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Cyclical Nonwork at Work when Labor is Hoarded

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Abstract: Measures of non-work at the workplace exhibit countercyclical behavior - time spent not working at the workplace in sanctioned and nonsanctioned breaks, exercise, eating and related activities increases in recessions, even as the probability of engaging in such activities declines (Burda, Genadek, and Hamermesh, forthcoming). A simple efficiency wage model with worker heterogeneity cannot account for all these facts. In this paper, I show that allowing profit-maximizing firms a role in the non-work outcome can readily generate this contradictory behavior at the extensive and intensive margins.

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I. Introduction

Empirical findings reported in Burda, Genadek, and Hamermesh (2019 forthcoming) imply contradictory and offsetting motives for non-work on the job over the business cycle. Self-reported data indicate that workers are more likely to engage in nonwork at the workplace in good times (when local unemployment is low), but during those good times, they tend to do less of it (as a fraction of the workday). Time spent at the workplace not working is cyclically sensitive, but its incidence and intensity move in opposite directions over the cycle. A simple efficiency wage model can explain these seemingly contradictory findings (Burda, Genadek, and Hamermesh 2016, 2019), yet it has difficulty accounting for the dominant extensive margin: In recessions, nonwork increases overall, even while fewer individuals engage in it.

In this paper, I show that increased tolerance of non-work in bad times is consistent with profit-maximizing behavior by firms. I highlight how interactions between firms and workers can lead to such ambiguous predictions. We have an environment in mind in which it is costly for firms to hire and fire workers. As this is a *hommage à Hamermesh*, this paper contains an explicit treatment of labor demand (Hamermesh 1993) and labor adjustment costs (Hamermesh 1989, Hamermesh and Pfann 1996), that are general enough to be adapted to the case of fixed adjustment costs, Dan's personal favorite. It recognizes our joint work on what individual workers actually do at the workplace. Their effort cannot be monitored perfectly, but their aggregate productivity is an observable outcome of the state of the business cycle and the fraction of workers' time spent in non-work activities. Hiring and firing costs lead to labor hoarding in the usual sense (Biddle 2014).

After deriving a model of labor demand with linear and asymmetric adjustment costs, I embed in it the efficiency wage framework explored in Burda, Genadek, and Hamermesh (2018). In our model, workers are heterogeneous and, in the spirit of Shapiro and Stiglitz (1984) choose to spend some of their working time in non-work (even though I sometimes slip, we prefer not to use the word "shirk" as non-work may be expressly tolerated or even encouraged by the firm). Firms hire labor to maximize expected profits, given that hiring and firing (changes in employment) are costly. The results are tantalizing: In this paper, I show that allowing profit-maximizing firms a role in the non-work outcome can readily generate this contradictory behavior at the extensive and intensive margins.

II. Firms and Labor Hoarding: A Suggestive Model of Hoarding

To keep things as simple as possible, we assume that the macroeconomic state of the world takes two values, high (θ^H) and low (θ^L) which also parametrize the productivity of workers in the two states. Productivity follows a time-invariant Markov process with state transition matrix $\begin{bmatrix} 1-\alpha & \alpha \\ \beta & 1-\beta \end{bmatrix}$ and initial state probabilities given by π_0. With $\theta^H > \theta^L$, good and bad states can be interpreted as boom and recession, respectively; α and β can be interpreted as the probabilities of entering and exiting a recession. Firms produce output *y* in each period *t* according to a standard neoclassical production function:

$$y_t = \theta_t f(e_t L_t), \quad f' > 0, f'' < 0 \quad \theta_t \in \{\theta^H, \theta^L\} \tag{1}$$

that takes as input the product of employment L and a measure of average worker effort *e*, a hidden action chosen by workers, observable to management only as an aggregate as

$$e^i = e^i(w), \quad e^{i\prime}(w) > 0, e^{i\prime\prime}(w) < 0, \ \ i = H, L \tag{2}$$

Below, we derive this function with the implication that $e_H > e_L$ and $\partial e/\partial w > 0$. For this reason, firms in our model take an interest in the wage as an additional tool for profit maximization; I examine the case when firms are wage setters or posters, rather than simply wage takers.[1]

