of age discrimination, influential research by Lazear (1979, 1981) pointed to ways that the law may have had other consequences that benefited currently-older workers, but impaired efficiency.

In particular, Lazear developed a model in which efficient long-term incentive contracts ("Lazear contracts") entail older workers being paid more than their marginal product, and more than their reservation wage, while younger workers are paid less than their marginal product. Thus, Lazear's model provides a characterization of labor markets that can generate rising age-earnings profiles even if age-productivity profiles are flat or declining. The model also provides insight into the potential effects of age discrimination laws. Specifically, because the wage of older workers exceeds their reservation wage, an implication of eliminating the ability of firms to use involuntary retirement based on age is 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" (Lazear, 1979, pp. 1283-84). Although this model is difficult to test in the absence of explicit productivity measures and there are other models with similar empirical implications, there is a considerable amount of evidence that is at least consistent with Lazear's model of rising age-earnings profiles (e.g., Hellerstein, et al., 1996; Kotlikoff and Gokhale, 1992; Kotlikoff and Wise, 1985; Medoff and Abraham, 1980). We therefore think it is of interest to examine evidence on the effects of age discrimination laws and the efficiency implications of

Lazear's model.

There are other considerations, however, which suggest that legislation barring age discrimination may encourage, rather than discourage, the formation of Lazear contracts. First, some research (e.g., Burkhauser and Quinn, 1983a) suggests that mandatory retirement was not a very important determinant of retirement age. In addition, despite restrictions on involuntary retirement based on age, firms have remained able to offer financial incentives to induce retirement at specific ages. Finally, the ADEA also prohibited age discrimination in layoffs (see, e.g., Levine, 1988), which may have inhibited firms from opportunistically reneging on long-term implicit contracts with older workers. As such, the ADEA may serve as a "precommitment" mechanism of the type studied by Schelling (1978, 1983). With its prohibition of age-based firings essentially providing a means for workers to enforce Lazear-type contracts, the ADEA may encourage workers to enter into such contracts. These considerations raise the possibility that age discrimination laws may encourage the formation of Lazear contracts, and hence increase rather than decrease labor market efficiency.

This paper evaluates evidence on these two competing views of age discrimination laws, by considering the effects of such legislation on a proxy for the use of Lazear contracts--the steepness of age-earnings profiles. Assuming that the slopes of productivity profiles are unaffected, if age discrimination laws inhibit the formation of Lazear contracts, and thus reduce labor market efficiency, they should lead to flatter earnings profiles. In contrast, if they strengthen the bonds between workers and firms, such laws should increase efficiency by encouraging Lazear contracts, and lead to steeper earnings profiles. Our identifying information comes from the fact that many states passed legislation barring age discrimination prior to the passage of federal legislation. In addition, we examine more general evidence on the effects of the prohibition of age

discrimination on employment of older and younger workers. This is of interest in its own right, and also because we expect any consequences for long-term contracting to be more severe if employment of older workers increases subsequent to the passage of age discrimination laws.

II. Interpreting Age Discrimination Laws

To provide a framework for thinking about the effects of age discrimination laws such as the ADEA, we consider a version of Lazear's model based on Lang (1989). To simplify the analysis, hours choices are eliminated. The notation is as follows:

v_t = worker's marginal revenue product in period t

w_t = wage

s_t = utility of leisure

e_t = disutility of effort

q_t = probability of detection and firing

i = discount rate of workers (constant)

r = discount rate of firms (constant)

P_T = pension paid at end of last period (T)

b = bond posted by workers at beginning of first period.

Workers have an intertemporally separable utility function defined over income and the disutility of work and effort:

$$(1) \qquad u_t = w_t - e_t - s_t \quad .$$

R_t is the "surplus" to a worker in period t from keeping his job, which is equal to

$$(2) \qquad R_t = \sum_{j=t+1}^{T} \left(\frac{w_j - e_j - s_j}{(1+i)^{j-t}} \right) + \frac{P_T}{(1+i)^{T-t+1}} \quad .$$

The no-shirk condition in each period t--such that the utility from not shirking is greater than or equal to the utility from shirking--is

$$(3) \qquad w_t - e_t - s_t + R_t \geq w_t - s_t + (1-q_t)R_t \quad .$$

Firms are assumed to hire a single worker, choosing a bond (b), wage profile (w_t, $t = 1, \ldots, T$), pension (P_T), and retirement date (T). Labor is the only input to the production process. The firm's problem is to maximize the present discounted value of profits, subject to the constraint that the worker's utility is greater than or equal to that in the competitive sector, and subject to the no-shirk condition holding in each period.

Lazear (1979) considers the case of costless bonding, captured in this model by setting $i = r$. Thus, for example, workers do not fear that firms may renege on long-term contracts, and hence do not discount the future more heavily than do firms. The implications of costless bonding are easily derived in this framework, and match those derived by Lazear in a continuous-time setting. When $i = r$, the no-shirk condition need not be binding in every period. On the other hand, the constraint with respect to the competitive level of utility is binding. This implies that the optimal solution with respect to the wage profile, bond, and pension is characterized only by the constraint that workers receive utility equal to that in the competitive sector. Other than this, the structure of the compensation package is indeterminate; in particular, nothing discourages backloading of contracts.

The optimal retirement date is a discrete variable, chosen such that the change in profits at the retirement date T is zero. Application of this decision rule implies that involuntary or

mandatory retirement occurs when the worker's marginal product is equal to the disutility of work, or $v_T = e_T + s_T$, which is required for efficiency. Workers are willing to accept retirement at T ex ante, but ex post it is involuntary. This, of course, is the basis of Lazear's critique of the ADEA. Specifically, if long-term incentive contracts with involuntary retirement are efficient, then legislation that destroys the ability to "write" such contracts must reduce efficiency.[1]

Despite the negative theoretical implications of age discrimination laws in Lazear's model, there are reasons to believe that age discrimination laws have in fact had little impact on firms' ability to induce retirement. First, although not all pension plans encourage early retirement, firms have remained able to offer financial incentives that induce retirement at specific ages (Mitchell and Fields, 1984 and 1986; Gustman and Steinmeier, 1986; Kotlikoff and Wise, 1985, 1987, 1989a and 1989b; Burkhauser, 1979; Nalebuff and Zeckhauser, 1985; Lazear, 1985; Burkhauser and Quinn, 1983a and 1983b; Hurd, 1990).[2] The legality of financial inducements to retire under the ADEA is codified in the 1990 Older Workers Benefit Protection Act (OWBPA), which specified conditions that such incentives must satisfy (Ford and Horn, 1992).[3] Second, much

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[1]Lazear's critique specifically referred to raising (and eventually eliminating) the mandatory retirement age. But as a general matter, age discrimination laws impair firms' ability to impose the involuntary (ex post) retirement that is required as part of Lazear contracts, and hence could entail efficiency losses in his model. Efficiency losses would only be avoided if the age range in which age discrimination is prohibited does not cover ages at which optimal Lazear contracts would end. There is no compelling reason to believe that an age such as 65, which was the upper bound for defining protected workers in the original ADEA, satisfies this criterion for all firms, despite the fact that prior to the ADEA 65 was the most common mandatory retirement age. Moreover, many of the age discrimination laws that we study in this paper cover workers over age 65, and may therefore effectively raise (or eliminate) the mandatory retirement age. Even if one questions extending the implications of Lazear's model to age discrimination laws generally, the evidence we present nonetheless addresses the effects of these laws.

[2]Empirically, such retirement incentives in pension plans (and Social Security) have been found to be effective in inducing retirement (Fields and Mitchell, 1984; Hurd and Boskin, 1984; Rees and Smith, 1991; Slade, 1987).

[3]This act did, however, attempt to outlaw coercing employees into taking early retirement, and to restrict the use of reduced benefits except when reductions could be justified on the basis of higher costs to older workers (Wiencek, 1992), overturning a 1989 Supreme Court ruling that excluded benefits from coverage by the ADEA (Albert and Schelberg, 1989; Kass, 1986).

research suggests that mandatory retirement per se was generally unimportant in inducing retirement for all but a small percentage of workers (e.g., Ruhm, 1990; Halpern, 1978; Parnes and Nestle, 1975; Fields and Mitchell, 1986). Burkhauser and Quinn (1983a) find that pension and Social Security characteristics explain much (but not all) of the higher retirement probabilities at mandatory retirement ages of those workers subject to mandatory retirement. Pension characteristics might explain even more behavior when workers have more accurate information about retirement incentives (Mitchell, 1988), which they may when firms are trying to encourage retirement. Thus, it could be argued that the ADEA did very little in the way of eliminating mandatory retirement, except in name, making the primary channel through which age discrimination laws reduce efficiency in Lazear's model largely inoperative.[4]

On the other hand, age discrimination laws may have beneficial effects. In the context of a different question, Lang (1989) considers the case in which bonding in the model laid out above is costly. In particular, he assumes that $i > r$, or workers' discount rates exceed those of firms. This is intended to capture costly bonding because, for example, with some possibility of firms reneging on long-term incentive contracts workers discount future flows of utility or income more heavily than do firms.[5] The introduction of costly bonding has important implications for the optimal wage profile and retirement age. First, the structure of the compensation package (i.e., the wage paid in each period, the pension, and the bond) now becomes determinate. This occurs

[4]Of course, using financial incentives to induce retirement at specific ages may be more costly than using mandatory retirement. This is nearly certain to be true when there are bonding costs (discussed below), because the optimal compensation structure is then determinate. Nonetheless, the other potential benefits of age discrimination laws, also discussed below, may outweigh these higher costs, on balance increasing efficiency.

[5]Curme and Kahn (1990) present evidence that workers discount implicit promises of deferred pay based on probabilities of bankruptcy of their employers, based on evidence that (1) the probability that workers have pensions is higher in industries with lower failure rates, and (2) among workers with pensions, wage-tenure profiles are steeper in industries with higher failure rates. The first result is interpreted as implying that delayed-payment contracts are more desirable when firm survival is more certain, and the second as implying that under delayed-payment contracts, workers discount future payments more heavily the higher the failure rate.

because the no-shirk condition becomes binding in each period. If we solve for w_T--the wage in the last period--and then w_{T-1}, etc., we find (by induction) the general expression,

$$(4) \qquad w_t = e_t + s_t + \frac{(1+i)e_{t-1}}{q_{t-1}} - \frac{e_t}{q_t} \quad .$$

We can similarly solve for b and P_T.

Second, with costly bonding retirement occurs earlier than is socially efficient. The calculation for the optimal retirement date yields

$$(5) \qquad v_T = e_T + s_T + \frac{(i-r)e_T}{(1+r)q_T} \quad .$$

With costly bonding ($i > r$), involuntary retirement occurs at a point at which the worker's marginal product exceeds the disutility of work and effort ($e_T + s_T$). Assuming--as is usual in these models--that e_t and s_t are rising in t, and v_t is constant or falling, retirement occurs too early.

The model with costly bonding points to the potential efficiency gains offered by age discrimination laws. Because such laws (like the ADEA) also prohibit age discrimination in layoffs, they reduce the ability of firms to renege on long-term implicit contracts with older workers. This reduces bonding costs, lowering the rate (i) at which workers discount future income. As equation (5) shows, a reduction in the costs of bonding will increase efficiency, by bringing the marginal product and the marginal disutility of labor closer together.

It is often argued that reputation effects deter firms from reneging on long-term contracts, because reneging would destroy the firm's ability to enter into such contracts again. This argument, however, ignores the possibility of an information asymmetry between firms and workers (as in Holmstrom (1981), in a different context). Suppose that, in the context of long-term incentive contracts, the marginal revenue product of workers at a firm in each period is

subject to random demand shocks. With the same information structure as in Holmstrom, the firm has an incentive to claim that a negative demand shock has occurred, and that older workers must be retired at an earlier age than was "agreed" upon in the initial contract. Because of the information asymmetry, workers may never learn the truth regarding the demand shock, in which case reputation effects cannot be completely effective.

