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Truth or macroeconomic consequences: theoretical implications of the decline and rise of job references in the United States

Since the 1970s, there has been a decline in the quantity and quality of employer-provided reference materials in the United States.[1] This has been attributed to a rash of defamation suits over the content of letters of reference.[2] As a reaction to this decline, twenty-two states passed statutes in 1996 and 1997 granting some type of immunity from suits

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[1] In the 1970s, surveys showed that the large majority of firms were willing to answer reference requests (Paetzold and Willborn, 1992). More recent surveys document that a large majority of firms do not provide detailed reference materials. See Long (1997), Forster (1996), and Langdon et al. (1989) for reports on recent surveys. There are indications that other countries have had similar problems; see Hilson (1996) and Napier (1987) for cases in the United Kingdom, and Shine and Linhares (1997) for similar issues in New Zealand.

[2] Interestingly, it is difficult to discover if plaintiffs have in fact been getting higher or more frequent settlements. See Paetzold and Willborn (1992) for a description of data-collection problems. Long (1997) notes that the risks from defamation lawsuits have not been properly assessed. Paetzold and Willborn (1992) suggest that there has not been an increase in successful suits; Nye (1988), Fenton and Lawrimore (1992), and Manley (1989) present evidence that there has been. The *Wall Street Journal* reported in 1986 that the ultimate cost of defending a defamation suit in front of a jury ranged from $140,000 to $250,000. There is also disagreement over the grounds on which these suits have been won. Galle and Langdon (1988) and Forster (1996) find that federal laws giving rights protections have been used as a basis for suits. Duffy (1983–84) finds the cause is an increase in employee rights. Paetzold and Willborn (1992) maintain that the law did not change. See Long (1997), and references therein, for a review of applicable laws. However, anecdotal and survey evidence make it clear that there has been a decline in both truthful and untruthful references.

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over reference materials.[3] A further sixteen states considered, but failed to pass, such legislation. This contrasts with before 1996, when only five states had such laws. These laws were often championed by groups like the Society for Human Resource Management and the National Federation of Independent Businesses, who claimed to suffer economic damage from the loss of reference information (Long, 1997).

At the firm level, the benefits of references stem from their two roles: screening undesirable workers and providing incentives for capable employees. This paper operates from the assumption that these laws will be successful in lowering costs to the point that firms will once again provide references. At the same time, it identifies tangible benefits to firms of providing references, showing that the legislation does not necessarily have to reduce the costs to zero.

The overall purpose of this paper is to examine the impact of the decline and predicted resurgence of references on the natural rate of unemployment and long-run wage rate. To accomplish this task, the two roles of references (in a simplified form) are integrated into each of two separate models of the labor market: a standard efficiency wage model and a standard turnover cost model. These models were chosen because they each have been used in recent years to explain the natural rate of unemployment.[4] Incorporating references into each of the models leads to the prediction that the resurgence of references will cause the long-run unemployment rate to fall. However, the impact on wages is less clear.

The efficiency wage model

When workers cannot be monitored well, firms must use alternative mechanisms to prevent shirking. One such mechanism is efficiency wages. As formulated by Shapiro and Stiglitz (1984), firms using the efficiency wage scheme pay workers a wage above the reservation wage. Since workers value the high wages, and fear losing them if caught shirk-

[3] For a list and discussion of the individual states' statutes, see Long (1997). Before statutory laws were passed, employers providing references were protected under common law as qualified, or conditional privilege. However, Long (1997) finds that most firms found these protections inadequate. The immunity laws generally formalized and strengthened the protections under privilege.

[4] The seminal paper linking efficiency wages and unemployment is Shapiro and Stiglitz (1984). Phelps (1994) provides a more recent study. Carter and De Lancey (1997) survey the use of an efficiency wage model to study the unemployment effects of just-cause dismissal laws. For a review of frictional unemployment models, see Mortensen (1986) and Hosios (1990).

ing, they do not shirk. The high wages result in steady-state unemployment, which creates another incentive: Fired workers must compete for new jobs with other unemployed workers. Efficiency wage models derive the "no-shirking condition" (NSC) that defines all the combinations of wages and unemployment rates for which workers do not shirk.

A negative letter of reference may make it extremely difficult for a fired worker to find a new job. Thus, the threat of a bad reference can also be used as a discipline device. The effectiveness of this incentive is explored below in the framework of a standard efficiency wage model.

The model is based on the Strand (1987) variant of the Shapiro and Stiglitz (1984) efficiency wage model. The Strand (1987) model consists of two types of workers, of which one type always shirks. However, a portion of the shirking-type workers are discovered in the screening process before being hired. To examine the impact of reference immunity laws, this framework is modified to allow an applicant's type to be identified only through letters of reference. However, letters of reference are only provided by former employers if doing so is a profit-maximizing action.

This model explores two steady-state regimes. In the first, "no-reference" regime, firms do not provide references, and shirkers are not discovered until caught. In the second, "open reference" regime, all shirkers with bad references are discovered in a screening process. In this regime, the cost of shirking is not the possibility of a period of unemployment, but essentially permanent exclusion from the labor force. The choice of regimes is endogenously determined by firms to maximize profits, and it is shown that sufficiently high legal costs will result in adoption of the no-reference regime. The unemployment rate and wage in each regime are then compared to make a prediction of the effect of the reemergence of references. One interesting result is that the wage meeting the no-shirking condition is positively related to the unemployment rate; a central result of the Shapiro and Stiglitz (1984) model is that the no-shirking wage falls as unemployment rises.

Workers, firms, and references

This is a continuous time model. There are two types of the N workers. Types A and B differ only to the degree that they dislike working.[5] The instantaneous utility function for a worker of type $i = (A, B)$, is $U_i(y, e;\alpha_i) = y - \alpha_i e$ where y is the income rate (from wages or unemployment

[5] Alternatively, they can be considered to differ in the effort required to finish a job.

benefits) received, e is the measure of effort expended on a job, and a_i is the measure of type i's dislike of effort. It is assumed that $\alpha_A < \alpha_B$. Later, we will constrain the equilibrium so that all type B workers shirk. This assumption justifies calling the N_A type A workers "good," and the N_B type B workers "bad." Both types of workers discount the future at rate ρ.