[1]My efficiency wage concept follows Shapiro and Stiglitz (1984) more closely than Solow (1979), but also incorporates elements of the latter. Despite the usefulness of the Marshallian paradigm, abundant evidence suggests that firms do post or set wages, even in apparently competitive environments, with central implications for the way labor markets function in practice (Burdett and Mortensen 1988, Bewley 1999, Manning 2003). For

The representative firm considering entering the market chooses a time-invariant and state-contingent wage and employment plan $\{w(\theta), L(\theta)\}$ that maximizes the unconditional expectation of discounted periodic profits:

$$E\left[\sum_{t=0}^{\infty}\left(\frac{1}{1+R}\right)^{t}(y_t - w_t L_t - H\max(0,\Delta L_t) - F\max(0,-\Delta L_t))\right] \tag{3}$$

where H and F are linear costs of hiring and firing workers, respectively, and R is the constant discount rate. Maximization occurs subject to the production function (2) and the dependence of effort on the wage given by $e^{i}(w)$. This "timeless perspective" reduces the complexity of the state-space considerably, Define time invariant policies as those that are a function of the state space only and not calendar time. This implies formulating a policy function $\{w(\theta), L(\theta)\}$ for $\theta \in \{\theta^{H}, \theta^{L}\}$.

The dependence of profits on past as well as current employment makes it necessary to formulate the problem, even from a "timeless perspective," in four states with the state vector taking the form [θ_{HH}, θ_{HL}, θ_{LH}, θ_{LL}], where θ_{ij} the state *i and* the previous state is *j*. Under these conditions, the profit maximization can be recast as choosing $\{w^{H}, w^{L}, L^{H}, L^{L}\}$ to solve

$$\max \pi_0{}' \sum_{t=0}^{\infty}\left(\frac{1}{1+R}\right)^{t} P^{t}\Pi.$$

where

$$\Pi = \begin{bmatrix} \theta^{H} f(e^{H}(w^{H})L^{H}) - w^{H}L^{H} \\ \theta^{L} f(e^{L}(w^{L})L^{L}) - w^{L}L^{L} - F((L^{H} - L^{L}) \\ \theta^{H} f(e^{H}(w^{H})L^{H}) - w^{H}L^{H} - H((L^{H} - L^{L}) \\ \theta^{L} f(e^{L}(w^{L})L^{L}) - w^{L}L^{L} \end{bmatrix},$$

$$P = \begin{bmatrix} 1-\alpha & 0 & \alpha & 0 \\ 1-\alpha & 0 & \alpha & 0 \\ 0 & \beta & 0 & 1-\beta \\ 0 & \beta & 0 & 1-\beta \end{bmatrix},$$

the monopsony/oligopsony perspective, see Boal and Ransom (1997) and new empirical evidence (Dubé et al., 2016, 2018 Azar et al. 2018). But since Dan is not a fan (of wage posting and monopsony) I won't rub this in too much.

and π_0 , the initial density over states of the world, is given.

When effort function depends on the state and the firm can set wages, the four first order conditions are:

L^{H}: $$\pi_0{}'(I-\frac{P}{1+R})^{-1}\begin{bmatrix} e^{H}\theta^{H}f'-w^{H} \\ -F \\ e^{H}\theta^{H}f'-w^{H}-H \\ 0 \end{bmatrix}=0 \tag{4}$$

L^{L}: $$\pi_0{}'(I-\frac{P}{1+R})^{-1}\begin{bmatrix} 0 \\ e^{L}\theta^{L}f'-w^{L}+F \\ H \\ e^{L}\theta^{L}f'-w^{L} \end{bmatrix}=0 \tag{5}$$

w^{H}: $$\pi_0{}'(I-\frac{P}{1+R})^{-1}\begin{bmatrix} L^{H}e^{H}{}'\theta^{H}f'-L^{H} \\ 0 \\ L^{H}e^{H}{}'\theta^{H}f'-L^{H} \\ 0 \end{bmatrix}=0 \qquad \Rightarrow\ e^{H}{}'\theta^{H}f'=1 \tag{6}$$

w^{L}: $$\pi_0{}'(I-\frac{P}{1+R})^{-1}\begin{bmatrix} 0 \\ L^{L}e^{L}{}'\theta^{L}f'-L^{L} \\ 0 \\ L^{L}e^{L}{}'\theta^{L}f'-L^{L} \end{bmatrix}=0 \qquad \Rightarrow\ e^{L}{}'\theta^{L}f'=1 \tag{7}$$