The prohibition of age-based terminations by age discrimination laws may eliminate the incentive for firms to falsely claim negative demand shocks as a pretext to fire older workers. Firms would no longer find it in their interest to do so, since they would have to lay off both workers paid more than their marginal products (older workers), and workers paid less than their marginal products (younger workers). This suggests that the ADEA may be interpretable as a "precommitment" mechanism of the type studied by Schelling (1978, 1983). Such mechanisms may serve the long-term interests of both parties, whereas in their absence, one (or both) parties might make short-term decisions that are ultimately detrimental to themselves. Firms may promise not to renege on long-term contracts. Although reputation effects might, in principle, serve to enforce the promise by firms not to renege on long-term contracts, in the presence of asymmetric information (and perhaps because reputation effects do not work), workers may not trust firms. However, the prohibition of age-based firings under the ADEA may put in place a means for workers to enforce long-term contracts, thus making workers willing to enter into them. Therefore, a perspective on age discrimination laws that focuses on the prohibition of opportunistic age-based terminations suggests that rather than discouraging long-term incentive contracts, such laws may encourage the formation of such contracts, and hence increase

efficiency.[6]

III. The Empirical Test

Ideally, assessing these alternative views of age discrimination laws requires evidence on the effects of these laws on the formation of Lazear contracts. Because such contracts are implicit, the best we can hope for is observable proxies. Therefore, the empirical analysis focuses on the effects of such legislation on the steepness of age-earnings profiles. As in other research on Lazear contracts, the presumption is that earnings profiles should become flatter if the predominant effect of the prohibition of age discrimination is to eliminate or reduce involuntary terminations of older workers, and thus reduce the use of long-term incentive contracts (see, e.g., Lazear and Moore, 1984).[7] On the other hand, if the principal effect of age discrimination laws is to reduce bonding costs, then profiles will steepen.

Estimating the effects of age discrimination laws on the slopes of age-earnings profiles seems a natural way to test whether age discrimination laws encourage or discourage Lazear contracts, because such contracts will generally lead to steeper age-earnings profiles. However, the test can also be derived as an implication of the specific theoretical model outlined above, at least under some conditions. First, if the predominant effect of age discrimination laws is to deter Lazear contracts, then the slopes of earnings profiles will move toward those of productivity profiles (v_t), and hence be flatter. Alternatively, if the predominant effect of such laws is to reduce the probability that firms renege on implicit contracts, then workers discount future earnings less heavily, so that i falls (remaining above r, so there is a determinate solution). If we assume that e

[6]Even Epstein (1992), a fierce critic of the ADEA, recognizes the potential gains it might yield by reducing opportunistic behavior by employers. He asserts, however, that the costs outweigh the gains.

[7]If age discrimination laws decrease efficiency via reducing the use of Lazear contracts, they should also result in lower present values of earnings profiles, and vice versa. However, in part because we do not have data on tenure spells, we do not focus on this empirical implication, although we present some limited evidence.

and q are constant, but that s (the marginal utility of leisure) rises with age, then equation (4) implies that the rate of growth of earnings rises as i falls (i.e., profiles become steeper).[8]

Because we use Census data to extend the empirical analysis over many decades, we do not have tenure data, and hence focus on age-earnings profiles rather than tenure-earnings profiles. Since increased use of long-term incentive contracts should steepen tenure-earnings profiles and increase attachment of workers to firms, implications for tenure-earnings profiles should carry over to age-earnings profiles. While changes in the slopes of earnings profiles could be interpreted as arising from changes in the "terms" of implicit long-term incentive contracts, it may also reflect changes in the incidence of such contracts, which is reflected in average age-earnings profiles. The critical identifying assumption is that age discrimination laws are not correlated (causally or otherwise) with changes in the slopes of age-productivity profiles, because the latter changes would generate changes in age-earnings profiles even in spot labor markets. Of course, age discrimination laws may affect the height of productivity profiles, which is the manifestation of the efficiency gains or losses.

We are careful to attempt to distinguish between changes in the slopes of earnings profiles that may be induced by relative demand shifts toward older workers as a consequence of age discrimination laws, and changes in life-cycle earnings profiles that are induced for young cohorts that enter the labor market subsequent to the passage of such laws; it is the latter changes that we are trying to estimate. In addition, we examine more general evidence on the effects of the prohibition of age discrimination on employment of older and younger workers.

A natural question concerns the implications of other models for the effects of age

[8]When e is also increasing, the result is more ambiguous, since high disutility of effort in the future weighs more heavily on the no-shirk condition in earlier periods, because of the lower discount rate. However, as long as e does not rise too quickly, this result still holds.

discrimination laws on the steepness of age-earnings profiles. In specific human capital models, workers may be more inclined to bear the costs of investment if it becomes less likely that firms will fire them when older, hence suggesting steeper earnings profiles (and productivity profiles) in response to prohibitions of age discrimination. However, in the standard specific human capital model, firms have no incentive to discriminate against older workers, since they are paid less, rather than more, than their marginal product. Hence, this model implies no impact of age discrimination laws. In Carmichael's (1983) alternative specific human capital model, workers are paid more than their marginal product when old, but firms have no incentive to discriminate against older workers by firing them because of the existence of promotion ladders. The general human capital model allows little role for firms. Nonetheless, if simple taste-based discrimination reduces employment opportunities for older workers, then laws prohibiting such discrimination could increase investment and therefore wage growth over the life-cycle.

Thus, while we are quite confident that our empirical procedures estimate causal effects of age discrimination laws on earnings profiles of cohorts that enter the labor market subsequent to the passage of such laws, we do not claim that our results necessarily speak solely to Lazear contracts. Nonetheless, we think that the interpretation of the results as testing the efficiency effects of age discrimination laws that arise via effects on Lazear contracts is a compelling one, for two reasons. First, the theoretical model outlined above generates the predictions for the alternative effects of age discrimination laws that we test. Second, at least some other models that generate upward-sloping earnings profiles do not predict the effects of age discrimination laws for which we test.

IV. Age Discrimination Legislation

One could use the advent of federal legislation to estimate the effects of age discrimination

laws by comparing labor market outcomes before and after passage of the ADEA or subsequent amendments. However, this strategy risks confounding the effects of the legislation with period or cohort effects in age-earnings and age-employment profiles. For example, an increase in employment of older workers resulting from the prohibition of age discrimination could be obscured by other factors contributing to a long-term decline in employment rates of older workers (Parsons, 1980). Instead, we rely on state-level variation in age discrimination laws created by the adoption of such laws in some states prior to the ADEA. Whereas in the federal "experiment" the control group is observations from an earlier period, the state-level variation provides a control group that includes observations on different states in the same period, thus eliminating the influence of period or cohort effects that are common across states. By using data from many years, we can also remove the influence of persistent differences in the dependent variables across states. Thus, state-level variation provides more compelling evidence on the effects of age discrimination laws.[9] We combine information on state laws with the data from the 1940, 1950, 1960, 1970, and 1980 decennial Censuses of Population to estimate the wage and employment effects of the state laws.

At the federal level, the original ADEA was enacted in 1968, and subsequently strengthened in 1979 with the transfer of enforcement authority to the EEOC (Stacy, 1990). Amendments to the ADEA affected the legally permissible mandatory retirement age; amendments in 1978 increased the age of mandatory retirement to 70 and explicitly prohibited nearly all forms of mandatory retirement prior to age 70, and subsequent amendments prohibited mandatory retirement at any age. Given the passage of federal legislation prohibiting age

[9]Of course, as always in this type of approach, we must be aware of the possibility that the state-level legislation differs from the federal legislation, in which case we do not necessarily obtain less biased estimates of the effects of federal legislation. We consider some evidence on this question below.

discrimination in 1968, identifying information for the effect of the state-level prohibitions of age discrimination comes from cross-state variation in state laws effective as of 1939, 1949, and 1959.[10] Identifying information also comes from 1969 because some states passed age discrimination laws protecting a wider age range than that covered by the initial federal law. Finally, given that some states had legislation in place when the federal legislation passed, we get further identifying information from comparisons between states in which the federal legislation introduced new prohibitions on age discrimination, and those in which it simply "caught up" with state law.

Passing a law and enforcing it may well be two different things, as alluded to in the preceding discussion of transferring authority for enforcing the ADEA to the EEOC. Because it is possible that legislation with weak enforcement mechanisms has little or no effect, in some analyses we distinguish as best we can between age discrimination laws with explicit enforcement mechanisms and those with weak or no enforcement mechanisms. In these analyses, we get additional identifying information from variation in state laws, because we treat the federal law as operating with little or no enforcement mechanism until 1979. More generally, we can test for differences in the effects of laws with and without explicit enforcement mechanisms. Although we expect laws with enforcement mechanisms to have stronger effects, it is possible that even laws with weak or no explicit enforcement mechanisms have some effect, perhaps in part because they give claimants standing in court.

Table 1 documents state by state the development of legislation regarding age

[10]We refer to these years because most of the labor market information in the decennial Censuses refers to the previous calendar year.

discrimination laws, and Table 2 describes the variables we construct based on the state laws.[11] The tables reveal numerous instances of states passing one of two types of legislation prior to federal legislation that had the same effect. First, some states (e.g., Colorado, Connecticut, New York, and Oregon) passed laws prohibiting age discrimination for some specified age range, with an upper age limit, by 1959. Additional states (e.g., California, Delaware, Maryland, and Michigan) passed such laws, with upper age limits at or below that in the original ADEA, by 1969. Other states (e.g., Alaska, Hawaii, and Illinois) passed laws barring age discrimination with either no upper age limit specified, or an age range wider than that covered by the original ADEA. In Table 2, laws prohibiting age discrimination are indicated by AD, with the protected age range listed in parentheses. The same coding is used for states that passed legislation after the federal legislation, although as discussed above, this often does not provide identifying information. Second, four states (California, Michigan, Minnesota, and New Hampshire) passed laws explicitly barring mandatory retirement by 1979, although the law in Minnesota essentially coincides with the federal law by protecting workers under age 70.[12] These laws are indicated by MR in Table 2, again with the covered age range in parentheses.[13] Note that in Michigan (after 1970) and in Minnesota, the upper end of the age range protected by the explicit prohibition of mandatory retirement is lower than that of the age discrimination statute. These cases point out that--like the original ADEA--an age discrimination statute does not necessarily prohibit all forms of mandatory

[11]We do not use the laws for 1980 and beyond, but include them in Table 1 for reference purposes.

[12]These laws sometimes apply to a subset of firms.

[13]Note that when mandatory retirement is allowed, it can be used at the upper limit of the protected age group, at least in the federal law (Gold, 1993). Thus, when the protected age range is 40-70, for example, and mandatory retirement is barred, the entry in Table 2 is MR (40-69).

retirement.[14] As a consequence, in the empirical work that follows we devote some attention to the independent impact of mandatory retirement prohibitions.

Of course, state age discrimination laws may have had little impact if enforcement mechanisms were inadequate. However, most of the state laws are part of fair employment practices legislation, with a civil rights commission or labor department given powers of conciliation and enforcement. Existing research points to numerous instances of state courts enforcing rulings of state civil rights commissions regarding state anti-discrimination statutes, and evidence of discrimination complaints filed with state commissions based on state legislation (e.g., Mulcahy, 1991; Wendt and Slonaker, 1993; Slonaker and Wendt, 1991; Friedman, 1984). In addition, earlier research by the U.S. Department of Labor (1965a) claimed that placements of men and women over age 45 by state employment services increased in relative terms in states that passed age discrimination laws, although such placements account for only a small part of total hiring. On the other hand, in some states, generally because the laws are not part of fair employment practices, there is no enforcement authority, and we might therefore expect weaker (if any) effects. These cases include Colorado's 1903 law, North Carolina's 1977 law, and North Dakota's 1965 law. In Table 2, these cases are indicated with ADNE.

Finally, below the codings for the individual states, Table 2 includes a row for the federal legislation. We have included the code ADNE for the federal law as of 1970, when the Department of Labor (rather than the EEOC) was responsible for enforcing the ADEA, and few resources were devoted to this enforcement. In addition, only as of 1980 did the federal law

[14]A similar possibility is suggested in North Carolina. In 1977 the Equal Employment Practices Act barred discrimination based on age for all ages, yet in 1979 the Monthly Labor Review notes that the mandatory retirement age for public employees was raised from 65 to 70, suggesting that the 1977 law did not fully eliminate mandatory retirement.

explicitly prohibit essentially all forms of mandatory retirement (prior to age 70).[15] Thus, only for that year is an explicit prohibition coded.