New workers (of both types) enter the labor market at rate v and leave at rate d. The steady state condition $v = d$ maintains a constant stock of workers. Denote L as the total stock of workers employed (L_i of each type i) at any given time, and w as the wage rate. Employed workers choose the rate of effort (e) to expend, quit their jobs with probability per unit time $b \in (0, \infty]$, and retire with probability per unit time $d \in (0, \infty]$. The remaining (N–L) workers are unemployed, receiving only unemployment benefits ($\overline{w}$) as income.[6] Since different types of workers may have different accession rates, the probability per unit time an unemployed good worker finds a job is $a_A \in (0, \infty]$, and the probability per unit time a bad worker finds a job is $a_B \in (0, \infty]$. Unemployed retire with probability per unit time $d \in (0, \infty]$. Because of the large number of workers and the assumption of the steady state, in the aggregate, a_A, a_B, b, and d can be considered rates.

There are a large number (M) of perfectly competitive, identical firms. Firms require workers to put forth exogenously determined effort level e on the job. They produce output according to a production function $f(L^e)$ which can be aggregated to form the aggregate production function $F(L^e)$. The term L^e is the number of effective units of labor employed, where "effective unit" is defined as one worker expending effort e.[7]

Any degree of shirking is detected with probability per unit time $q \in (0, \infty]$, so workers choose between putting forth full effort and zero effort. If a firm catches a worker shirking, the worker is fired and will have to search for another job. The firm firing the worker also has the option of providing a "bad reference" detailing the reason for the firing to future prospective employers.[8] The issue of whether firms provide references

[6] Some authors (e.g., Bulow and Summers, 1987) prefer to conceptualize the "unemployed" workers as being employed in the "secondary sector," and the employed workers as working in the "primary sector." We follow Shapiro and Stiglitz (1984) in calling the workers unemployed. We do allow workers with a bad primary sector reference to work in a secondary sector which pays the opportunity cost of time (the value of unemployment benefits plus the disutility of work).

[7] In equilibrium, $L^e = L_A$.

[8] We do not wish to examine the issue of the effect of lawsuits on the accuracy of references. Inaccurate references—especially those motivated by malice—would not be immune from lawsuits in the new legislation.

is studied later, after the conditions for preventing shirking are derived.

In order to keep the model as simple as possible, yet incorporate essential elements of references, it is assumed that firms cannot tell if a worker is the shirking type without a reference or observation.[9] However, any firm may obtain any worker's references at a small per-worker cost (z), if such exist.[10] As noted below, firms will be willing to pay for such information, as hiring a shirking worker is costly to the firm. The necessary conditions are assumed for type B workers always to shirk, and type A workers never to shirk.[11] Thus, a bad reference is a signal that the applicant is a type B worker. Also to avoid nonessential complications, we abstract from "good" references. The existence of good references would not change the fundamental results of the model.

The no-shirking conditions

We now derive the aggregate no-shirking conditions (NSCs) that define the conditions under which type A workers do not shirk. Formally, an aggregate NSC is a relation that defines combinations of aggregate employment levels and wages such that the value of not shirking on the job is at least as great as the value of shirking. Since it relates wages to productive employment, it is analogous to an "effective labor supply" curve.

We find NSCs for two regimes: (a) when references are not provided, and (b) when references are openly provided. The NSCs for the regimes will be derived simultaneously. For clarity, the open reference regime equations will be denoted by a prime ($'$). Further, a tilde ($\sim$) is used in the open reference regime to denote variables whose value is (possibly) different from the no reference regime. The derivation generally follows that of Shapiro and Stiglitz (1984).

As noted above, the NSCs show conditions under which the value of exerting effort on the job is at least as great as the value of shirking on the job. Thus, to derive the NSCs, the value functions that define the

[9] Later, we allow the firm to set a wage equal to the expected marginal product of labor, where the expectation operator depends on the (subjective) probability of a newly hired working being type A. This probability may be based on the work history of the new hire, when this is made available to firms.

[10] Thus, we abstract from the interesting issue of type B workers hiding references. An obvious way to handle this issue is to introduce a probability that reference materials are uncovered; however, doing so does not change the fundamental results. This is discussed further below.

[11] It can be shown that a sufficient condition is for B to be sufficiently large and A to be sufficiently small. Another is for a_B/a_A and N_A/N_B both to be sufficiently large.

value of working and shirking in the different regimes must be derived. These value functions show the present value of being employed, based on wages, effort, and the probabilities of becoming unemployed or leaving the labor market.

If there are no references, a shirking worker values her job at the present value V_E^S defined by equation (1). The discount rate (ρ) for this equation is moved to the left-hand side for convenience.[12]

(1)

$$\rho V_E^S = w + (b+q)(V_U - V_E^S) + d(0 - V_E^S).$$

V_U is the present value of unemployment when the worker does not have a bad reference. Intuitively, equation (1) shows that a shirking worker values employment at wage w, plus the probability per unit time of leaving the job ($b + q$) times the value of leaving the job and becoming unemployed (V_U), plus the probability per unit time of retiring (d) times the value of leaving the job market (0). Note that since the worker shirks, he or she does not lose any value from expending effort.

If firms do provide references, the present value of a job to a shirking worker ($\tilde{V}_E^S$) is described by equation (1′).

(1′)

$$\rho \tilde{V}_E^S = \tilde{w} + b(\tilde{V}_U - \tilde{V}_E^S) + q(\tilde{V}_U^S - \tilde{V}_E^S) + d(0 - \tilde{V}_E^S).$$

This equation differs from equation (1) because, if the worker is caught shirking, he or she is fired with a bad reference. $\tilde{V}_U^S$ is the present value of being unemployed with a bad reference.

The present value of a job for a nonshirking worker when references are not used, V_E^N, is characterized by equation (2):

(2)

$$\rho V_E^N = w - \alpha_A e + b(V_U - V_E^N) + d(0 - V_E^N).$$

Equation (2) differs from equation (1) in two respects. First, a nonshirking worker loses value from providing effort ($-\alpha_A e$). Second, since the worker

[12] Shapiro and Stiglitz (1984) use r to denote the time preference rate, which presumably incorporates the probability of retirement from labor. Because workers in the model here retire with explicitly defined probability per unit time d, we denote r as the discount rate. A time preference rate r would consist of ($\rho + d$).

is not shirking, the probability per unit time of a separation is only b. The corresponding relationship for the reference regime is:

(2′)

$$\rho\tilde{V}_E^N = \tilde{w} - \alpha_A e + b(\tilde{V}_U - \tilde{V}_E^N) + d(0 - \tilde{V}_E^N).$$

This equation is identical to equation (2), with the exception that the values of the variables are different because some of the shirking workers will be filtered out of the pool of hirable workers.