Now assume for simplicity that upon entry all states are equally likely:

$$\pi_0=\begin{bmatrix} 0.25 \\ 0.25 \\ 0.25 \\ 0.25 \end{bmatrix}$$

Under these conditions, the first two first-order conditions for employment can be written as

L^{H}: $$A\begin{bmatrix} e^{H}\theta^{H}f'-w^{H} \\ -F \\ e^{H}\theta^{H}f'-w^{H}-H \\ 0 \end{bmatrix}=0$$

L^L: $$A\begin{bmatrix} 0 \\ e^L\theta^L f' - w^L + F \\ H \\ e^L\theta^L f' - w^L \end{bmatrix} = 0$$

and those for the wage are

w^H: $$A\begin{bmatrix} L^H e^{H\prime}\theta^H f' - L^H \\ 0 \\ L^H e^{H\prime}\theta^H f' - L^H \\ 0 \end{bmatrix} = 0 \qquad \Rightarrow\ e^{H\prime}\theta^H f' = 1$$

w^L: $$A\begin{bmatrix} 0 \\ L^L e^{L\prime}\theta^L f' - L^L \\ 0 \\ L^L e^{L\prime}\theta^L f' - L^L \end{bmatrix} = 0 \qquad \Rightarrow\ e^{L\prime}\theta^L f' = 1$$

where

$$A = (I - \frac{P}{1+R})^{-1}$$

$$= \frac{1}{R(\alpha+\beta+R)}\begin{bmatrix} (1+R)(\beta+R)-\alpha\beta & \alpha\beta & \alpha(\beta+R) & \alpha(1-\beta) \\ (1-\alpha)(\beta+R) & (\alpha+R)(\beta+R) & \alpha(\beta+R) & \alpha(1-\beta) \\ (1-\alpha)\beta & (\alpha+R)\beta & (\alpha+R)(\beta+R) & (1-\beta)(\alpha+R) \\ (1-\alpha)\beta & (\alpha+R)\beta & \alpha\beta & (1+R)(\alpha+R)-\alpha\beta \end{bmatrix}$$

Intuitively, optimal firm policy is a linear combination of the first order conditions in each state, recognizing that all states may be visited in the future but will be less valuable than the present state, due to discounting. This can be seen by premultiplying all four first order conditions by $R(\alpha+\beta+R)$, letting the interest rate R go to zero, and using

$$\lim_{R\to 0} R(R+\alpha+\beta)A = \begin{bmatrix} (1-\alpha)\beta & \alpha\beta & \alpha\beta & \alpha(1-\beta) \\ (1-\alpha)\beta & \alpha\beta & \alpha\beta & \alpha(1-\beta) \\ (1-\alpha)\beta & \alpha\beta & \alpha\beta & \alpha(1-\beta) \\ (1-\alpha)\beta & \alpha\beta & \alpha\beta & \alpha(1-\beta) \end{bmatrix}$$

Under these conditions, the first order conditions for the firm are (there are four):

Modified efficiency wage condition, good state:

$$\frac{\left[w^{H}+\alpha(F+H)\right]e^{H\,\prime}}{e^{H}}=1 \tag{8}$$

$$\Rightarrow \frac{w^{H}e^{H\,\prime}}{e^{H}}=\frac{w^{H}}{w^{H}+\alpha(F+H)}$$

Modified efficiency wage condition, bad state:

$$\frac{\left[w^{L}-\beta(F+H)\right]e^{L\,\prime}}{e^{L}}=1 \tag{9}$$

$$\Rightarrow \frac{w^{L}e^{L\,\prime}}{e^{L}}=\frac{w^{L}}{w^{L}-\beta(F+H)}$$

Employment condition, good state; determines L^{H} given $e^{\mathrm{H}}(.)$:

$$e^{H}\theta^{H}f'=w^{H}+\alpha(F+H) \tag{10}$$

Employment condition, bad state; determines L^{L} given $e^{\mathrm{L}}(.)$:

$$e^{L}\theta^{L}f'=w^{L}-\beta(F+H)\,. \tag{11}$$

Note that as in standard efficiency wage models, wage setting is separable with respect to the employment decision (see e.g. Solow 1979, Akerlof and Yellen 1990). Given the effort function in the respective states, the wage is set independently of employment; the implied effort then determines an optimal choice of employment. There is a slight catch however: unlike in Solow (1979), this "modified Solow condition" does not stipulate a constant wage over the two states of the world, nor does it set the elasticity of effort to unity. The existence of linear hiring and firing costs induces a wedge between the elasticity of the effort function and unity equal to the inverse of the share of the wage paid to worker in total expected labor costs. Figure 1 shows optimal wage and effort in each state of the world by the optimizing firm.