V. The Census Data

Aside from the information on age discrimination and mandatory retirement laws, we extract data from the decennial Censuses of Population for 1940, 1950, 1960, 1970, and 1980. We use the one-percent public use samples for 1940, 1950, 1960, and 1970 (using the 15 percent questionnaire sample for 1970). For 1980, we use a 0.5 percent sample (a subset of the A sample, which identifies all states). We restrict the sample to include white males age 18 through 70 working in the private sector. We exclude non-whites to avoid confounding effects of age discrimination laws with effects of laws protecting other groups. We exclude unpaid and public-sector workers (including armed forces), and self-employed workers for most of the analysis. Thus, we study the effects of age discrimination laws on earnings or the probability of employment in the private wage and salary sector. We also exclude individuals who had missing or erroneous data (for example, individuals who were reported as employed but who did not report an occupation). For the earnings analysis, we exclude the non-employed, and part-time workers (fewer than 27 weeks per year or 30 hours per week), since the Lazear model is probably much more applicable to full-time, and especially year-round workers.

We made two adjustments to the earnings data. First, although earnings in the 1940 Census are recorded as actual earnings values, earnings in the 1950-1970 Censuses are recorded in $100 intervals.[16] We converted the earnings figures from categorical values to the midpoints of

[15]The original ADEA barred involuntary retirement before age 65 unless it was part of a bona fide pension or retirement plan, required by the terms of the plan, and essential to the plan's economic survival or some other legitimate business purpose. The 1978 amendments made it illegal for any seniority system or employee benefit plan to entail involuntary retirement before age 70.

[16]In the 1960 Census, earnings above $10,000 are recorded in intervals of $1,000.

Table 1 (continued)

Year: State:	1900-1959	1960-1969	1970-1979	1980-1989
SD				
TN				1980-amend anti disc. law to prohibit age disc. in emp. for those 40-70 years old 1988-remove age limit for age disc. law was 40-70 now > age 40
TX				1983-enacted law prohibiting age disc. in emp., employers with > 15 workers for those 40-70 years old 1989-remove age limit for age disc. law was 40-70 now > age 40
UT			1975-amend anti disc. act to prohibit age disc. in emp. for those 40-65 years old 1979-amend anti disc. act to remove upper age limit of 65	1985-lowered age for age disc. law from no upper limit to those 40-70 years old employees with > 15 workers 1987-amend anti disc. law to remove limit of 70 now > age 40, ban mandatory retirement
VA				1987-enact human rights act prohibit age disc. to comply with federal age disc. act
VT				1981-enacted law prohibiting age disc. in emp. for those > age 18, ban mandatory retirement
WA		1961-amend fair emp. practices act-prohibit age disc. for those 40-65 years old		1985-Age limit 40-70 as of this year (year of change as yet unknown)
WI	1959-amend fair emp. practices act-prohibit age disc. for those 40-65 years old			1982-expand coverage of age disc. law to those 40-70 years was for those 40-65 years 1982-pension plans prohibited from requiring mandatory retirement before age 70 years 1984-remove age limit for age disc. law was 70
WV			1971-enacted law prohibiting age disc. in emp. for those 40-65 years old	1987-remove age limit for age disc. law, now > age 40, was 40-65
WY				1984-enacted law prohibiting age disc. in emp. for those 40-70 years old

Except where otherwise noted, to the best of our knowledge these laws are part of fair employment practices administered by civil rights commissions or labor departments with powers of conciliation and enforcement.

Sources: Monthly Labor Review, all years, Northrup (1978), Schachter, et al. (1985), U.S. Department of Labor (1965b, 1983), Miller (1966), Kertzer (1981), Ross (1973), and Bureau of National Affairs (1994).

the categories. Earnings in the 1980 census, which we did not adjust, are recorded as midpoints of $10 intervals. Second, in each of the census years earnings were top-coded. Because the real values of the top codes were not the same across all years, we adjusted the earnings top code values of our sample by imputing the real (1983) value of the nominal top codes in each year using the CPI (all urban). Because the 1939 earnings top code was the lowest in real terms, we use the same implied real earnings top code for all years, rounding to the closest interval for the categories used in each year.[17] We also imposed a lower limit on earnings, eliminating individuals from the earnings regressions whose earnings would have been less than one dollar per hour (in 1980 dollars) based on half-time, half-year work.[18]

We merge the individual-level data by state and year with the data on age discrimination legislation. Thus, for each individual we have information on demographic characteristics (age, education, marital status, residence in an SMSA), annual earnings, industry, occupation, hours and weeks of work, and the prevailing age discrimination legislation in the state and year. We define employment as whether any earnings for the previous calendar year are reported. Because hours of work refer to usual weekly hours in the census year, while weeks of work refer to the previous calendar year, and because these variables are coded in categories, we analyze earnings including controls for hours and weeks of work, rather than attempting to convert earnings to an hourly wage.[19]

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[17]The top codes used, in nominal dollars, were $5000 in 1939, $8550 in 1949, $10,500 in 1959, $13,250 in 1969, and $26,140 in 1979. Because the 1939 top code was the lowest in real terms, it affected a greater fraction of workers in the other Census years, specifically 1.5 percent of the observations in 1950, 4.3 percent in 1960, 13.1 percent in 1970, and 15.8 percent in 1980. Because imposing the 1939 real top code has such severe consequences in later years, we also reestimated the earnings regressions discussed below using only the actual (i.e., Census-defined) top codes for each Census year. The results were unaffected.

[18]The nominal lower earnings limits, rounded down to the closest income category, are $100 in 1939, $150 in 1949 and 1959, $250 in 1969, and $540 in 1979.

[19]We construct hours and weeks categories that can be used consistently across all Census years.

VI. Employment Effects of Age Discrimination Legislation

We first examine the effects of age discrimination legislation on the employment of protected workers. Although the alternative perspectives on age discrimination laws do not have different implications for employment effects, age discrimination laws are more likely to affect the formation of Lazear contracts (in either direction) if such laws boost employment of older workers, i.e., they must be binding and therefore affect the behavior of workers and firms. These laws are likely to boost employment of older workers by reducing the use of involuntary terminations, or by reducing bonding costs (as in equation (5)). However, age discrimination laws may make it more difficult for older workers who lose or leave their jobs for other reasons to find re-employment, making it possible that the overall employment effect could go in the other direction. Thus, rising employment of older workers is a sufficient condition for age discrimination laws to be binding, but it is not a necessary condition. In addition, we think the results on employment effects are of independent interest because we are unaware of any work that has examined the effects of anti-discrimination laws on employment of protected (or unprotected) groups using state-level variation in such laws.[20]

To discuss identification of the effects of age discrimination laws on employment, we begin with the simplest version of the employment equation we estimate, and ignore the federal legislation by using only the 1940, 1950, and 1960 Censuses. This equation is of the form,

$$(6) \qquad E_{ijt} = X_{ijt}\beta + T_t\beta' + S_j\beta'' + AD_{jt}\cdot PAD_{ijt}\alpha + AD_{jt}\cdot(1-PAD_{ijt})\alpha' + \epsilon_{ijt} \quad .$$

E is a dummy variable indicating employment in the year covered by the Census, X is a vector of standard controls, T is a set of year dummy variables, S is a set of state dummy variables, and i, j,

[20]In future work we will extend this analysis to legislation regarding race and sex discrimination.

and t index individuals, states, and years. The state and year dummies control for unmeasured characteristics common to all workers in a year or a state that affect employment, which may be correlated with the independent variables. Finally, because employment profiles have changed over time, probably in part for reasons unrelated to age discrimination laws, in some specifications we also interact the age profile with year dummy variables (included in X).[21] Additional controls that are added in some specifications are discussed below.

AD is the dummy variable corresponding to the codes in Table 2. PAD is a dummy variable equal to one when the individual is in the age range indicated in the parentheses in Table 2. The interactions of AD and PAD pick up the effects of the laws on the "protected" groups. Because these laws may also affect unprotected groups of workers in the same state relative to workers of similar ages in states that do not pass such laws, the interaction with (1-PAD) is also included. As an example, Table 1 shows that New York enacted a law prohibiting age discrimination for those aged 45-65 in 1958. Thus, in 1960, AD equals one for individuals in New York, while PAD equals one for those aged 45-65, and 0 for those aged less than 45 or over 65. The direction of the effect on unprotected workers is ambiguous. On the one hand, age discrimination laws can lead employers to substitute away from younger workers as they hire or retain more older workers, while on the other hand such laws may increase the relative costs of employing older workers, and hence induce substitution toward younger workers. The important point is that unprotected workers do not necessarily serve as a valid control group. Instead, we make comparisons between workers in states with age discrimination laws and similar workers in states without such laws.

[21]The age profile is captured in a set of dummy variables for ages 18-24, five-year age ranges through age 64, and ages 65-70.

In equation (6), α is the effect of a ban on age discrimination. We expect to find that $\alpha > 0$, so that such laws boost employment of workers in the protected age categories. We may also find that $\alpha' < 0$ if the law induces substitution of older for younger (generally unprotected) workers.[22] We present results for this specification, excluding the state dummy variables and age-year interactions, and using the state laws and Census data for the years 1940-1960, in column (1) of Table 3. The specification includes controls for years of schooling, residence in an SMSA, marital status, the year of the observation, and narrowly-defined age categories. Given the extremely large sample size, we present OLS estimates of a linear probability model, rather than logit or probit estimates.[23] As expected, the estimate of α is positive (and significant), with an age discrimination law boosting the employment rate of protected workers by .016, relative to similar workers in states with no age discrimination laws. Conversely, the estimate of α' is negative, indicating that the same types of prohibitions lower the employment rate of unprotected workers by .011.

Before going on to include the state dummy variables and age-year interactions, and to consider other specification issues, we first augment the specification to consider the possibility that age discrimination laws have a greater effect on the oldest workers in the protected group. In particular, we estimate separate effects for protected workers aged 60 and older, from the specification

$$(7) \qquad E_{ijt} = X_{ijt}\beta + T_t\beta' + S_j\beta'' + AD_{jt}\cdot PAD_{ijt}\cdot OLD_{ijt}\alpha + AD_{jt}\cdot PAD_{ijt}\cdot(1-OLD_{ijt})\alpha' + AD_{jt}\cdot(1-PAD_{ijt})\alpha'' + \epsilon_{ijt} \quad .$$

Results for this specification are reported in column (2), and indicate substantially stronger

[22]However, if the labor supply curve of younger workers--taking account of the employment response--is nearly vertical, the main effect for such workers may be a reduction in wages. Below, we report evidence of this latter effect.

[23]Given memory constraints arising from the large sample and large number of control variables, we had to build up moment matrices prior to computing estimates, which precludes estimating non-linear models.

effects of age discrimination laws on the employment of the oldest protected workers. In particular, these laws are estimated to boost employment of protected workers aged 60 and over by .067, and to have only a slight positive effect (.008) on protected workers under age 60.

In column (3) we add state dummy variables to this specification to control for influences on employment rates that are common across states and fixed over time. The inclusion of these controls results in slightly larger positive employment effects on protected workers, both those aged 60 and over and more so for those under age 60. In addition, the negative effect of such laws on the employment of unprotected workers disappears, as the estimated effect remains negative but becomes small and insignificant. This suggests that age discrimination laws were passed in states with relatively lower employment rates of workers in unprotected age groups, rather than that these laws lowered employment of these workers.

Next, because employment rates of older workers have changed over the sample period, to avoid confounding the effects of age discrimination legislation with other sources of these changes in employment, in column (4) we introduce interactions between the age dummy variables and the year dummy variables, allowing the age-employment profiles to vary by year, although in the same manner for all states. In this specification, we identify the effects of age discrimination from differences within years in employment of workers in different age groups (i.e., protected and unprotected), between states that did and did not outlaw age discrimination. The results indicate slightly weaker effects of such laws in boosting employment of protected workers, with employment rates higher by .072 for those aged 60 and over, and by .017 for those under age 60. The estimated effect on unprotected workers is now positive, but still very small (.002) and insignificant. Thus, to this point it appears that age discrimination laws boost employment of older, protected workers, without inducing substitution away from younger, unprotected workers

(at least insofar as this is reflected in employment rates).