Equations (1) and (2) are dependent on the value of unemployment under various conditions. Since there are no search costs, an unemployed good worker does not have to expend any effort to attain the probability per unit time a_A of finding a job. The present value of unemployment to a good worker in the no reference regime (V_U) is given in equation (3).

(3)

$$\rho V_U = \bar{w} + a_A(V_E - V_U) + d(0 - V_U).$$

When rearranged, equation (3) can be substituted into equation (1) and (2) to express the value of shirking and nonshirking employment (respectively) as a function of parameters. Specifically, V_E becomes V_E^S in equation (1) and V_E^N in equation (2). Later, when deriving the NSC for type A workers, V_E will take the value of V_E^N.

When there are references, the present value of unemployment to a good worker without a bad reference is denoted by $\tilde{V}_U$ and is defined in equation (3a′).

(3a′)

$$\rho\tilde{V}_U = \bar{w} + \tilde{a}_A(\tilde{V}_E - \tilde{V}_U) + d(0 - \tilde{V}_U).$$

This equation is analogous to equation (3). When a worker has a bad reference, the present value of unemployment is denoted by $\tilde{V}_U^S$, and is expressed in equation (3b′).

(3b′)

$$\rho\tilde{V}_U^S = \bar{w} + d(0 - \tilde{V}_U^S).$$

Note that equation (3b′) reflects the fact that a worker with a bad reference will never be hired.

As noted above, a no-shirking condition for each of two circumstances

must be derived: one for the regime in which firms provide references, and one for the regime in which firms do not provide references. First, we will derive the NSCs as a function of the value of unemployment. Since these NSCs contain no information about the job market, they can be considered firm-specific NSCs. All NSCs are derived by invoking the condition $V_E^N \geq V_E^S$. From this inequality, equations (1) and (2) for the no reference regime, and (1′) and (2′) for the open reference regime, are used to derive NSCs. The resulting inequality is solved for w to define the range of wages for which the type A workers will not shirk.

The no-shirking condition for the no reference regime is:

(4)

$$w_A \geq V_U(\rho + d) + \alpha_A e\left(\frac{\rho + d + b + q}{q}\right) = w_A^*(V_U).$$

A profit-maximizing firm will pay the minimum wage that meets condition (4). This wage is denoted $w_A^*(V_U)$.

The NSC for the reference regime is given in equation (4′). It differs from equation (4) because shirking workers suffer the penalty of a bad reference in addition to being fired.

(4′)

$$\tilde{w}_A \geq \tilde{V}_U^S(\rho + d + b) - \tilde{V}_U b + \alpha_A e\left(\frac{\rho + d + b + q}{q}\right) = \tilde{w}_A^*(\tilde{V}_U^S, \tilde{V}_U).$$

The minimum wage that prevents shirking is denoted by $\tilde{w}_A^*(\tilde{V}_U^S, \tilde{V}_U)$.

Before we convert equations (4) and (4′) into an aggregate NSC, a comparison between (4) and (4′) yields a central result. The minimum wage that satisfies the NSC in the open reference regime, $\tilde{w}_A^*(\tilde{V}_U^S, \tilde{V}_U)$. is less than the wage that satisfies the NSC in the no reference regime, $w_A^*(V_U)$, as long as employment is non-zero. This means that a firm that adopts a reference policy will be able to lower its wage bill, given that it is still able to attract workers at the lower wage.[13] This phenomenon is denoted the "discipline effect" of references, to differentiate it from the "filtering effect" of improving the pool of workers. The result is proven in proposition 1.

[13] If one (or a few) firm(s) lowers the wage offer, a dual labor market results. Depending on accession rates, workers may turn down employment at a lower-paying firm to wait for a job at a higher-paying firm. This issue is addressed later.

Proposition 1: $w_A^*(V_U) > \tilde{w}_A^*(\tilde{V}_U^S, \tilde{V}_U) \forall L > 0.$

Proof: From equations (4) and (4′), the condition for $w_A^* > \tilde{w}_A^*$ is:

$$(\rho + d)V_U - (\rho + d + b)\tilde{V}_U^S + b\tilde{V}_U > 0,$$

which can be rearranged to form:

$$(\rho + d)[V_U - \tilde{V}_U^S] + b[\tilde{V}_U - V_U^S] > 0,$$

which holds if $\tilde{V}_U > \tilde{V}_U^S$ and $V_U > \tilde{V}_U^S$. From (3), (3a′), and (3b′), this holds as long as the probability per unit time of an unemployed worker without a bad reference obtaining a job paying $w > \overline{w}$ is greater than zero. From (4), (4′), this is clearly the case when $L > 0$. Q.E.D.

Because they rely on undefined "values of unemployment," equations (4) and (4′) cannot be used to solve for a market equilibrium. Since equations (3), (3a′) and (3b′) (which define the present value of unemployment) are dependent on an undefined accession rate (a_A), we must determine a_A before substituting (3), (3a′), and (3b′) into (4) and (4′).

To look at issues of the long run, we assume the labor market is in a steady state. For the steady state to occur, the number of good workers flowing into jobs $[\alpha_A(N_A - L_A)]$ must equal the number of good workers flowing into unemployment and retirement $[(b+d)L_A]$.[14] In the no-reference regime, this condition can be rearranged to form equation (5).

(5)

$$a_A = \frac{(b+d)L_A}{(N_A - L_A)} = \frac{b+d}{u_A} - (b+d).$$

The unemployment rate for type A workers $((N_A - L_A)/N_A)$ is denoted u_A.

When references are freely provided, the steady-state condition is the same, but the values are different. This is reflected in the notation of equation (5′).