III. Predictions of the simple model for the firm's decision

The simple model generates a number of important predictions:

Labor hoarding. The model establishes a robust nexus between firms' employment policies and the costs of hiring (H); it also predicts a clear effect of the cost of firing workers (F). In the limiting case shown above ($R\rightarrow 0$) this depends on asymmetry in transition probabilities rather than in adjustment costs. While there is still some discussion concerning a precise definition of labor hoarding, it is clear from the first order condition (11) that when H>0, F>0 or both, profit maximizing employers will fire fewer workers in downturns than in the absence of variable effort and efficiency wages. From (10), they will also fire fewer workers in upturns, as predicted by Oi (1962).

In the following, I define labor hoarding as the decrease in the spread of employment between employment in good and bad states (or the variance of L over the cycle) relative to the case of no hiring or firing costs. Differentiation of the firm's first order conditions for employment in the two states and combining them yields

$$\frac{d(L^H - L^L)}{dH} = \frac{d(L^H - L^L)}{dF} = \frac{\alpha}{e^H(\theta^H)^2 f''(L^H)} + \frac{\beta}{e^L(\theta^L)^2 f''(L^L)''}$$

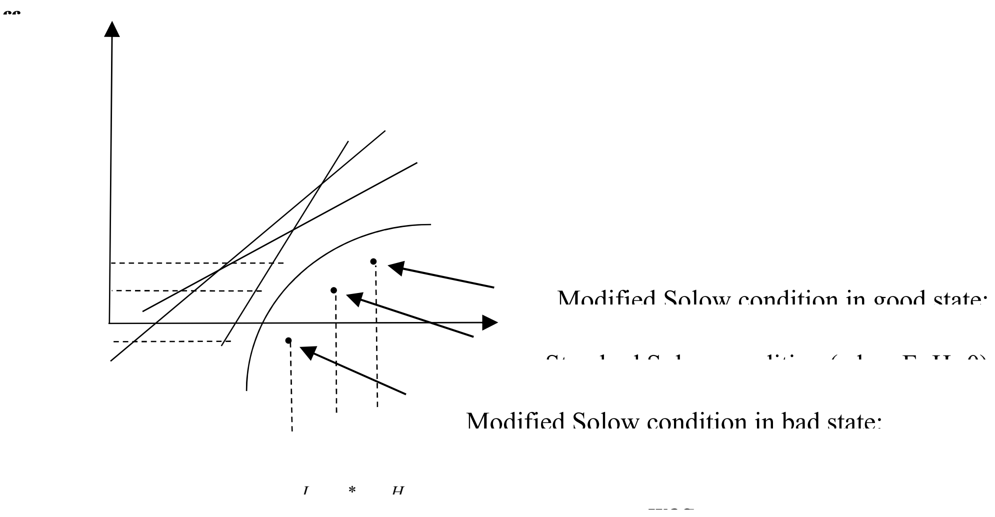
which is unambiguously positive, so labor hoarding depends on the *sum* of piecewise linear hiring and firing costs interacting with the respective probabilities of their relevance α and β.[2]

Labor wedge. With or without efficiency wage considerations, the model predicts a wedge between the wage and marginal product of labor. Firms that pay efficiency wages will also build this wedge into the optimal state contingent wage. The deviation from the This is because

[2]It should be stressed that this result holds in the absence of efficiency wages. As a benchmark, consider the model when wages are competitively set.

worker effort only responds to the wage paid and not the wedge. It follows that the greater the wedge, the higher the efficiency wages are, the higher is H or F or both.

Figure 1: Solow elasticity condition with positive hiring and firing costs (F+H>0)



Modified efficiency wage (Solow) condition. Under firing and hiring costs, efficiency wages are no longer rigid across states of the world as in Solow (1979). The wedge described above is state contingent. Furthermore, it is not symmetric but depends on the probability of exiting or entering a recession. As Figure 1 shows, the Solow condition no longer predicts a constant wage; the optimal wage is higher when effort is required (in the good state of the world) and lower when it is not. The model continues, however, to provide the usual rationale for unemployment: the real wage is rigid relative to its market clearing level, despite fluctuations in labor demand due to exogenously changing productivity.