To this point, observations on individuals in the same state and year, conditional on the state and year effects, are treated as independent. Because there may be common error components for observations in the same state and year that are neither persistent across states nor across years (such as state business-cycle effects), the residuals in the specifications estimated so far may be positively correlated among subsets of observations, in which case the standard errors are likely to be downward biased. We address this potential problem by adding state-year interactions to the specification--i.e., dummy variables for each state and year.[24] The estimates are reported in column (5). As might be expected if there are common state-by-year effects, the standard errors rise substantially. In addition, the estimated employment effects on protected workers fall somewhat. However, the positive effect for workers aged 60 and over remains substantial (.056), and statistically significant.

In columns (1)-(5), identification of the effects of age discrimination laws comes from states that enacted such laws in 1950 or 1960, as well from states that already had them as of 1940 (Colorado, Louisiana, and Massachusetts). Because the three states that already had such laws may differ from the other states, it may be preferable to identify the effects of age discrimination laws only from the states whose laws changed over the 1940-1960 period. We do this by adding interactions of the age dummy variables with a single dummy variable for individuals in either Colorado, Louisiana, or Massachusetts, which allows a separate age-employment profile for these three states. We also take this analysis one step further, allowing for differences in the slopes of age-employment profiles between all states that passed age discrimination laws prior to the

[24]While this problem is often handled via random effects (Moulton, 1986), fixed effects are more flexible because they allow a correlation between the state-year effects and the observables.

passage of federal legislation, and those states that did not. We do this by introducing additional interactions between the age dummy variables and a dummy variable for all of the states that passed laws in the 1940-1960 period. By allowing the age-employment profile to differ in all states that passed laws prior to the federal legislation, this specification ensures that we identify the effects of age discrimination laws from relative changes in age-employment profiles in the states that passed these laws, rather than from persistent differences that existed between states that did and did not pass such laws, but which did not result from the passage of these laws. This is equivalent to a difference-in-difference estimator in which we allow for a fixed effect in the slope of the age-employment profile that differs between states that did and did not pass age discrimination laws prior to the federal legislation.

The results are reported in column (6). The estimated coefficients of the age discrimination variables decline slightly, but the qualitative conclusions are unchanged; age discrimination laws still appear to boost employment of the oldest protected workers. These results imply that the outcome is essentially the same if we identify the effects of age discrimination laws only from the states whose laws changed, controlling for fixed state differences in the relative employment of older versus younger workers between states that did and did not pass age discrimination laws.

We next consider two additional features of age discrimination legislation. First, so far we have studied only state laws. However, federal legislation also changed over this period. As of 1970, the federal ADEA protected workers aged 40-65, and as of 1980, workers aged 40-70. Thus, we can use data from the 1970 and 1980 Censuses as well, using the state codes from Table 2, and the corresponding codes for the U.S. as a whole, defining PAD based on the age range encompassed by federal and state laws. For example, for a state with no law, we code AD as zero

through 1960 and as one for 1970 and 1980, and we code PAD as one for workers aged 40-65 in 1970, and 40-70 in 1980. An example of a state with a law is, again, New York, for which in 1970 AD and PAD are coded as one for those aged 40-65 (because the state and federal laws cover the same age range), and for which in 1980 AD and PAD are coded as one for those aged 18-70 (because the state law covers those aged 18-65, while the federal law covers those aged 40-70).

Thus, the federal legislation provides identifying information for two reasons. First, in 1970 age discrimination legislation comes into existence in the states that did not yet have their own laws. Any effects of such legislation should appear in differences between 1970 and 1960 for these states, relative to differences between 1970 and 1960 for states that already had such laws.[25] Similarly, the 1980 data provide additional identifying information despite the inclusion of age-year interactions, because the expansion in the age range of the group protected by the federal legislation is not identical across all states; for example, some states already protected workers over age 65 as of 1970.

An implicit assumption entailed in using data from all of the available Census years is that the effects of federal and state laws are the same, so that when the federal law is passed, it supersedes state law. However, the existence of a separate state law may give individuals additional options for pursuing age discrimination claims, and thus result in stronger effects of the law. A state law may also cover some workers not covered by federal law, such as workers in small firms. On the other hand, federal legislation may have stronger effects than state legislation. Finally, state laws passed prior to federal legislation may reflect state differences in employment of older workers or age discrimination. Unfortunately, we cannot test for different effects of state

[25]As long as we define AD·PAD and AD·(1-PAD) based on federal and state laws, and the protected age ranges are not identical for all states, the year dummy variable for 1970 is not perfectly collinear with these two variables.

and federal laws. In particular, we cannot estimate a specification that includes a dummy variable for passage of a state age discrimination law, and another dummy variable for a federal law, since the federal law variables would be perfectly collinear with the year dummy variables or the age-year interactions. All we can do is estimate the average effect of the federal and state laws. However, in the data through 1960 only, we obtain all of our identifying information from state-level variation in laws, and hence we can assess whether the average effect for the state laws exclusively is different from that of the state and federal laws by comparing the results with those obtained using the data through 1980. Of course, we have no way of telling whether any differences arise because the federal and state laws have different effects regardless of where they are applied, or because the laws are similar but have different effects in different states or time periods.

A second feature of age discrimination laws is that, as noted earlier, a few states passed age discrimination laws without setting up an explicit enforcement mechanism. In particular, Colorado had such a law throughout the sample period, while North Dakota and Georgia passed such laws in 1970 and 1980, respectively. Also, as previously noted, the federal law could be viewed as not having had an enforcement mechanism until 1979. We therefore estimate an augmented specification that allows for differential effects of age discrimination laws in the absence of an enforcement authority, where the federal legislation in 1970 is treated as having no enforcement mechanism. This specification is of the form

$$(8) \quad E_{ijt} = X_{ijt}\beta + T_t\beta' + S_j\beta'' + AD_{jt}\cdot PAD_{ijt}\cdot OLD_{ijt}\alpha + AD_{jt}\cdot PAD_{ijt}\cdot(1-OLD_{ijt})\alpha' + AD_{jt}\cdot PAD_{ijt}\cdot ADNE_{jt}\gamma + AD_{jt}\cdot(1-PAD_{ijt})\alpha'' + AD_{jt}\cdot(1-PAD_{ijt})\cdot ADNE_{jt}\gamma' + \epsilon_{ijt} \quad .$$

The estimates of γ and γ' detect any differences in the effects of laws without enforcement authority, and those with enforcement authority. The information from North Dakota and Georgia

provides no identifying information, because their laws coincide with the federal law. However, the 1970 vs. 1980 contrast in the federal law provides identifying information, as numerous states had laws with enforcement mechanisms as of 1970. In addition, the contrast between 1970 and earlier years provides identifying information, as the federal law as of 1970 introduces states (in addition to Colorado) with age discrimination laws, but weak or no enforcement.

Results incorporating the federal legislation are reported in column (7), where we treat the federal law as effective in 1970, without regard to enforcement. The estimates indicate a stronger (.091), statistically significant positive effect of age discrimination laws in boosting employment of the oldest protected workers. They also point to a smaller positive effect (.038) on protected workers under age 60, and a positive but insignificant effect on unprotected workers. Alternatively, column (8) reports estimates of equation (8), incorporating information on whether the law included an enforcement mechanism. The estimated employment effects are very similar. However, we find that employment of protected workers is boosted by relatively less (.026) in states with no enforcement mechanism, a differential that is statistically significant. This renders the employment effect for protected workers under age 60 close to zero, but still leaving a sizable effect (.065) for protected workers aged 60 and over. Paralleling these results, the positive (although insignificant) effect of age discrimination laws on unprotected workers falls to just below zero for laws without an enforcement mechanism. Thus, the results indicate that age discrimination laws with enforcement mechanisms boost employment of protected workers, considerably more so for the oldest among these, and have little discernible effect on unprotected workers. However, in the absence of enforcement mechanisms the effects are weaker, in particular indicating no effect on younger but protected workers. Finally, the evidence in columns (7) and (8) suggests stronger effects on protected workers of federal laws than of state laws. This result

may arise because federal legislation has more of an effect. Alternatively, employment of older workers may have been less problematic in those states in which age discrimination laws passed prior to the federal legislation, whereas the problems in states in which the laws were driven by federal legislation were more severe. While the differences in the results raise some caution flags with respect to treating state and federal legislation symmetrically, the results also indicate that state anti-discrimination laws are far from irrelevant.

Prohibitions on age discrimination do not always include explicit prohibitions of mandatory retirement. It is conceivable that such explicit prohibitions have additional effects, either because they rule out specific circumstances under which mandatory retirement is allowed even for workers in the protected age group (such as in the original ADEA), or because they provide additional means for workers to challenge employers' decisions regarding older workers, and hence strengthen age discrimination laws. Table 2 reveals that we have a small amount of identifying information regarding the effects of explicit prohibitions of mandatory retirement. Michigan had such a prohibition in 1970, before the federal law included essentially a blanket prohibition of mandatory retirement (with the 1978 amendments to the ADEA). By 1980, five states had such prohibitions, but the federal legislation also became effective for workers through age 69 by 1980, so only those states that had such prohibitions covering a wider age range than the federal legislation provide additional information. Of these, California's law has no upper age limit, but because we look at employment effects on individuals through age 70 (presuming that we have insufficient observations to learn anything about workers older than this), California adds identifying information only for 70 year-olds. New Hampshire has a prohibition covering all ages. Unfortunately, we suspect that such a prohibition is essentially meaningless for workers under age 40, in which case this state only provides useful information on 70 year-olds. Nonetheless,

exploiting the limited identifying information we have available, we augment the specification in a parallel fashion to equation (8), to allow effects of mandatory retirement provisions. Specifically, we estimate the equation

$$
\begin{aligned}
E_{ijt} = {} & X_{ijt}\beta + T_t\beta' + S_j\beta'' + AD_{jt}\cdot PAD_{ijt}\cdot OLD_{ijt}\alpha + AD_{jt}\cdot PAD_{ijt}\cdot(1-OLD_{ijt})\alpha' + AD_{jt}\cdot PAD_{ijt}\cdot ADNE_{jt}\gamma \\
& + AD_{jt}\cdot(1-PAD_{ijt})\alpha'' + AD_{jt}\cdot(1-PAD_{ijt})\cdot ADNE_{jt}\gamma' \\
& + MR_{jt}\cdot PMR_{ijt}\cdot OLD_{ijt}\delta + MR_{jt}\cdot PMR_{ijt}\cdot(1-OLD_{ijt})\delta' + MR_{jt}\cdot(1-PMR_{jt})\delta'' + \epsilon_{ijt} \quad ,
\end{aligned} \tag{9}
$$

where MR is the dummy variable corresponding to the codes in Table 2, and PMR is a dummy variable equal to one for those in the age range covered by a mandatory retirement prohibition. δ and δ' capture up the incremental effects of explicit prohibitions of mandatory retirement on older and younger protected workers, and δ'' captures the effect on unprotected workers.[26]

The results for equation (9) are reported in column (9). The estimated effects of explicit mandatory retirement provisions are small and insignificant for protected older and younger workers, and for unprotected workers.[27] The failure to find that mandatory retirement prohibitions increase employment of older workers bolsters the evidence discussed earlier that mandatory retirement appears to have had little effect on retirement, and that the more general prohibition of age discrimination may be the more consequential aspect of age discrimination laws. In fact, adding the mandatory retirement controls in column (9) has essentially no effect on the estimated effects of age discrimination laws. In particular, we still find large and statistically significant

[26]We might consider trying to infer the effect of eliminating mandatory retirement from age discrimination laws with no upper age limit. But as discussed already, prohibition of age discrimination does not necessarily bar mandatory retirement. Also, we would still have relatively little identifying information, because of the small number and late date of such age discrimination laws.

[27]We could in principle experiment with coding mandatory retirement as prevailing in all states for workers aged 40-64 as of 1970, and aged 40-69 as of 1980, since the original ADEA did prohibit some form of mandatory retirement. But given that we include age-year interactions, and that there were no wider age ranges (i.e., higher upper limits) in any state laws prevailing in 1970, we get no identifying information from the 1970 data.

positive effects of age discrimination laws on employment of older workers.