(5′)

$$\tilde{a}_A = \frac{b+d}{\tilde{u}_A} - (b+d).$$

It is now possible to determine the aggregate steady-state no-shirking

[14] There are corresponding steady-state conditions for type *B* workers and the aggregate labor force.

conditions for each regime. Starting with the no-reference regime, equation (3) is substituted into equation (4) to rewrite the NSC as the wage as a relation of the accession rate. This yields:

(6)

$$w \geq \bar{w} + \alpha_A e + \alpha_A e \left(\frac{a_A + b + \rho + d}{q} \right).$$

Equation (5) is substituted into equation (6) to obtain the steady-state NSC, which is equation (7). It maps all the combinations of wages and unemployment rates (and thus employment levels) for which type A workers do not shirk. Denote $w_A^*(u_A)$ as the minimum wage that meets the NSC.

(7)

$$w \geq \bar{w} + \alpha_A e + \frac{\alpha_A e}{q} \left(\frac{b+d}{u_A} + \rho \right) = w_A^*(u_A).$$

The standard Shapiro and Stiglitz (1984) results hold for equation (7). In particular, $w_A^*(u_A)$ is increasing in employment and is asymptotic to full employment. This asymptotic property means that unemployment is necessary to induce productivity; unemployment must persist in the long run.

The same method can be used to find the NSC for the open reference regime. Utilizing equations (5′) , (3a′), and (3b′) yields the open reference regime counterpart to equation (6):

(6′)

$$\tilde{w} \geq \bar{w} + \frac{\alpha_A e}{q} \left(\frac{\tilde{a}_A(q+\rho+d) + (\rho+d)(b+q+\rho+d)}{\tilde{a}_A + \rho + d} \right).$$

Substituting equation (5′) into equation (6′) reveals the open reference regime counterpart to equation (7):

(7′)

$$\tilde{w} \geq \bar{w} + \frac{\alpha_A e}{q} \left(\frac{\tilde{u}_A[bq - \rho(d+q+\rho)] - (d+q+\rho)(b+d)}{\tilde{u}_A(b-\rho) - (b+d)} \right) = \tilde{w}_A^*(\tilde{u}_A).$$

Close inspection of equation (7′) reveals that the standard Shapiro and Stiglitz (1984) results do not hold for the open reference regime. Proposition 2 shows that it is not necessary for any nonstigmatized workers to be unemployed in equilibrium. The threat of permanent exclusion from the labor force fulfills the role of temporary unemployment.

Proposition 2: $\lim_{\tilde{u}_A \to 0} \tilde{w}_A^*(\tilde{u}_A) \in (0, \infty)$.

Proof: $\lim_{\tilde{u}_A \to 0} \tilde{w}_A^* = \bar{w} + \alpha_A e(d + q + \rho)/q$, which is clearly finite. Q.E.D.

Further, $\tilde{w}_A^*(\tilde{u}_A)$ is increasing with unemployment, rather than decreasing. This surprising result arises from the fact that the unemployment rate does not affect the cost of shirking when references are provided. Specifically, equation (2) shows that the value of not shirking on a job is positively related to b (the probability per unit time of a voluntary separation), multiplied by the value of unemployment. Since the value of unemployment declines as the unemployment rate rises, the value of a job declines when the unemployment rate rises, and firms must pay higher wages to compensate (to prevent shirking). In the standard efficiency wage case, higher unemployment rates more strongly affect the value of shirking on the job, as shirkers leave jobs for unemployment at rate $(b+q)$. That is, higher unemployment rates raise the cost of shirking relative to not shirking, so firms can actually pay lower wages at higher unemployment rates and prevent shirking. However, when the cost of shirking is lifetime unemployment (or banishment to the secondary sector), the unemployment rate does not affect the cost of shirking—unemployment only diminishes the value of not shirking on the job, forcing the firm to pay higher wages at higher unemployment rates. This result is formally proven in proposition 3:

Proposition 3:

$$\partial \tilde{w}_A^*(\tilde{u}_A)/\partial \tilde{L}_A < 0, \partial \tilde{w}_A^*(\tilde{u}_A)/\partial \tilde{u}_A > 0 \forall \tilde{L}_A \in (0, N_A).$$

Proof: $$\frac{\partial \tilde{w}_A^*}{\partial \tilde{L}_A} = -\frac{bN_A\alpha_A e(\rho + d)(b + d)}{q(b\tilde{L}_A + dN_A - \rho(\tilde{L}_A - N_A))^2} < 0.$$

Because the unemployment rate $(N_A - \tilde{L}_A)/N_A$, is negatively related to the employment level, by the chain rule,

$$\frac{\partial \tilde{w}_A^*}{\partial \tilde{L}_A} \frac{\partial \tilde{L}_A}{\partial \tilde{u}_A} > 0.$$

Q.E.D.

If workers can hide bad references with some probability, it can be shown that the reference regime no-shirking condition will have a flatter slope than the no reference regime; its slope may be negative, but is not necessarily so.

Propositions 2 and 3 together lead to the result that the minimum wage that satisfies the good workers' aggregate NSC is lower in the open reference regime, regardless of the unemployment rate in either regime. This is a version of proposition 1, proven as proposition 4:

Proposition 4:

$$\tilde{w}_A^*(\tilde{u}_A) > w_A^*(u_A) \forall L_A \in (0, N_A].$$

Proof: When $L_A = 0$ (or $u_A = 1$),

$$w_A^*(u_A = 1) = \tilde{w}_A^*(\tilde{u}_A = 1) = \bar{w} + a_A e(b + q + \rho + d)/q.$$

Proposition 3 states that the NSC is decreasing in the reference case, and Shapiro and Stiglitz (1984) show that the no reference NSC is increasing with employment. Q.E.D.

The fact that the wage defined by the open reference NSC is finite at full employment means that the effective labor supply becomes perfectly inelastic at full employment. Thus, when there is full employment, the wage is equal to the expected marginal product of labor, which may be above both the reservation wage and $\tilde{w}_A^*(\tilde{u}_A)$. These wages are not considered efficiency wages, because they are determined by competition for scarce workers.

The equilibrium reference policy

It is now possible to discuss conditions under which firms will provide references. First note that references are only effective if they are checked. To simplify this aspect of the model, it is assumed that the cost of checking references is $\zeta > 0$, but, if even one firm provides references, it is a profit-maximizing decision for all firms to check references. This assumption is made to simplify the discussion of the reference policy de-

cision. Without this assumption, each firm's decision to provide references will depend on expectations of the other firms' decisions to check references. The benefits of checking references are detailed below, in the next section.