4. Optimal firm behavior with firm-initiated breaks.

Firms can affect effort the behavior of its workers by providing breaks or "down-time." Let aggregate effort now be given by $e(w,\kappa)$, where κ stands for the fraction of the workday spent in rest or "regeneration." As before, higher wages increase effort (e_w>0), but now, so do firm-initiated breaks (e_κ>0). While breaks increase worker utility and buy loyalty (Akerlof and Yellen 1990), in the first instance they also cost labor input in production. The firm's problem now reads

$$\max E\left[\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t (\theta_t f(e_t(1-\kappa_t)L_t) - w_t L_t - H\max(0,\Delta L_t) - F\max(0,-\Delta L_t))\right]$$

with $e_t = e(w_t, \kappa_t)$, and the maximization over policy functions $\{w(\theta), L(\theta), \kappa(\theta)\}$ defined on the two states $\theta \in \{H, L\}$ possible in each period. There are now six first order conditions, four identical to (8) (9) (10) and (11) above, augmented by two additional conditions characterizing optimal firm-authorized slack time:

$$(1-\kappa^H)e_\kappa(w^H,\kappa^H) = e^H \tag{12}$$

$$(1-\kappa^L)e_\kappa(w^L,\kappa^L) = e^L \tag{13}$$

where e^H and e^L stand for $e(w^H,\kappa^H)$ and $e(w^L,\kappa^L)$ respectively.

Under minimal conditions, it is possible to characterize the "downtime" policy of the firm. From (12) and (13) as well as Figure 1, we know that $w^H > w^L$ and $e^H > e^L$; in the presence of hiring and firing costs, firms pay higher wages and in doing so elicit higher effort from their employees in the good state. The latter inequality implies $(1-\kappa^H)e_\kappa(w^H,\kappa^H) > (1-\kappa^L)e_\kappa(w^L,\kappa^L)$. In the case of linear or near-linear dependence of effort on break time, this implies $\kappa^H < \kappa^L$; the employer provides more downtime in recessions.

5. The Burda/Genadek/Hamermesh (BGH) model of nonwork as one possible microfoundation of $e(w.\kappa)$

In the previous section, linear labor adjustment costs in an efficiency wage model leads to procyclical wages and effort. Where does $e(w,\kappa)$ come from? Interpreting nonwork time identified by Burda, Genadek and Hamermesh (2019) as the obverse of effort, the model of the previous section predicted countercyclical employer-initiated breaks required that the effort function $e(w,\kappa)$ must be linear or nearly linear in κ. In this section, I use the model presented in BGH (2016) as an example of a model that satisfies this condition.

BGH extend Shapiro and Stiglitz (1984) to the case in which workers are heterogenous in their taste for nonwork. Workers starting a new job receive draw ℓ_i from the time invariant cumulative distribution $G(\ell_i)$ that summarizes the preferred fraction of the workday they would spend not working if they could do so without detection; ℓ_i also normalized to equal monetary value they attach to that non-work time in each period. As in Shapiro and Stiglitz (1984), risk-neutral worker compare the present discounted value of a strategy taking ℓ_i in non-work (loafing or shirking), exerting effort e_i=1-ℓ_i and risking detection and job loss, with the alternative strategy of full effort (e_i=1) each period. Since each worker has a different value of ℓ_i, each worker has a different critical value of the wage that deters shirking. Since unemployment involves lower income and a delayed return to the labor market, risk of job loss will deter some workers from choosing the loafing strategy. Workers lose their job for either exogenous reasons, with probability δ, or if they are monitored with probability q and are not exerting full effort. Upon job loss, workers are unemployed, receive unemployment income b and a prospect of finding a new job but only with a delay determined by rate of unemployment in the economy. When they are reemployed, they receive a new draw of non-work preference ℓ_i with expected value $E\ell = \int_0^1 \ell_i g(\ell_i) d\ell_i = \int_0^1 [1-G(\ell_i)] d\ell_i$.