VII. Effects of Age Discrimination Legislation on Long-Term Contracting

We now turn to the effects of age discrimination laws on the formation and use of Lazear contracts, which is the principal concern of this paper. The proxy we use for the incidence or strength of these contracts is the steepness of age-earnings profiles. As explained in Section II, if a policy inhibits the formation of Lazear contracts, it should lead to flatter average earnings profiles, and vice versa. Because we are estimating average effects, we interpret them as arising either through changes in the slopes of age-earnings profiles for workers who enter into such contracts, or through changes in the incidence of such contracts.

To study the effects of age discrimination laws on the steepness of age-earnings profiles, we need to alter the previous specifications in two ways, aside from changing the dependent variable to earnings. First, we need to draw inferences regarding the effects of age discrimination legislation on the slopes of earnings profiles, not the levels. We therefore estimate equations of the form

$$(10) \quad \begin{aligned} Y_{ijt} = {} & Z_{ijt}\beta + T_t\beta' + S_j\beta'' + A_{ijt}\theta' + A_{ijt}\cdot T_t\theta'' + PAD_{ijt}\cdot AD_{jt}\gamma + (1-PAD_{ijt})\cdot AD_{jt}\gamma' \\ & + AGE_{ijt}\cdot PAD_{ijt}\cdot AD_{jt}\alpha + AGE_{ijt}\cdot(1-PAD)_{ijt}\cdot AD_{jt}\alpha' + \epsilon_{ijt} \quad , \end{aligned}$$

where Y is log earnings, Z is the vector of control variables excluding the age dummy variables, and A is the vector of age dummy variables. Again, we also include interactions of the age profile with year dummy variables.

We are trying to estimate the effects of age discrimination laws on long-term incentive contracts by examining the consequences of the passage of these laws for the steepness of age-earnings profiles. However, age discrimination laws can also affect relative demands for workers of different ages and hence affect relative wages, which raises an identification problem. For

example, from Table 3 it appears that age discrimination laws boost employment of older workers; while there is little evidence of an offsetting decline in the employment of younger, unprotected workers, their wages and earnings could fall. If such employment changes are driven by relative demand changes spurred by age discrimination laws, we could be led to conclude that age discrimination laws lead to steeper age-earnings profiles because of increased strength of long-term incentive contracts, when in fact all we are detecting is the effects of simple relative demand shifts induced by these laws. We take two approaches to distinguishing between relative demand effects and effects on long-term contracting. The first, more simple one, is embedded in equation (10). Specifically, we have introduced the interactions of AD, the dummy variable indicating age discrimination legislation, with PAD and (1-PAD). These interactions pick up shifts in wages or earnings that are common across workers of all ages within either the protected or the unprotected age groups. Thus, the identifying assumption we make in this specification is that relative demand shifts affect wages of all workers within either the protected or unprotected group equally. On the other hand, we allow the effects on long-term contracting to be reflected in changes in the steepness of profiles within each of these groups. In particular, the coefficients α and α', on the interactions between AGE (a linear age variable), AD, and PAD or (1-PAD), pick up the effects of the policies on the steepness of age-earnings profiles that arise other than through the overall differences between older protected workers and younger unprotected workers. Note that given the assumption that γ and γ' pick up relative demand shifts, we cannot infer the effects that age discrimination laws have on the intercepts of age-earnings profiles, which might be of interest. Below, we describe a second method of isolating relative demand shifts from changes in long-term contracting that permits us to identify the effects of age discrimination laws on the slopes and the intercepts of age-earnings profiles.

In our view, we obtain more compelling evidence from equation (10) regarding the effects of age discrimination legislation on earnings profiles from the unprotected group (i.e., from the estimate of α'), for two reasons. First, this group is almost always younger, generally workers under age 40 or 45. As explained below, most of our identifying information for the effects of age discrimination legislation on the slopes of age-earning profiles is for younger workers. Second, age discrimination legislation provides protection within the class of protected workers, not just relative to unprotected workers. That is, employers can be found guilty of discrimination if they discriminate on the basis of age within the protected age group (e.g., hiring 45 year-olds over 55 year-olds). Thus, the legislation may induce relative demand shifts toward older workers within the protected age group, in which case it will be difficult to distinguish effects of these demand shifts from effects on long-term contracting.

The second alteration to the previous (employment) specification arises because of the additional complication that the potential effects of age discrimination laws on Lazear contracts are likely to appear only for young cohorts, for whom these contracts are formed under the new legal regime, and then appear for older workers only as these younger cohorts age. Other effects may appear for workers who are older and already in the labor market when age discrimination laws are passed, but these effects are less likely to reflect changes in long-term contracting. By stringing together the decennial Censuses, we are able to observe random samples from cohorts as they age, and to draw inferences from differences between cohorts that enter before and after age discrimination laws are enacted. In the employment specifications, the "treatment" variable AD was defined based on whether the state in which a person resides had laws barring age discrimination in the year in which that person is observed. In studying earnings profiles, to identify effects from those who enter after laws pass we instead define the treatment variables

based on whether the state of residence had an age discrimination law as of the year in which a person was in the youngest age group (i.e., the period in or before which they entered the labor market). With this specification, the effects of age discrimination laws are identified from changes in the cohort earnings profiles that occur with the passage of age discrimination laws, rather than from period effects in cross-section age-earnings profiles.

To see the difference, suppose we just use the dummy variable AD corresponding to the state and year in which a person is observed. If a state first prohibits age discrimination in 1960, the estimate of α' is identified from the differences in wages across age groups between the state in question, in 1960, 1970 and 1980, compared with the differences across age groups in the same state in 1940 and 1950, relative to the changes in differences across age groups for these years in states that do not pass age discrimination laws.[28] This is because AD equals one for all individuals in the state in question, in 1960, 1970, and 1980. In contrast, the approach we use identifies the effects from workers first affected by the law when they are young. Thus, we define AD as equal to one for workers aged 18-24 in 1960, for workers aged 18-24 and 25-34 in 1970 (because workers aged 25-34 in 1970 were all aged 24 and under in 1960), and workers aged 18-24, 25-34, and 35-44 in 1980. So if the law only affects new cohorts, or affects these cohorts differently, the second approach identifies its effects from the right cohorts.

In carrying out this strategy, the cleanest approach is to exclude from the sample (and hence from the control group) observations on those workers who were in older cohorts when age discrimination laws were passed, in the years subsequent to passage of the laws. Because older workers may be affected by such laws, although not in the same way as young workers coming

[28]The difference with respect to these latter states is pertinent because of the inclusion of the age dummy-year dummy interactions.

into the labor market under a new legal regime, including such workers in the control group may confound the estimated effects in unknown ways.

It is instructive to clarify the source of identifying information in this estimation. As detailed in Table 4, included in the restricted control group are all observations from states prior to passage of age discrimination laws, which is all observations through 1960 in states without state laws. Included in the "treatment group" are all workers who were in the youngest age group (18-24) at the time the age discrimination legislation was passed. For the states that had no law, and were first affected by the federal law, this includes observations on 18-24 year-olds in 1970, and 18-34 year-olds in 1980 (in specifications in which we ignore enforcement). For the six states that passed laws in the period 1950 to 1959, this includes observations on 18-24 year-olds in 1960, 18-34 year-olds in 1970, and 18-44 year-olds in 1980. Note, however, that because no workers in other states who were past the 18-24 age range when these laws were passed are included in the control group, the fact that we include age profile-year interactions implies that the 25-34 and 35-44 year-olds in these latter six states provide no identifying information. For example, consider the observations on 25-34 year-olds in these states in 1970. Their earnings may differ from those in the same state and same age range in earlier years, as well as those in the same age range in other states in 1970. However, because the federal legislation passed in 1970, workers in the same age range in states that did not earlier pass age discrimination laws are excluded from the sample in 1970, so the only comparison is with workers in the control group in the same age range from earlier years. However, this comparison is absorbed in the age profile-year interactions.[29]

In other words, defining the control group as we do here--to exclude workers who were already in the labor market when age discrimination laws passed--makes it difficult to get workers

[29]Note that for the same reason, adding data from the 1990 Census would not be helpful.

aged 25 and over in both the treatment and control groups in the same year, because the federal legislation came only one decade after the state legislation in many states. States that passed age discrimination laws prior to 1950 are necessary to identify effects on age-earnings profiles over a wider age range. In particular, states with laws as of 1940 (Colorado, Louisiana, and Massachusetts) provide the identifying information for workers aged 25 and over. For example, the Massachusetts law passed in 1937. Thus the treatment group for this state includes those aged 18-24 in 1940, 18-34 in 1950, 18-44 in 1960, 18-54 in 1970, and 18-64 in 1980. Of course, for the reasons explained above, workers aged 25 and over in the latter two years provide no identifying information, but these states still identify effects on the age-earnings profile through age 44. In contrast, the Colorado law passed in 1903 (although it had no enforcement mechanism, and covered discharges only). Thus, for this state workers of all ages as of 1960 are included in the treatment group, and provide identifying information on the entire age profile. Given that these latter three states had age discrimination laws on the books during the entire sample period, the assumption that is crucial for these states to provide identifying information is that we rule out persistent differences in age-earnings profiles between these states and other states; we explored a similar assumption with respect to employment effects (see column (6) of Table 3), in which case this assumption appeared not to be important.

An alternative strategy, which provides more identifying information, is to define the control group more broadly to include those workers who were already beyond the youngest age group when the age discrimination law passed. In this case, for example, workers aged 25 and over in New York (and the other states that passed laws in 1960) are in the control group for 1960, as are those 35 and over in 1970 and 45 and over in 1980. We therefore get more identifying information from the six states that passed age discrimination laws by 1960, because workers in

these years and age groups in states that never passed their own age discrimination laws remain in the control group in the years after the federal law takes effect, rather than being excluded from the sample. This allows us to infer the effects of age discrimination legislation by comparing, for example, the earnings of workers in New York who are aged 25-34 in 1970 (and 35-44 in 1980) with the earnings of workers in the same age group in the same year in states that never passed laws and were first affected by the federal law. Using this strategy, it is also feasible to check whether the identifying information using the more restrictive control group comes from policy effects, or from state-specific differences in age-earnings profiles for the three states that had age discrimination laws as of 1940. We do this by introducing interactions between the age dummy variables and a dummy variable for the three states that--in the specification with the more restrictive control group--provide much of the identifying information (Colorado, Louisiana, and Massachusetts), and comparing the estimated effects of the age discrimination laws that are now identified only from age discrimination laws passed during the sample period. When we include these interactions (and use the less restrictive control group), we can identify the effects through age 44, because these are the oldest workers who were in the 18-24 age group as of 1960.[30] In addition, we can add the interactions between age and a dummy variable for the states that passed age discrimination laws in the 1940-1960 period, as we did in the employment regressions, to allow these states to have different age-earnings profiles from the other states, and to therefore identify the effects of age discrimination laws from changes in age-earnings profiles stemming from the enactment of these laws.

We also consider estimates from a specification that uses information only on laws with an

[30]Given the much later dates of explicit mandatory retirement prohibitions, and the absence of evidence that such prohibitions increase employment, we do not attempt to estimate the effects of such prohibitions on age-earnings profiles.

enforcement mechanism, assigning to the control group observations from states and years with laws that did not include an enforcement mechanism.[31] In this case, some state laws (such as Colorado) are eliminated, and the federal legislation does not take effect until 1980, which allows for much more identifying information on the effects of the "early" segments of age-earnings profiles from states that passed laws as of 1960 (or 1970). On the other hand, because observations in Colorado are dropped from the treatment group, we can only identify effects through age 54 when we use the restricted control group.