Denote the legal and administrative cost of providing references for one worker by $z > 0$.[15] Firms will freely provide references if doing so results in other cost savings of at least z. Proposition 4 shows that providing references decreases the minimum wage that firms must pay workers, specifically, from $w_A^*(u_A)$ to $\tilde{w}_A^*(\tilde{u}_A)$. Suppose firms initially provide references. They will continue to do so as long as $z < [\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$. If an increase in litigation (as some evidence suggests occurred in the 1970s and 1980s) causes a sufficient increase in z, firms will cease providing (and checking) references and will resort to paying efficiency wages. If z again decreases below $[\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$, as is the apparent intention of recent legislation, the market will return to the open reference equilibrium.[16]

Since the stated intention of these laws is to increase references, the purpose of this paper is to examine the impact on the labor market if these laws are successful. That is, we assume that the outcome of the laws will reduce z such that $z < [\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$, and that the market will return to the open reference regime. However, in order to deter-

[15] In the context of the model, it may seem irrational for workers to sue over reference materials when only bad workers receive negative references. That is, a jury would know that any worker with a negative reference is a bad worker. This apparent contradiction can be resolved in two ways. First, it may be assumed that workers can successfully sue on technical grounds. For example, a worker with a bad reference may sue his or her employer claiming the reason for the reference was malice or inept record keeping. In fact, the purpose of much of the new pro-reference legislation is to make it more difficult to sue on such grounds. Second, it can be argued that it is the threat of a suit that keeps firms from mistakenly firing good workers in the first place. Suppose it is costly to avoid mistakes with references. In the absence of the threat of a lawsuit, firms would be less careful in providing reference materials, and would mistakenly (or maliciously) fire and defame good workers. Further suppose the cost of potential lawsuits is sufficient to induce the firm to avoid making mistakes (or avoid acting upon malice). However, plaintiffs may still claim that individual firms have made mistakes, making suits possible. A much more complex model could be constructed incorporating mistakes, but the results would likely not be different.

[16] The dynamics of the move to the open reference equilibrium are beyond the scope of this paper. The issues are complex, as when a single firm decreases its wage offer after announcing an open reference regime, it may have difficulty attracting workers. Given that workers will accept some wage offer $\varepsilon > 0$ below the no-reference regime efficiency wage (because of the opportunity cost of unemployment), firms could perhaps decrease the wage offer by a sequence of wage cuts. However, the initial firms to make an wage cut would suffer losses if $\varepsilon < z$, leading to a "leader–follower" issue that is beyond the scope of this paper.

mine the full impact of the resurgence in references on the labor market, labor demand must first be specified.

Labor demand and the equilibrium

The assumptions of perfect competition and no turnover costs define the demand for labor as the locus of points where the sum of wage and nonwage costs equals the expected marginal product of labor. Nonwage costs include the expected cost of administering the reference policy for each worker (z), plus the expected cost of collecting reference information on the worker's replacement when he or she leaves. The expected marginal product of labor is equal to $f'(L^e)$ weighted by the probability of a newly hired worker being type A.[17]

Since references allow the screening out of some type B workers, the expected marginal product of labor for a worker in the open reference regime is higher than in the no reference regime. Denote this externality of references the "filtering effect."[18] Note that, because it is an externality (enjoyed by the firms checking the references), the filtering effect does not directly enter into the decision to provide references.

However, the filtering effect does demonstrate the benefit to checking references, and suggests that firms will be willing to pay to obtain reference information.[19] Recall that the costs of checking references are $\zeta > 0$ for any worker hired. The assumption that all firms check references when at least one firm provides them is equivalent to assuming

[17] Allowing firms to provide good references would simply result in identified type A workers receiving a wage equal to $f'(L^e)$. This would not change the general results of the paper.

[18] In the absence of references, firms may use other signals to assess a worker's type; for example, the average job tenure and frequency of job separations give some insight to an experienced worker's probable work history. This would improve screening, diminishing the magnitude of the filtering effect of references, but would not alter the notion of the discipline effect of references on workers. That is, if firms use information like the frequency of job separations to make hiring decisions (say, by making a rule setting the maximum frequency of separations a job applicant may have to be hired), references would still discipline workers, as a bad reference is a clear signal of type. It should be noted that workers would optimally choose shirking decisions based on knowledge of hiring policies; type A and B workers may choose not to shirk for just long enough to avoid becoming stigmatized, and then shirk. (In this case, the optimal hiring and shirking decisions would be determined by a game theoretic framework that is outside the scope of this paper.) In this latter case, a reference is the only clear signal of type.

[19] Presumably, firms could sell the valuable reference information; however, the sale of reference information is not a common practice in the United States.

that the gains of the filtering effect (when one firm provides references) are as least as large as ζ.

While the filtering effect places upward pressure on the labor demand curve, the additional cost per worker of administering the reference policy (z) and checking references (ζ) will place downward pressure on labor demand. As a result, it is not possible to tell if labor demand is higher or lower in the open reference regime.

The equilibrium level of employment and rate of wages is found at the intersection of the labor demand and NSC curves. Figure 1 depicts the market for good workers, where the curves in the open reference regime are marked with a prime ($'$). Note that the shape of the open reference regime NSC (labeled NSC$'$) follows propositions 2, 3, and 4. Also note that while figure 1 depicts a shifting down of the labor demand curve, it is possible for the discipline effect to be greater than the costs of providing and checking references ($z+\zeta$), in which case the labor demand curve would shift up.

While proposition 2 showed that unemployment is not necessary when references are provided, it may still exist. Unemployment occurs when the demand for labor intersects the NSC at any level of employment below the full employment level. Further, since an intersection may occur at one, two, or three points when labor demand is downward-sloping and convex, multiple equilibria are possible.[20]