The BGH model leads to an efficiency wage result, but unlike in Shapiro and Stiglitz (1984), full effort exerted by some workers coincides with less than full effort by others. Under these conditions, the representative firm experiences a smooth positive relationship between the wage w it pays and the effort e it observes among its employees; additionally, unemployment in the local labor market exerts a positive influence on worker effort.

The BGH model can readily be modified to allow for employer-initiated nonwork. A worker i compares the value of full effort (V^F) with that of less than full effort (V^N) entailing nonwork ℓ_i with risk of job loss. All workers are offered, but need not accept, the break time κ. In the steady state, these expected present values are given by

$$V_i^F = \frac{w+\kappa}{1+r} + \frac{\delta}{1+r}V^U + \frac{1-\delta}{1+r}V_i^F \tag{14}$$

$$V_i^N = \frac{w+\kappa+\ell_i}{1+r} + \frac{q+\delta}{1+r}V^U + \frac{1-q-\delta}{1+r}V_i^N \tag{15}$$

where V^U is the valuation of the state of unemployment described by

$$V^U = \frac{b}{1+r} + \frac{f}{1+r}EV^E + \frac{1-f}{1+r}V^U \tag{16}$$

and f is the unconditional job finding rate for the unemployed and

$$EV^E = E\left[\max_{e_i \in \{1-\ell_i, 1\}} \left\{V_i^F, V_i^N\right\}\right] \tag{17}$$

is the expected value of employment to an unemployed person who is, by assumption, ignorant of her next draw of ℓ_i.

Define the "full effort wage" $\overline{w}_i$ for each worker i such that if $w > \overline{w}_i$, the worker's valuation of full effort dominates that of positive non-work:

$$V_i^F \geq V_i^N \tag{18}$$

In the spirit of Shapiro and Stiglitz (1984), a "full effort condition" (FEC) defines the cutoff or threshold wage at which worker i is indifferent between full effort and her preferred positive level of non-work ℓ_i. For worker i, this is given by[3]

$$\overline{w_i} = b - \kappa + \frac{f}{q} E\ell + \frac{r+\delta}{q} \ell_i \tag{19}$$

Ceteris paribus, the FEC wage depends positively on unemployment income (b), the interest rate (r), exogenous job turnover (δ), the outflow rate from unemployment (f), and the expected valuation of non-work ($E\ell$). It depends negatively on q, the probability of detection. Because workers are heterogeneous, it depends positively on the individual's valuation of non-work (ℓ_i). Workers most prone to prefer nonwork will require the highest wage to prevent them from doing so. Most important for this paper, it depends negatively on employer-initiated breaks κ, and does so nearly linearly.

All workers receive by assumption the same wage w, and inversion of (19) yields a threshold valuation of nonwork $\bar{\ell}$ implied by indifference between full effort (e_i=1) and effort level (e_i=1 - ℓ_i). At wage w, the model implies the following *aggregate* measures:

1) ***Full effort threshold*** $\bar{\ell}$**:** $\bar{\ell} = \dfrac{q(w+\kappa-b)}{r+\delta} - \dfrac{f}{r+\delta} E\ell$

2) ***Fraction of workers with positive non-work at wage w:*** $\gamma = \int_{\bar{\ell}}^{1} g(\ell_i) d\ell_i = 1 - G(\bar{\ell})$

3) ***Aggregate effort at wage w:*** $e(\bar{\ell}) = 1 - \int_{\bar{\ell}}^{1} \ell_i g(\ell_i) di$

4) ***Conditional mean non-work:*** $\phi(w) = \dfrac{\int_{\bar{\ell}}^{1} \ell_i g(\ell_i) d\ell_i}{1 - G(\bar{\ell})} = \dfrac{\int_{\bar{\ell}}^{1} [1 - G(\ell_i)] d\ell_i}{1 - G(\bar{\ell})}$

The key modification with respect to the original BGH model is to allow for employer-initiated nonwork. The model implies that giving workers a break crowds out some of the

[3] Derivation are available upon request from the author.

incentive to engage in nonwork. Aggregate effort will then have the form $e(\bar{\ell}) = 1 - \int_{\bar{\ell}}^{1} \ell_i g(\ell_i) di = 1 - \int_{\bar{\ell}}^{1} (1 - F(\ell_i)) di + (1\text{-}\kappa)\gamma$ with $\bar{\ell} = \frac{q(w + \kappa - b)}{r + \delta} - \frac{f}{r + \delta} E\ell$. In either state, e is dependent on both w and κ and thus the effort function takes the form $e(w,\kappa)$.