Turning first to the specification that ignores enforcement, estimates of equation (10) are reported in the first seven columns of Table 5. Columns (1)-(5) use the restricted control group, and columns (6) and (7) use the broader control group. The first column reports estimates of the log earnings specifications with controls for years of schooling, residence in an SMSA, marital status, the year of the observation, narrowly-defined age categories, and hours and weeks of work. For reasons discussed above, we focus on estimates of the effect of age discrimination laws on the steepness of earnings profiles for workers in the younger unprotected age group (α'). In column (1), the estimate of α' is positive and significant. The estimate of .0057 indicates that earnings rise by an additional .57 percentage point per year following the adoption of age discrimination laws. Given typical slopes of age-earnings profiles on the order of .03-.05, this represents a substantial effect. Because, as explained above, the estimates of γ and γ' cannot be used to measure the intercept shift, we do not report them for these specifications.

Columns (2)-(4) report results for specifications adding additional control variables, including state dummy variables in column (2), industry and occupation dummy variables in

[31]We do this rather than introducing a set of interactions for non-enforcement, given the earlier evidence that unenforced laws have smaller effects on employment, and no effect for protected workers under age 60 or for unprotected workers.

column (3), and interactions between the age dummy variables and year dummy variables in column (4), to allow for changes in age-earnings profiles over time that are common to states irrespective of changes in age discrimination laws. The first two specification changes have virtually no effect on the estimate of α', with the estimates in columns (2) and (3) indicating that age discrimination laws boost earnings growth of unprotected workers by .60-.67 percentage point per year. The estimate in column (4) indicates a stronger effect, rising to 1.12 percentage points per year. The estimates of α, the effects of these laws on the steepness of age-earnings profiles for older, protected workers, also indicate some steepening of age-earnings profiles once more controls are added, although the effects appear to be weaker for this older group. However, as pointed out earlier, we do not have as much confidence in the results for these older workers.

Column (5) adds the state-year interactions to the specification, to allow for unobserved effects common to individuals in the same state and year. In contrast to the results for employment, this has only a negligible impact on the standard errors, suggesting that common effects in employment are much more important than those in earnings. However, the effect of age discrimination laws in steepening age-earnings profiles is even sharper in this specification, rising to 1.59 percentage points per year for unprotected workers.

Column (6) reports results using the specification in column (5), augmented to include in the control group observations on workers who were already in the labor market when age discrimination laws were passed (i.e., who were 25 or older in the Census years in which the laws were first in effect). The estimated effect of age discrimination laws on the steepness of age-earnings profiles for the younger, unprotected workers, falls to .94 percentage point per year, but remains strongly statistically significant and still indicates a large effect.

Column (7) adds interactions between the age dummy variables and a dummy variable for

Colorado, Louisiana, or Massachusetts, and an additional set of interactions of age dummies with a dummy variable for states that passed laws in the 1940-1960 period. As with the employment results, these enrichments of the specification have essentially no effect on the results.

Table 6 reports estimates for the same specifications, using only laws with an enforcement mechanism to define the treatment group.[32] Qualitatively, the results are very similar. In particular, the estimates of α' are always positive and strongly significant (and the estimates of α are positive and significant once the fuller set of controls is included). The estimates of α' based on the richer specifications indicate that age discrimination laws increase earnings growth by about .74-1.06 percentage points per year. Note that these estimates are a bit lower than those in Table 5, which is counterintuitive if we are considering "tougher" laws in Table 6. On the other hand, if laws without an enforcement mechanism have some effect, we are including in the control group some observations for which the treatment applies, which can lead to lower estimated treatment effects.

Finally, the above discussion of the restricted and broad control groups points to an alternative approach to distinguish between the effects of age discrimination laws on age-earnings profiles that arise via changes in long-term contracting, and those that arise from relative demand shifts. This alternative approach may be desirable if the identifying assumption underlying equation (10)--that relative demand shifts affect wages of all workers within either the protected or unprotected group equally--is regarded skeptically. In addition, this approach permits us to estimate the effects of age discrimination laws on the intercepts of age-earnings profiles that arise from changes in long-term contracting.

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[32]The sample size grows in the specifications with the restricted control group because observations on workers in states that passed laws with no enforcement mechanism, who were not in the youngest age group when these laws passed, can now be included in the sample.

In particular, the group of workers who are excluded from the restricted control group, but included in the broad control group, are those observed in the labor market after age discrimination laws are passed, but who were already in the market (i.e., aged 25 or older) when the laws passed. An alternative way to think about this group is that they are unaffected by changes in long-term incentive contracting--because to a large extent they have already entered into long-term employment relationships including the pensions and other institutional arrangements that underlie such relationships--but that they are affected by relative demand shifts. For example, workers in their 40's when an age discrimination law is passed may be relatively unlikely to experience an earnings increase because of changes in long-term incentive contracts, since such contracts are strongly influenced by earnings and productivity in years prior to the law's passage. Nonetheless, a relative demand shift toward workers in their 40's (as, for example, spot-market firms with dismal records of hiring older workers begin to do so) could raise the average earnings of such workers. A similar argument could be made for workers in their 30's, who will shortly be in the protected age group. Thus, we estimate the effects of age discrimination laws on long-term incentive contracts augmenting equation (10) to allow age discrimination laws to affect those workers in the market but already "older" when the law passes, but differentiating between the effects on these workers and workers who enter the labor market after the laws passed. Specifically, we estimate the specification

$$
\begin{aligned}
Y_{ijt} = {} & Z_{ijt}\beta + T_t\beta' + S_j\beta'' + A_{ijt}\theta' + A_{ijt}\cdot T_t\cdot\theta'' + PAD_{ijt}\cdot AD_{jt}\cdot YNG_{ijt}\gamma + (1-PAD_{ijt})\cdot AD_{jt}\cdot YNG_{ijt}\gamma' \\
& + AGE_{ijt}\cdot PAD_{ijt}\cdot AD_{jt}\cdot YNG_{ijt}\alpha + AGE_{ijt}\cdot(1-PAD)_{ijt}\cdot AD_{jt}\cdot YNG_{ijt}\alpha' \\
& + PAD_{ijt}\cdot AD_{jt}\delta + (1-PAD_{ijt})\cdot AD_{jt}\delta' + AGE_{ijt}\cdot PAD_{ijt}\cdot AD_{jt}\lambda + AGE_{ijt}\cdot(1-PAD)_{ijt}\cdot AD_{jt}\lambda' + \epsilon_{ijt} \quad ,
\end{aligned}
\tag{11}
$$

where YNG is a dummy variable equal to one for workers who were less than 25 years old when an age discrimination law passed. In this specification, λ and λ' capture the effects of age

discrimination laws on the steepness of age-earnings profiles of all workers in states in which such laws pass, while δ and δ' capture the effects of such laws on the intercepts of their earnings profiles--interpreted as arising from relative demand shifts. In contrast, α and α' capture the difference in the effects of such laws for workers who entered the labor market after such laws passed, thus serving as difference-in-difference estimators of the effects of age discrimination laws from which the effects of relative demand shifts are differenced out by allowing earnings profiles to shift for all workers after age discrimination laws pass. In addition, because the intercept shifts (γ and γ') no longer serve to capture the relative demand shifts, in equation (11) these parameters can be interpreted as capturing the effects of age discrimination laws via long-term contracting. Thus, with this specification and the accompanying identifying assumption, we can more readily interpret the estimated effects of age discrimination laws on the slopes and the intercepts of earnings profiles as arising from changes in Lazear contracting.

Estimates of equation (11) are reported in column (8) of Tables 5 and 6. First, note the results for all observations after a law passed (which includes those workers who were older when the law passed). These estimates indeed indicate that relative demand may have shifted toward older workers within the group of unprotected workers (i.e., those in the upper range of the younger, unprotected group); the estimates of λ' are positive (in the range .0011-.0013, indicating that earnings are increased by .11-.13 percentage point more for each year of age). More importantly, though, the estimates of α' remain positive and significant, and only a bit smaller than in the previous specifications. In particular, the estimates indicate that age discrimination laws increase the slopes of age-earnings profiles for younger, unprotected workers by .85-.99 percentage point per year, now measured relative to other workers in the labor market, but not

workers who were older when these laws passed.[33] The table also reports the shift in earnings implied by the estimates for an 18 year-old in the unprotected group (the "intercept" of the earnings profile). This estimate is $g' + a' \cdot 18$, where g' and a' are the estimates of γ' and α', respectively. The estimates indicate that initial earnings are lowered by 7.3 to 10.5 percent by age discrimination laws, with the larger estimated intercept reduction corresponding to the larger estimated slope increase.[34] Such evidence is consistent with increased use of long-term incentive contracts.[35]

Finally, it is conceivable that the evidence reported in this section--that age discrimination laws steepen age-earnings profiles--stems from other sources of changes in relative earnings at different ages that happen to coincide with the advent of age discrimination laws, rather than from effects of these laws. We have controlled for fixed state effects, year effects, and state-year effects, as well as changes in the demographic composition and education levels of the workforce in each state via the individual-level controls. But we cannot rule out on a priori grounds the influence of other factors that vary with state and year, although we regard it as unlikely that they would have generated the results reported in earlier tables.

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[33]The estimates in Tables 5 and 6 were nearly identical when we omitted the interactions of the age dummies with a dummy variable for Colorado, Louisiana, or Massachusetts, and with a dummy variable for states that passed age discrimination laws between 1940 and 1960.

[34]This happens to some extent by construction, because the computation adjusts using the estimate of α' to make the intercept correspond to age 18, not the mean age in the sample.

[35]Increased use of long-term incentive contracts also implies greater present discounted values of earnings profiles. As noted earlier, we do not think our data are sufficiently rich to obtain convincing evidence on this question, in part because we do not have data on actual tenure spells. Nonetheless, we did some illustrative calculations. For example, assuming a three-percent annual growth rate of earnings, and using a thirty-year period, the intercept reduction of 7.30 percent and slope increase of .85 percentage point (as in column (8) of Table 6) results in a higher present discounted value of the earnings stream for discount rates of 11 percent and below. Using the estimates in column (8) of Table 5, the present discounted value is higher for discount rates of seven percent and below. With a higher annual growth rate of earnings, the steeper profiles have higher present values for even higher discount rates.

Nonetheless, to test for this possibility we consider evidence for self-employed workers, for whom Lazear contracts are regarded as irrelevant (Lazear and Moore, 1984). If we observe the same relationship between age discrimination laws and steepening of age-earnings profiles for self-employed workers as for wage and salary workers, we would be suspicious that we are detecting changes induced by these laws via strengthened Lazear contracts (or via other changes that would tend to affect only wage and salary workers, such as greater general human capital investment spurred by better employment opportunities for older workers). On the other hand, if we fail to find any corresponding evidence among the self-employed, then we would be more inclined to believe that our results for wage and salary workers reflect changes in Lazear contracting stemming from age discrimination laws.[36]

The results are presented in Table 7. Because self-employment income is not available in 1940, this table uses data beginning only in 1950. However, we replicated the results from Tables 3, 5, and 6 using only the 1950-1980 data, and the results were unchanged relative to those tables, so any differences in Table 7 are attributable solely to using the self-employed. In addition, in some years only combined business and farm income is reported in the Census data, so we use the sum of these for each year. Finally, because the issue of changes in relative demand for self-employed workers induced by age discrimination laws does not arise, we only report estimates of specification (10). We further limit attention to a subset of specifications from the earlier tables, although the results were similar across the full set of specifications, and the standard errors were only slightly lower if the state-year interactions were excluded.

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[36]An alternative possibility is that self-employment income is measured too imprecisely to observe the relationships we observe for wage and salary workers, even if they exist for the self-employed. However, given the standard errors of the estimates of α' that we obtain for the self-employed, estimates of α' of the magnitudes we obtain for the non-self-employed would still be significant. In addition, many of the estimates of α' are negative rather than positive, which cannot be attributed to random measurement error in self-employment income.

In brief, in contrast to the results for wage and salary workers, the results in Table 7 provide no evidence that age discrimination laws are associated with steeper age-earnings profiles (or lower intercepts) for the self-employed. In fact, for the unprotected workers on whom we focus with respect to this question (i.e., the estimates of α'), the estimates are more often than not in the opposite direction. The results in Table 7 lead us to conclude with more confidence that our evidence for wage and salary workers represents causal effects of age discrimination laws that operate only on wage and salary workers--the types of effects that we would expect if such laws strengthen Lazear contracts.