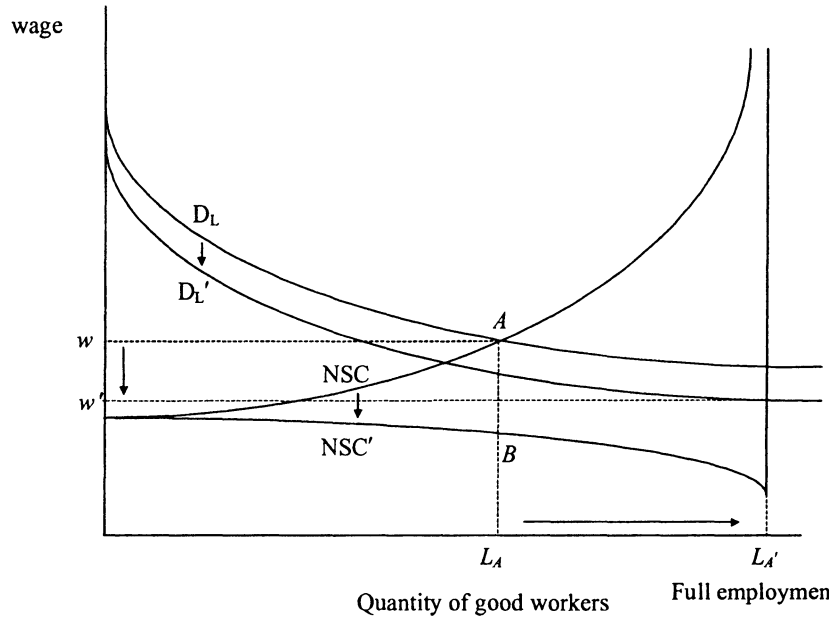
Open references versus no references

To make inferences on the effect of references on unemployment and wages, we must carefully consider the effects on the NSC and labor demand of switching to the reference regime. First consider the effect of the shifting NSC. When a market moves from the steady state no reference regime to the steady-state open reference regime, the discipline effect shifts down the NSC (on figure 1 from NSC to NSC$'$). As the market moves down along the labor demand curve to the new higher employment level (which may be full employment), the unemployment and wage rates decrease.

The effect on the demand for labor is more complicated. Because of the assumption on ζ, in the open reference regime, all firms will both provide and check references. On the labor demand side, when firms provide references, they sustain a cost z per worker, diminishing labor

[20] If there are three equilibria, only the full employment and lowest employment equilibria are stable. If labor demand is concave to the origin, more than three equilibria are possible.

Figure 1



demand. When firms check references, they receive the benefit of improved productivity from the filtering effect and hence increase the demand for labor but sustain the reference-checking cost ζ per worker which decreases labor demand. To analyze the total impact of moving to the reference regime on unemployment and wages, consider the impact of providing and checking references separately.

In figure 1, the wage savings from the discipline effect of providing references $[\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$ is the distance between points A and B. The legal and administrative costs of providing references (z) are nonwage labor costs to the firm, and consequently labor demand will decrease (shift down) by z. Given the shape of the reference NSC, this decrease in labor demand causes an unambiguous increase in unemployment and a fall in wages. However, because $z \leq [\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$, the combined effect of the shift down in the NSC by $[\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$ and the shift down in labor demand by z is a decrease in unemployment.[21] (If $z = [\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$, there is no change in unemployment.)

As noted above, labor demand is further dampened by the cost of

[21] The implied assumption is diminishing (or constant) marginal product of labor.

checking references (ζ). However, the filtering effect gain in productivity is assumed to be at least ζ (in order for firms to check references). Thus, the net effect of the filtering effect and the reference checking cost (ζ) is to increase labor demand, which reduces the unemployment rate and raises the wage rate. (When the filtering effect gain in productivity equals ζ, there is no change in labor demand.)

As a result, the effect of moving to the open reference regime is to decrease the unemployment rate. The exception is the coincidental case when $z = [\, w_A^*(u_A) - \tilde{w}_A^*(\tilde{u}_A)\,]$ and the filtering effect is exactly offset by ζ. In this case, the unemployment rate does not change.

The total effect of the adoption of references on the wage is indeterminate. If the costs of checking and providing references ($z + \zeta$) is greater than the filtering effect increase in marginal product, labor demand will decrease, causing the wage to fall. However, if the net effect on labor demand is an increase (when the filtering effect is greater than $z + \zeta$), it is possible for wages to rise. For wages to rise, the shift up in labor demand must at least offset the decrease in wages caused by moving down the (new) labor demand curve as the unemployment rate falls. Figure 1 depicts the former case, in which labor demand shifts down and the wage falls.

The indeterminate effect on wages leads to ambiguous welfare effects on workers of moving to an open reference regime. The decrease in the unemployment rate improves the welfare of type A workers by increasing the total expected duration of lifetime employment. However, wages may fall in the reference regime, and falling wages depress welfare. While the open reference regime results in the permanent expulsion from the labor force of some shirkers, the average type B worker can be made better off in the reference regime when there is zero type A unemployment (and thus zero undetected type B unemployment), and the detection technology is weak (i.e., q is small). As a side note, when legal costs are low enough to place the economy in the reference regime, the existence of a few type B workers is welfare-improving for firms, and possibly for workers.[22] This is because negative references are only meaningful (and thus effective) if they mark the worker as the shirking type; at least some shirking workers are necessary for references to be valuable.[23]

[22] The general principle of this result is noted in Strand (1987).

[23] An interesting extension of this framework is to derive an endogenous e. There are likely certain conditions under which firms will choose an e high enough so some group of workers will shirk in equilibrium, allowing the threat of a negative reference to be used (and the gains to be garnered).

The turnover cost model

We now focus on the impact of references when firms face turnover costs.[24] This model has the same assumptions as the efficiency wage model, with two major exceptions. First, we abstract from monitoring difficulties by assuming that all shirking workers are quickly caught and fired. Second, we assume that firms must absorb a turnover cost when a worker is fired or quits. Unemployment is induced by this friction when a standard matching cost is used.

Turnover costs

When replacing turnover, firms pay discharge and recruiting costs. These costs include unemployment benefits, advertising costs, training costs, the costs of keeping vacant work space, and so on. As shown below, the amount of turnover costs depends on the reference regime.

As in the efficiency wage model, there are two types of workers, A and B. The assumptions about relative dislike for work apply in this model. As above, we constrain the equilibrium so that type B workers shirk but type A workers do not. Without a reference letter, firms cannot tell the type of a worker without hiring him or her. However, all shirking is detected soon after work begins, and shirking workers are immediately fired, receiving wages for the short period of employment. Since all fired workers are replaced through a costly search process, the type B workers that pass the initial screening process are a drain on the firm's profits.