6. Equilibrium

Following Shapiro and Stiglitz (1984) and BGH (2016), I close the model in the simplest possible way, letting f be determined by the constant unemployment condition in the steady state: $f = (\delta + q\gamma)L / (\bar{L} - L)$ (and thus the steady state unemployment rate is given by $u = \frac{\delta + q\gamma}{\delta + q\gamma + f}$). Alternatively, a matching function approach might have been employed to model the bringing together unemployed and new jobs, but offers little gain for my purposes over the original Shapiro-Stiglitz setup.

I now sketch an equilibrium in this model. It consists of an aggregate wage w^i, aggregate effort e^i, a full effort threshold $\bar{\ell}^i$*, and aggregate employment* L^i *for each of the states* $i \in \{H,L\}$ *such that the following eight equ*ations hold:

Employment in good and bad states (LD):

$$e^H \theta^H f' = w^H + \alpha(F + H) \tag{20}$$

$$e^L \theta^L f' = w^L - \beta(F + H) \tag{21}$$

Efficiency wage in good and bad states (EW):

$$\frac{w^H e^{H\prime}}{e^H} = \frac{w^H}{w^H + \alpha(F + H)} \tag{22}$$

$$\frac{w^L e^{L\prime}}{e^L} = \frac{w^L}{w^L - \beta(F+H)} \tag{23}$$

Full effort condition threshold in good and bad states (FE):

$$\bar{\ell}^H = \frac{q\left(w^H - b\right)}{r+\delta} - \frac{\left(\delta + q\gamma\right)}{\left(r+\delta\right)\left(\bar{L}/L^H - 1\right)} E\ell \tag{24}$$

$$\bar{\ell}^L = \frac{q\left(w^L - b\right)}{r+\delta} - \frac{\left(\delta + q\gamma\right)}{\left(r+\delta\right)\left(\bar{L}/L^L - 1\right)} E\ell \tag{25}$$

Aggregate effort (AE) in good and bad states:

$$e(w^H, \kappa^H) = 1 - \int_{\bar{\ell}^H}^{1} (1 - G(\ell_i)) d\ell_i + (1\text{-}\kappa^H)\gamma^H \tag{26}$$

$$e(w^L, \kappa^L) = 1 - \int_{\bar{\ell}^L}^{1} (1 - G(\ell_i)) d\ell_i + (1\text{-}\kappa^L)\gamma^L \tag{27}$$

where γ^L=1 - G($\bar{\ell}^L$) and γ^L=1 - G($\bar{\ell}^L$). In the good state, employment is higher, the wage is higher, total effort is higher, while unemployment is lower, but employer-sanctioned breaks are shorter; the bad state, while characterized by some labor hoarding, shows still higher unemployment, lower wages, and lower effort overall. Comparative statics analysis confirms that the conditions for this to hold in the present model are robust.

7. Conclusion

Evidence from the American Time Use Survey indicates that workers spend a fair amount of time at the workplace not working – and this excludes meals. Our estimates (Burda, Genadek, and Hamermesh 2019) point to roughly 7% of all time spent at the workplace; conditional on any nonwork, the share of the workday rises to 10%. As might be expected, this nonwork is countercyclical, rising in recessions and declining in expansions, but this is the outcome of much more pronounced and statistically significant, offsetting cyclical movements of the incidence (extensive margin) and intensity (intensive margin) of nonwork at the workplace. It is difficult to reconcile these facts with recourse to efficiency wage theory, and it is equally difficult to explain them as an artifact of labor hoarding by firms alone. The fact that nonwork time by workers varies over time and with local business cycle/labor market conditions is nevertheless consistent with firms hoarding over the cycle.

Combining a model in which firms can employ slack and downtime as part of a profit maximizing strategy with a model of heterogeneous preferences for nonwork is able to account for contradictory patterns in the data. Empirical analyses of firm behavior have long nurtured the notion that labor hoarding is a rational response supported to fluctuating demand (Oi 1962, Fay and Medoff 1985, Hamermesh 1989). That the fraction of workers admitting to nonwork over the cycle is procyclical, at least in the United States, suggests that researchers also need to take theories of the wage as a motivating device seriously.

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