VIII. Conclusions

Lazear's critique of the Age Discrimination in Employment Act (ADEA) was based on the view that employers needed to be able to discriminate based on age in order to implement long-term incentive contracts, because such contracts, while acceptable ex ante to both workers and firms, are unacceptable to workers ex post. In this view, laws prohibiting age discrimination would reduce the use of long-term incentive contracts. An alternative perspective on such laws is that they serve as a precommitment device that makes credible the long-term commitment to workers that firms must make under long-term incentive contracts, by making it costly for firms to dismiss older workers to whom payments in excess of current marginal product are owed. Forcing workers to retire at some point (in Lazear's model, when the present values of the streams of wages and marginal products are equal) may appear to be made more difficult if mandatory retirement is prohibited, but under the ADEA firms retain the ability to offer strong financial incentives to encourage retirement at any age they choose. Thus, this alternative perspective suggests that the predominant effect of the ADEA and other age discrimination laws may have been to strengthen the bonds between workers and firms, thus enabling greater use of Lazear

contracts.

We assess evidence on these alternative perspectives on the ADEA by estimating the effects of age discrimination laws on the steepness of age-earnings profiles. If long-term incentive contracts are strengthened and become more prevalent, average age-earnings profiles should steepen for workers who enter the labor market after age discrimination laws are passed, while if they are weakened these profiles should flatten. We also estimate the effects of such laws on employment of protected and unprotected workers.

We find that age discrimination laws boost the employment of older workers, while having essentially no effect on employment of younger, unprotected workers. More importantly, the results indicate that age discrimination laws lead to steeper age-earning profiles in the labor market. While possibly consistent with other interpretations, one interpretation of this evidence consistent with the model we lay out is that age discrimination laws strengthen bonds between workers and firms, leading to greater use of Lazear contracts in labor markets, and hence more likely increasing than decreasing labor market efficiency.

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Table 1: State Age Discrimination and Mandatory Retirement Laws for Private-Sector Workers

Year: State:	1900-1959	1960-1969	1970-1979	1980-1989
AL				
AK		1960-enacted law prohibiting age disc. in emp. for those age > 45		
AR				
AZ				1980-enacted law prohibiting age disc. in emp. for those 40-70 years old
CA		1961-enacted law prohibiting age disc. in emp. for those 40-64 years old	1977-ban mandatory retirement for age > 40	
CO	1903-enacted law prohibiting age disc. in emp. for those 18-60 years old (covers discharges only, no enforcement agency)			1986-age disc. prohibited by state civil rights law for those 40-70
CT	1959-amend fair emp. practices act-prohibit age disc. for those 40-65 years old		1975-remove age limits for age disc. 1978-ban mandatory retirement to conform to federal act (before age 70)	
DE		1960-enacted law prohibiting age disc. in emp. for those 45-65 years old	1979-raise age limit for age disc. from 65 to 70 years old, lower limit 40 years (lower limit 40 as of 1973, year of change as yet unknown)	
DC			1974-enacted law prohibiting age disc. in emp., age 18-65	
FL			1977-enact human rights law prohibit age disc. for all employers with > 15 employees 1978-amend human rights law ban mandatory retirement to conform to federal act (before age 70)	
GA			1971-enacted law prohibiting age disc. in emp. for those 40-65 years old (no enforcement agency)	1981-raised age limit for age disc. from 65 to 70
HI		1963-enacted law prohibiting age disc. in emp., no age limit specified in law		1984-ban mandatory retirement
ID		1965-enacted law prohibiting age disc. in emp. for those < age 60		1982-replaced age disc. law with fair emp. practices act for those 40-70 years old ban mandatory retirement 1988-amend human rights act both age disc. and mandatory retirement to remove upper age limit, now > 40 was 40-70 years
IL		1967-enacted law prohibiting age disc. in emp. for those > age 45, > 25 employees	1974-expanded coverage of age disc. law to cover employers with > 15 employees	1980-expand coverage of age disc. law to those 40-70 years 1987-remove upper age limit of 70 for age disc., also conformed to federal act for mandatory retirement

Table 1 (continued)

Year: State:	1900-1959	1960-1969	1970-1979	1980-1989
IN		1965-enacted law prohibiting age disc. in emp. for those 40-65 years old	1979-state anti disc. law no longer applicable to those covered by federal law raised upper age limit for age disc. from 65 to 70	
IA			1972-enacted law prohibiting age disc. in emp. for those > age 18	1983-mandatory retirement banned as of this date (year of change as yet unknown)
KS				1983-enacted law prohibiting age disc. in emp. for employers with > 4 employees and for those 40-70 years old 1988-amend age disc. in emp. act extend coverage to those > age 18, was for those 40-70 years old ban mandatory retirement
KY			1972-enacted law prohibiting age disc. in emp, age 40-65	1980-raised upper age limit from 65 to 70 for age disc.
LA	1934-bans age disc. in emp. for those < age 50, for employers with > 25 emp., excludes hazardous, endurance, unusual skill jobs		1978-expand coverage of age disc. law to those 40-70 and to employers with > 20 employees (excludes those covered by federal law)	1985-expanded coverage of age disc. law to those covered by the federal act 1988-enact human rights law prohibit age disc. for employers with > 8 employees, 40-70 years
ME		1965-enacted law prohibiting age disc. in emp.	1971-enacted human rights act prohibits age disc. in emp., no age limit set	1980-ban mandatory retirement at any age
MA	1937-enacted anti-disc. law prohibiting dismissal from or refusal to employ persons age 45-65, and contracts with limits on age 1950-amend fair emp. practices act-prohibit age disc. 45-65	1966-expanded coverage of age disc. law to those age 40-65 was for those age 45-65		1984-remove age limit for disc. now over 40 was for those 40-65 years
MD		1968-enacted law prohibiting age disc. in emp. for those 45-65 years old	1973-expanded age disc. law to employers with > 15 employees	
MI		1965-enacted law prohibiting age disc. in emp. for those 35-60 years old, ban mandatory retirement before 65	1972-expanded coverage of age disc. law to those > age 18, was for those 35-60	
MN			1977-enacted law prohibiting age disc. in emp. for those > age 18, allow mandatory retirement 1978-ban mandatory retirement for those < age 70	
MO				1986-enacted law prohibiting age disc. in emp. for those 40-70 years old
MS				
MT			1974-enacted law prohibiting age disc. in emp.	
NB		1963-enacted law prohibiting age disc. in emp. for those 40-65 years old	1979-raised age limit from 65 to 70 for disc. protection	

Table 1 (continued)

Year: State:	1900-1959	1960-1969	1970-1979	1980-1989
NC			1977-Equal Emp. Practices Act public policy to protect against age disc. for all persons	
ND		1965-enacted law prohibiting age disc. in emp. for those 40-65 years old (no enforcement agency)		1983-enacted law prohibiting age disc. in emp. for those 40-70 years old, employers with > 10 employees
NH			1971-enacted law prohibiting age disc. in emp. 1979- ban mandatory retirement employers with > 6 employees	
NJ		1962-amend fair emp. practices prohibit age disc. in emp. for those > age 21		1985-ban mandatory retirement may refuse to hire/promote those over 70 yrs old
NM		1969-enacted law prohibiting age disc. in emp.		
NV			1973-enacted law prohibiting age disc. in emp., no age limits	1981-impose age limits of 40-70 for disc. prohibition 1987-remove upper age limit in disc. prohibition
NY	1958-amend fair emp. practices act-prohibit age disc. for those 45-65 years old	1961-expand coverage of age disc. law to those age 40-65 was for those age 45-65	1975-expand coverage of age disc. law to those 18-65 years was for those 40-65 years	1984-ban mandatory retirement eliminate upper age limit for age disc. law (effective 1986 for private sector)
OH		1961-enacted law prohibiting age disc. in emp. for those 40-65 years old	1975-amend equal pay law to prohibit wage differentials based on age 1978-ban on age disc. for job interview or discharge 40-65 1979-amend civic rights act to prohibit age disc. for those 40-70 years old, expand coverage of earlier age disc. law to those 40-70 years was for those 40-65 years	1990-amend age disc. law to extend coverage to those > age 40, was for those 40-70 years
OK				1985-amend civil rights act to prohibit age disc. in emp. for those 40-70 years old
OR	1959-amend fair emp. practices act-prohibit age disc. for those 25-65 years old		1973-expand coverage of age disc. law to those 18-65 was 25-65 years old	1981-raise age limit for age disc. from 65 to 70 years 1987-remove upper age limit in disc. prohibition was 70
PA	1956-amend fair emp. practices to prohibit age disc. in emp. for those 40-62 years old 1956-amend fair emp. practices allow inquiry of applicant age			1983-raised upper age limit of age disc. from 62 to 70
RI	1956-enacted law prohibiting age disc. in emp. for those 45-65 years old		1979-amend fair emp. practices to prohibit age disc. in emp. for those 40-70 years old state has separate law for those 45-65 years old	
SC			1979-expand coverage of age disc. law to private employers for those 40-70 years old was previously only public employers	1988-amend human affairs law remove upper age limit of 70

Table 2: Coding of Prohibitions of Age Discrimination and Mandatory Retirement

Census Year: State:	1940	1950	1960	1970	1980
AK				AD (>45)	AD (>45)
CA				AD (40-64)	AD (40-64), MR (>40)
CO	AD (18-60), ADNE	AD (18-60), ADNE	AD (18-60), ADNE	AD (18-60), ADNE	AD (18-60), ADNE
CT			AD (40-65)	AD (40-65)	AD (≥40), MR (40-69)
DE				AD (45-65)	AD (40-70)
DC					AD (18-65)
FL					AD (all ages), MR (40-69)
GA					AD (40-65), ADNE
HI				AD (all ages)	AD (all ages)
ID				AD (< 60)	AD (<60)
IL				AD (>45)	AD (>45)
IN				AD (40-65)	
IA					AD (>18)
KY					AD (40-65)
LA	AD (<50)	AD (<50)	AD (<50)	AD (<50)	
ME				AD (all ages)	AD (all ages)
MA	AD (45-65)	AD (45-65)	AD (45-65)	AD (40-65)	AD (40-65)
MD				AD (45-65)	AD (45-65)
MI				AD (35-60), MR (<65)	AD (>18), MR (<65)
MN					AD (>18), MR (<70)
MT					AD (all ages)
NB				AD (40-65)	AD (40-70)
NC					AD (all ages)
ND				AD (40-65), ADNE	AD (40-65), ADNE
NH					AD (all ages), MR (all ages)
NJ				AD (>21)	AD (>21)
NM				AD (all ages)	AD (all ages)
NV					AD (all ages)
NY			AD (45-65)	AD (40-65)	AD (18-65)
OH				AD (40-65)	AD (40-70)
OR			AD (25-65)	AD (25-65)	AD (18-65)
PA			AD (40-62)	AD (40-62)	AD (40-62)
RI			AD (45-65)	AD (45-65)	AD (40-70)
SC					AD (40-70)
UT					AD (40+)
WA				AD (40-65)	AD (40-65)
WI			AD (40-65)	AD (40-65)	AD (40-65)
WV					AD (40-65)
U.S.				AD (40-65), ADNE	AD (40-70), MR (40-69)

Key: AD--age discrimination law; MR--explicit ban on mandatory retirement; ADNE--age discrimination law does not provide enforcement authority. After the variables AD and MR the age range is indicated for the protected group, used to define the variables PAD and PMR, that are explained in the text. States with no applicable laws as of 1980 (the 1980 Census) are not shown. In IN and LA, as of 1980 the state laws does not apply to those covered by the federal law, so we do not code this state as AD in 1980.