Following Blanchard and Diamond (1989), we consider recruiting efforts as the number of "vacancies" kept open by the firm. The number of vacancies kept open by firm i is V_i. For each vacancy advertised, the firm must pay cost $c > 0$. This cost c includes the probability of hiring a type B worker times the cost of firing him or her and initiating a new search. When firms cannot obtain references, more type B workers are hired, and consequently hiring costs c are higher. For the moment, denote $\tilde{c}$ as the cost of keeping open a vacancy (including the cost of checking references) when firms freely provide references, and c as the costs in the no reference regime; $c > \tilde{c}$.

The equilibrium reference policy

To determine conditions under which firms will or will not provide references, consider the decision faced by an individual firm under two

[24] See Hamermesh and Pfann (1996) for a review of the turnover cost literature.

polar conditions. First, when only a single firm provides references, type *B* workers will not accept employment at that firm, since doing so will exclude them from future employment. The policy of providing references acts as an effective screening device, lowering turnover costs to below $\tilde{c}$. Second, when all other firms provide references, a firm that does not provide references will attract all the type *B* workers, raising turnover costs to above *c*. This analysis leads to the conclusion that firms provide references in this frictional model to save on turnover costs.

If the administrative and legal costs of providing references (equal to *z* for each employee) are less than the savings on turnover costs, each firm will provide references. Furthermore, each individual firm (in the absence of collusion) will cease providing references only when the legal and administrative costs of references exceed the turnover costs associated with attracting all type *B* workers. If the current labor market can be described by the turnover cost model, it is apparent that the legal costs from defending against lawsuits have overcome this cost savings. Just as in the efficiency wage model, if the reference immunity legislation lowers legal costs sufficiently, one would expect firms will once again provide references. Later, the administrative costs of providing references will be explicitly modeled.

Job matching

As in the efficiency wage model, we analyze the labor market in terms of the market for type *A* workers. Denote $\mu_i = \mu_i(V_i; \cdot)$ as the matching function that determines the flow of good workers to the firm for a given rate of vacancies advertised (V_i), the efficiency of the matching technology (ψ), the number of unemployed type *A* workers searching for jobs ($N_A - L_A$), the number of firms in the economy (M), and elasticity parameters (ϕ, γ).[25]

(8)

$$\mu_i = \psi (N_A - L_A)^{\phi} \frac{V_i^{\gamma}}{M^{1-\gamma}}.$$

The efficiency of matching parameter (ψ) captures factors related to the availability of employment agencies, Internet job postings, newspapers, and the like. It is constrained to the range $0 \leq \psi \leq 1$. The parameter ϕ is

[25] This formulation is consistent with Blanchard and Diamond (1989) and the Hosios (1990) survey article.

the elasticity of matches with respect to the unemployment level and is designed to capture congestion effects. This elasticity is also constrained to $0 \leq \phi \leq 1$, reflecting the idea that high levels of congestion impede the search process by inundating the firm with applications. The parameter γ is the elasticity of vacancies. The assumption $0 \leq \gamma \leq 1$ captures diminishing returns to vacancies. It is necessary to raise the term $(1/M)$ to the power $(1-\gamma)$ in order for the M individual firm matching functions to sum to an aggregate matching function that is independent of M (which is the convention).[26] Note that the stream of matches a firm receives at a given level of unemployment $(N_A - L_A)$ and vacancy rate (V_i) is increasing in ψ, ϕ, and γ.

Equation (8) can be aggregated over all M firms to obtain the aggregate matching function. Since, in the steady state all firms hire at the same rate, it is true that

$$\sum_{i=1}^{M} \mu_i = M\mu_i = \mu,$$

and

$$\sum_{i=1}^{M} V_i = MV_i = V.$$

Multiplying both sides of (8) by M, making appropriate substitutions, and rearranging yields the aggregate matching function:

(9)

$$\mu = \psi(N_A - L_A)^{\phi} V^{\gamma}.$$

Workers voluntarily leave their jobs with probability per unit time b, and retire at rate d, so each firm suffers a turnover stream of $(b+d)L_i$. Since we are considering a long-run steady-state model, each firm must advertise enough vacancies to cover this turnover. Later, it is shown that the optimal level of employment chosen by the firm depends on the number of vacancies necessary to maintain that level.

To maintain a steady state, it must be the case that $\mu_i = (b+d)L_i$ for each firm. Substituting $(b+d)L_i$ for μ_i in equation (8) yields each firm's steady-state condition.[27]

[26] The aggregate version of this matching function was estimated by Blanchard and Diamond (1989), and empirical support was found for the above restrictions. Romer (1996) derives this same matching function using a slightly different method.

[27] Noting that unemployed type A workers stream into jobs at rate $a_A(N_A - L_A)$ confirms that the steady-state condition can also be described by equation (5).

(10)

$$(b+d)L_{Ai} = \psi(N_A - L_A)^{\phi} \frac{V_i^{\gamma}}{M^{1-\gamma}}.$$

Equation (10) can be solved for V_i as a function of L_{Ai}, to reveal the number of vacancies the firm must keep open to maintain employment at L_{Ai}.

(10a)

$$V_i = \frac{((b+d)L_{Ai})^{1/\gamma} M^{(1-\gamma)/\gamma}}{\psi^{1/\gamma}(N_A - L_A)^{\phi/\gamma}}.$$

Equation (10a) has an important implication: Recruiting costs for firm i (cV_i) can be considered a function of the steady-state employment level of firm i (L_{Ai}).[28] Firms take this turnover cost into consideration when choosing the level of employment and wage to offer recruits, as each newly hired worker represents a liability for future turnover costs. Following earlier results that the stream of matches conveyed by a given vacancy rate increases with larger ψ, ϕ, and γ, recruiting costs fall with larger ψ, ϕ, and γ.

When aggregate type A employment (L_A) approaches full employment (N_A), the number of vacancies necessary for the firm to maintain steady-state employment approaches infinity. Thus, unemployment persists in the turnover cost model. Unemployment lowers recruiting costs to the point where firms are willing to pay workers enough to draw them into jobs.

Labor demand

Labor demand equates the wage with the marginal product of labor less nonwage costs. However, the future expected turnover costs that the firm will have to endure when the worker departs effectively subtracts from each worker's marginal product. The expected marginal rate of turnover cost for any worker is found by taking the derivative of cV_i with respect to L_i. This is accomplished by multiplying both sides of equation (10a) by c and taking the appropriate derivative, shown in equation (11).

[28] Hamermesh and Pfann (1996) note that, though adjustment costs are normally assumed to be quadratic, this is due to convention (and tractability), and not to empirical support.