Table 3: Employment Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age discrimination law:									
Protected ages	.0164	...	...	...	...	...	...	...	...
	(.0018)								
× age ≥ 60	...	.0667	.0731	.0717	.0556	.0426	.0912	.0909	.0909
		(.0047)	(.0049)	(.0051)	(.0185)	(.0186)	(.0163)	(.0163)	(.0163)
× age < 60	...	.0083	.0228	.0172	.0038	.0030	.0380	.0380	.0370
		(.0019)	(.0027)	(.0027)	(.0179)	(.0179)	(.0160)	(.0160)	(.0160)
× no enforcement authority	...	...	...	...	...	...	...	-.0259	-.0254
								(.0041)	(.0042)
Unprotected ages	-.0112	-.0110	-.0018	.0019	-.0134	-.0131	.0300	.0299	.0301
	(.0017)	(.0017)	(.0023)	(.0024)	(.0180)	(.0180)	(.0160)	(.0160)	(.0160)
× no enforcement authority	...	...	...	...	...	...	...	-.0349	-.0347
								(.0049)	(.0049)
Explicit mandatory retirement law:									
Protected ages									
× age ≥ 60	...	...	...	...	...	...	...	...	.0005
									(.0115)
× age < 60	...	...	...	...	...	...	...	...	.0006
									(.0107)
Unprotected ages	...	...	...	...	...	...	...	...	-.0107
									(.0101)
Last Census used:	1960	1960	1960	1960	1960	1960	1980	1980	1980
Sample size	751873	751873	751873	751873	751873	751873	1449596	1449596	1449596
R-squared	.380	.380	.382	.383	.384	.384	.392	.392	.392
Other controls included:									
State dummy variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age-year interactions	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
State-year interactions	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Age-Colorado/Louisiana/ Massachusetts interactions	No	No	No	No	No	Yes	Yes	Yes	Yes
Age-passed law 1940-1960 interactions	No	No	No	No	No	Yes	Yes	Yes	Yes
Specification in text:	(6)	(7)	(7)	(7)	(7)	(7)	(7)	(8)	(9)

OLS estimates are reported. Standard errors are reported in parentheses. All specifications include years of schooling, and dummy variables for SMSA, marital status (one for married, spouse present, and one for divorced, widowed, separated, or married spouse absent), year of observation, and age (using categories 18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-70).

Table 4: Identifying Information for Wage Profile Regressions

Restricted control group, w/o reference to enforcement:

Treatment group: Workers under age 25 as of Census year when legislation passed, in state under jurisdiction of legislation.

Control group: All workers prior to passage of legislation in their state (or federal legislation).

LA, MA (passed legislation as of 1940, after 1930)--
Treatment: age 18-24 in 1940, age 18-34 in 1950, age 18-44 in 1960, age 18-54 in 1970, and age 18-64 in 1980
Control: none
Age ranges of α and α' identified by treatment group: age 18-44

CO (passed legislation as of 1940, in 1903)--
Treatment: age 18-54 in 1940, age 18-64 in 1950, age 18-70 in 1960, 1970, and 1980
Control: none
Age ranges of α and α' identified by treatment group: age 18-70

CT, NY, OR, PA, RI, WI (passed legislation as of 1960)--
Treatment: age 18-24 in 1960, 18-34 in 1970, and 18-44 in 1980
Control: all ages prior to 1960
Age ranges of α and α' identified by treatment group: age 18-24

All other states (affected by federal legislation in 1970)--
Treatment: age 18-24 in 1970, and 18-34 in 1980
Control group: all ages prior to 1970
Age ranges of α and α' identified by treatment group: none

Broader control group, w/o reference to enforcement:

Treatment group: Workers under age 25 as of Census year when legislation passed, in state under jurisdiction of legislation.

Control group: All workers prior to passage of legislation in their state (or federal legislation), and workers aged 25 and over as of Census year when legislation passed, in state under jurisdiction of legislation.

LA, MA (passed legislation as of 1940, after 1930)--
Treatment: age 18-24 in 1940, age 18-34 in 1950, age 18-44 in 1960, age 18-54 in 1970, and age 18-64 in 1980
Control: age 25 and up in 1940, age 35 and up in 1950, age 45 and up in 1960, age 55 and up in 1960, and age 65 and up in 1970
Age ranges of α and α' identified by treatment group: age 18-64

CO (passed legislation as of 1940, in 1903)--
Treatment: age 18-54 in 1940, age 18-64 in 1950, age 18-70 in 1960, 1970, and 1980
Control: age 55 and up in 1940, and age 65 and up in 1950
Age ranges of α and α' identified by treatment group: age 18-70

CT, NY, OR, PA, RI, WI (passed legislation as of 1960)--
Treatment: age 18-24 in 1960, 18-34 in 1970, and 18-44 in 1980
Control: all ages prior to 1960, age 25 and up in 1960, age 35 and up in 1970, and age 45 and up in 1980
Age ranges of α and α' identified by treatment group: age 18-44

All other states (affected by federal legislation in 1970)--
Treatment: age 18-24 in 1970, and 18-34 in 1980
Control group: all ages prior to 1970, age 25 and up in 1970, and age 35 and up in 1980
Age ranges of α and α' identified by treatment group: none

Restricted control group, w/ reference to enforcement:

Treatment group: Workers under age 25 as of Census year when legislation with enforcement passed, in state under jurisdiction of legislation.
Control group: All workers prior to passage of legislation with enforcement in their state (or federal legislation).

LA, MA (passed legislation as of 1940, after 1930)--
Treatment: age 18-24 in 1940, age 18-34 in 1950, age 18-44 in 1960, age 18-54 in 1970, and age 18-64 in 1980
Control: none
Age ranges of α and α' identified by treatment group: age 18-54

CT, NY, OR, PA, RI, WI (passed legislation as of 1960)--
Treatment: age 18-24 in 1960, 18-34 in 1970, and 18-44 in 1980
Control: all ages prior to 1960
Age ranges of α and α' identified by treatment group: age 18-34

States passing legislation with enforcement as of 1970--
Treatment: age 18-24 in 1970, and age 18-34 in 1980
Control: all ages prior to 1970
Age ranges of α and α' identified by treatment group: age 18-24

All other states (affected by federal legislation in 1980)--
Treatment: age 18-24 in 1980
Control group: all ages prior to 1980
Age ranges of α and α' identified by treatment group: none

Broader control group, w/ reference to enforcement:

Treatment group: Workers under age 25 as of Census year when legislation with enforcement passed, in state under jurisdiction of legislation.

Control group: All workers prior to passage of legislation with enforcement in their state (or federal legislation), and workers aged 25 and over as of Census year when legislation passed, in state under jurisdiction of legislation.

LA, MA (passed legislation as of 1940, after 1930)--
Treatment: age 18-24 in 1940, age 18-34 in 1950, age 18-44 in 1960, age 18-54 in 1970, and age 18-64 in 1980
Control: age 25 and up in 1940, age 35 and up in 1950, age 45 and up in 1960, age 55 and up in 1960, and age 65 and up in 1970
Age ranges of α and α' identified by treatment group: age 18-64

CT, NY, OR, PA, RI, WI (passed legislation as of 1960)--
Treatment: age 18-24 in 1960, 18-34 in 1970, and 18-44 in 1980
Control: all ages prior to 1960, age 25 and up in 1960, age 35 and up in 1970, and age 45 and up in 1980
Age ranges of α and α' identified by treatment group: age 18-44

States passing legislation with enforcement as of 1970--
Treatment: age 18-24 in 1970, 18-34 in 1980
Control: all ages prior to 1970, age 25 and up in 1980
Age ranges of α and α' identified by treatment group: age 18-34

All other states (affected by federal legislation in 1980)--
Treatment: age 18-24 in 1980
Control group: all ages prior to 1980, age 25 and up in 1980
Age ranges of α and α' identified by treatment group: none

Table 5: Earnings Profile Regressions, All Age Discrimination Laws

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individuals < 25 years old when law passed:								
Age discrimination law:								
Protected ages								
Slope shift (α)	-.0009	.0003	.0010	.0076	.0098	.0026	.0044	.0044
	(.0002)	(.0002)	(.0002)	(.0004)	(.0005)	(.0002)	(.0003)	(.0003)
Unprotected ages								
Slope shift (α')	.0057	.0060	.0067	.0119	.0159	.0094	.0107	.0099
	(.0003)	(.0003)	(.0003)	(.0004)	(.0004)	(.0003)	(.0004)	(.0004)
Intercept shift ($\gamma' + \alpha' \cdot 18$)	...	...	...	...	...	...	...	-.1052 (.0057)
All observations after law passed:								
Age discrimination law:								
Protected ages								
Slope shift (λ)	...	...	...	...	...	...	...	.0012 (.0002)
Unprotected ages								
Slope shift (λ')	...	...	...	...	...	...	...	.0013 (.0002)
Years of schooling	.0493	.0478	.0344	.0350	.0350	.0344	.0344	.0344
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Sample size	579214	579214	579214	579214	579214	972038	972038	972038
R-squared	.775	.781	.808	.809	.810	.768	.768	.768
Restricted control group:	Yes	Yes	Yes	Yes	Yes	No	No	...
Other controls included:								
State dummy variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and occupation dummy variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Age-year interactions	No	No	No	Yes	Yes	Yes	Yes	Yes
State-year interactions	No	No	No	No	Yes	Yes	Yes	Yes
Age-Colorado/Louisiana/ Massachusetts interactions	No	No	No	No	No	No	Yes	Yes
Age-passed law 1940-1960 interactions	No	No	No	No	No	No	Yes	Yes
Specification in text:	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(11)

See notes to Table 3. Control variables included in all specifications are the same as in Table 3, with the addition of variables for weeks and hours per week (constructed as midpoints of ranges reported in the Census, using ranges consistent across all years). Observations working fewer than 27 weeks or fewer than 30 hours per week were excluded. The high R-squared values are attributable to using nominal earnings and including year dummy variables.

Table 6: Earnings Profile Regressions, Age Discrimination Laws with Enforcement Mechanism

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individuals < 25 years old when law passed:								
Age discrimination law:								
Protected ages								
Slope shift (α)	-.0010	.0001	.0009	.0043	.0049	.0021	.0033	.0030
	(.0002)	(.0003)	(.0002)	(.0003)	(.0004)	(.0003)	(.0003)	(.0003)
Unprotected ages								
Slope shift (α')	.0026	.0038	.0048	.0084	.0106	.0074	.0096	.0085
	(.0003)	(.0003)	(.0003)	(.0004)	(.0004)	(.0003)	(.0004)	(.0004)
Intercept shift ($\gamma' + \alpha' \cdot 18$)	...	...	...	...	...	...	...	-.0730 (.0053)
All observations after law passed:								
Age discrimination law:								
Protected ages								
Slope shift (λ)	...	...	...	...	...	...	...	.0009 (.0002)
Unprotected ages								
Slope shift (λ')	...	...	...	...	...	...	...	.0011 (.0002)
Years of schooling	.0504	.0488	.0350	.0356	.0356	.0344	.0344	.0344
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Sample size	646184	646184	646184	646184	646184	972038	972038	972038
R-squared	.761	.767	.796	.797	.798	.768	.768	.768
Restricted control group:	Yes	Yes	Yes	Yes	Yes	No	No	...
Other controls included:								
State dummy variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry and occupation dummy variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Age-year interactions	No	No	No	Yes	Yes	Yes	Yes	Yes
State-year interactions	No	No	No	No	Yes	Yes	Yes	Yes
Age-Colorado/Louisiana/ Massachusetts interactions	No	No	No	No	No	No	Yes	Yes
Age-passed law 1940-1960 interactions	No	No	No	No	No	No	Yes	Yes
Specification in text:	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(11)

See notes to Table 5.

Table 7: Earnings Profile Regressions for Self-Employed

	All Age Discrimination Laws		Laws with Enforcement Mechanism	
	(1)	(2)	(1')	(2')
Individuals < 25 years old when law passed:				
Age discrimination law:				
Protected ages (45 year-old)				
Slope shift (α)	.0022	-.0006	-.0048	-.0022
	(.0024)	(.0013)	(.0029)	(.0017)
Unprotected ages (18 year-old)				
Slope shift (α')	.0040	.0007	-.0002	-.0048
	(.0025)	(.0018)	(.0034)	(.0025)
Sample size	63097	118006	75624	118006
R-squared	.450	.469	.427	.469

See notes to Table 5. Specifications (1) and (2) correspond to columns (5) and (6) of Table 5; specifications (1') and (2') correspond to columns (5) and (6) of Table 6. Self-employment income includes both business and farm income. The same bottom cutoff on income is imposed as for the wage and salary workers, so there are no observations in the sample with zero or negative income. This income information is available only for 1950-1980, so the data for 1940 are excluded.