(11)

$$\frac{\partial cV_i}{\partial L_i} = \frac{c(b+d)^{1/\gamma}(L_{Ai}M)^{(1-\gamma)/\gamma}}{\gamma\psi^{1/\gamma}(N_A - L_A)^{\phi/\gamma}}.$$

From equation (11), it is possible to derive the conditions for which firms will provide references. Specifically, firms will provide references when the marginal cost of administering the reference policy (z) is less than the marginal turnover costs saved by providing references $((c-\tilde{c})\cdot(\partial^2 cV_i/\partial L_i\partial c))$. Labor demand for a single firm i is thus defined by setting the wage equal to the marginal product less marginal turnover costs and marginal reference administration costs (z).

(12)

$$w_i = f'(L_{Ai}) - \frac{c(b+d)^{1/\gamma}(L_{Ai}M)^{(1-\gamma)/\gamma}}{\gamma\psi^{1/\gamma}(N_A - L_A)^{\phi/\gamma}} - z.$$

Note that equation (12) shows that the optimal steady-state level of employment is a function of the reference regime, directly through z, and indirectly through c. When references are provided, c falls to $\tilde{c}$, and $z > 0$. When references are not provided, $c > \tilde{c}$ and $z = 0$.

Since all firms are identical, in equilibrium all firms pay the same wage $w = w_i$. Further, note that $L_{Ai} = L_A/M$ so $L_{Ai}M = L_A$. Making substitutions into (12) achieves a market labor demand curve, which relates the wage to the aggregate level of type A employment, L_A.

(13)

$$w = f'(L_A/M) - \frac{c(b+d)^{1/\gamma}(L_A)^{(1-\gamma)/\gamma}}{\gamma\psi^{1/\gamma}(N_A - L_A)^{\phi/\gamma}} - z.$$

It can be shown that this demand curve is downward sloping when $f''(L_A/M) \leq 0$, and asymptotic to full employment.

Equilibrium wages and unemployment in the two regimes

Equilibrium is achieved when labor supply meets labor demand. Following the assumptions on unemployment benefits, labor supply is assumed to be perfectly elastic when $w = \bar{w} + \alpha_A e$, and perfectly inelastic when $w > \bar{w} + \alpha_A e$. Equilibrium in the frictional model is depicted in

Figure 2

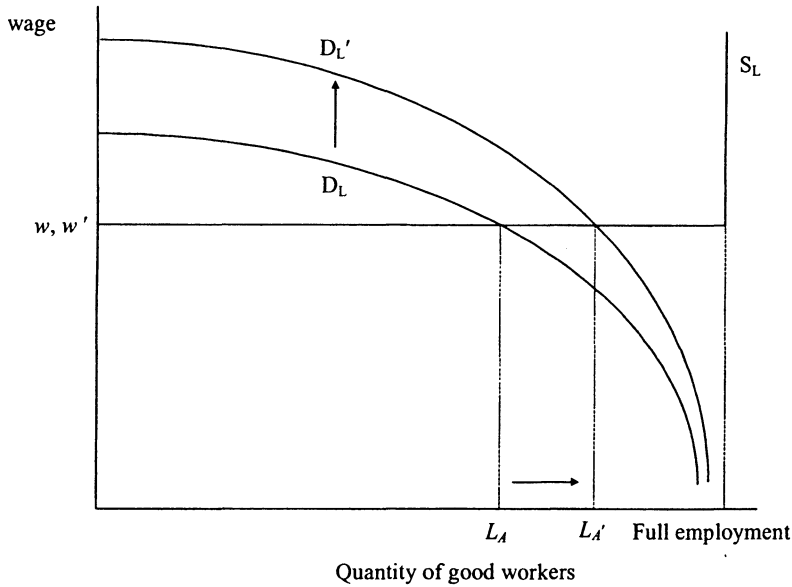


figure 2. The no-reference labor demand is labeled (D_L) and the open reference counterpart is labeled (D_L').

By depicting a shift up in labor demand, figure 2 implicitly assumes that z is less than the cost savings from providing references. In this case, the figure shows that the turnover cost model predicts that the reemergence of references will result in lower (but positive) unemployment and an unchanged wage. If the supply of labor were not perfectly elastic, the model would predict an increase in wages. It is possible (though only by coincidence) for the cost of providing references z to just offset the associated turnover cost savings; in such a case, there would be no shift in labor demand and, consequently, no change in the unemployment rate or the wage.

Conclusion

According to both the efficiency wage and turnover cost models, a reemergence of references is likely to result in a lower unemployment rate. In the efficiency wage framework, unemployment declines for one or possibly two reasons. First, firms are able to use the threat of a bad reference instead of unemployment to deter shirking. In fact, unemployment deters production when references are provided; the no-shirking

wage is a positive function of unemployment. Second, as references screen out some unproductive workers before they are hired, open reference policies increase labor demand for sufficiently small reference-providing and -checking costs. In the turnover cost model, references reduce the costs of screening and firing workers, resulting in greater labor demand and consequently lower unemployment.[29]

The timing of the decline and reemergence of references is broadly consistent with long-run unemployment data. The natural rate apparently rose through the 1970s and mid-1980s (when references are believed to have declined), and more recently declined (after the new legislation was adopted). These shifts in unemployment have been attributed to shifts in external demand, demographic changes, government policy, and other factors, but are still not fully understood (see Juhn et al., 1991; Vedder and Galloway, 1993; Phelps, 1994). This is not to say that changing reference policies are necessarily the only factor, or even a major factor, in determining the natural rate of unemployment. The models developed in this paper, however, predict that changing reference policies are a determinant of the natural rate that has been thus far overlooked.

Unfortunately, there are currently not enough data to determine conclusively the impact of reference policies on unemployment. A consistent time series documenting the decline of references simply does not exist, and the data on defamation lawsuits are woefully incomplete. Yet, the recent passage of reference immunity laws will make for a straightforward test in the future. Specifically, unemployment rates from states that passed reference immunity statutes can be compared with states that have not. Any significant otherwise unexplained difference (in the predicted direction) may indicate that reference policies do have macroeconomic consequences.

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[29] It should be noted that Cahill (2000) shows that when both efficiency wages and turnover costs are present, the combined unemployment effects of the frictions may be more or less than additive.

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