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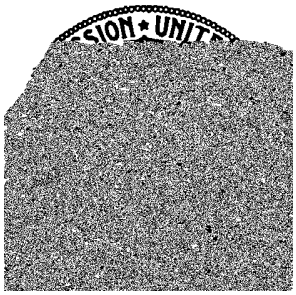

Sometimes it's Better to Just Let them Shirk

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1. Introduction:

In their famous 1984 paper, Shapiro & Stiglitz (hereafter S&S) developed what has become the canonical efficiency wage model.[1] The premise of the model is that high effort can be induced if workers are paid "efficiency" wages high enough that they fear losing their jobs and so choose not to shirk. The main result of the paper is that unemployment always exists in equilibrium; if there were no unemployment, then a fired worker could find another job right away at the same wage, and so there could be no wage high enough to induce non-shirking.

In their paper, S&S assume that workers who put forth low effort are completely unproductive, so the only way for a firm to hire effective labor is to pay an efficiency wage and induce non-shirking. In contrast, I treat the effective labor provided by a shirking worker as a parameter that is allowed to vary from zero (shirkers provide no effective labor) to one (shirkers provide as much effective labor as a non-shirker).[2] If shirkers are productive, then there are two ways to hire a unit of effective labor: offer a single "good" job, meaning a job that pays an efficiency wage and where shirking is punished by firing; or to offer "bad" jobs, meaning jobs where workers are allowed/expected to shirk.

The first goal of this paper is to show that it is possible for only good jobs to be offered in equilibrium (as in S&S); but it is also possible for only bad jobs, or for some good jobs and some bad jobs, to be offered in equilibrium. Specifically, I show that if is sufficiently small, then firms will always find it cheaper to hire a unit of effective labor by offering one good job and paying an efficiency wage than by offering 1/ bad jobs, so only good jobs will be offered in

[1] A small sample of the theoretical research inspired by this paper includes Bulow & Summers (1986), Levine (1989), MacLeod & Malcomson (1998), and Strand (1987).

[2] In both the S&S model and the present one, workers are all identical; they do not vary in their disutility of effort. So whether or not workers shirk depends entirely on the incentives they face.

equilibrium.[3] Similarly, if b is sufficiently large, firms will always find it cheaper to offer 1 $-e$ bad jobs than to offer one good job, so only bad jobs will be offered in equilibrium (i.e., all workers in the economy will shirk). For intermediate values of b, firms will be indifferent between offering one good job and offering 1 $-e$ bad jobs, and there will be a positive number of both good jobs and bad jobs in equilibrium.

It is worth noting that the threshold level of b below which only good jobs are offered, and the threshold level of b above which only bad jobs are offered, are functions of labor demand. I show that as labor demand becomes arbitrarily high the threshold level of b below which only good jobs are offered approaches zero; the higher is labor demand, the more unproductive shirkers must be for no employers to want to offer any bad jobs.[4] The intuition is that when labor demand is very high, the efficiency wage becomes very high as well, while the cost of offering 1 $-e$ bad jobs and filling them with unemployed workers stays constant, as these workers only need to be paid enough to compensate them for their foregone leisure.

Similarly, I show that as labor demand becomes arbitrarily high the threshold of b above which only bad jobs are offered approaches one; the higher is labor demand the more productive shirkers must be for no employers to want to offer any good jobs.[5] The intuition for this relies on the fact that the magnitude of the efficiency wage depends on how much utility a fired worker gets. In the S&S equilibrium, a fired worker gets the utility that comes from being unemployed. But if bad jobs exist, then a worker fired from a good job can get the utility associated with having a bad job. If there is unemployment in the economy, then the bad-job wage is just enough to make workers indifferent between having a bad job (and shirking) and being unemployed, and so

[3] This is consistent with the S&S paper. While formally they assume that shirkers produce no output, they point out that their equilibrium will hold if shirkers have productivity that is positive but sufficiently low.
[4] No bad jobs will ever be offered if $b = 0$, regardless of the level of labor demand.
[5] No good jobs will ever be offered if $b = 1$, regardless of the level of labor demand; if shirkers are just as productive

the bad-job wage is just equal to the cost of foregone leisure. But if there is full employment in the economy--if everyone who does not have a good job has a bad job--then the bad-job wage will be higher than this. It turns out that a one dollar increase in the bad-job wage causes a one dollar increase in the efficiency wage, so a one-dollar increase in the bad-job wage makes hiring a unit of effective labor by offering one good job increase by a dollar, but makes hiring a unit of effective labor by offering 1/ bad jobs more expensive by 1/ 1 dollars, making it more attractive to offer a good job.

For intermediate values of, neither the condition for only good jobs to be offered nor the condition for only bad jobs to be offered holds; if all firms were offering only good jobs, a firm would prefer to replace one good job with 1/ bad jobs, and if all firms were offering only bad jobs, a firm would prefer to replace 1/ bad jobs with one good job. In these cases, there exists an intermediate equilibrium in which there are a positive number of both good jobs and bad jobs, and firms are indifferent between offering one good job and 1/ bad jobs.

The second goal of this paper is to show the results of two sets of comparative statics exercises. The first set involves the effect of changes in labor dem

Increasing labor demand when both good and bad jobs are offered in equilibrium and there is unemployment causes the number of bad jobs and output to increase. The additional workers are drawn from the unemployment pool, so the bad-job wage, and hence the good-job wage, remain constant, but the average wage falls. If there is full employment in the economy, then an increase in labor demand causes the number of good jobs to rise, the number of bad jobs to fall, and both kinds of wages (and average wages) and total effective labor supplied to rise. The intuition is that when labor demand is higher, there is no way to expand total employment (because everyone has a job), but higher demand makes it worthwhile to increase good-job wages by enough to convert some bad-job workers into good-job workers.

This comparative statics analysis may have some relevance for the empirical literature on cyclicality of wages. That literature has found mixed results regarding whether wages are pro-cyclical.[6] The present model contains testable predictions about when wages should be pro-cyclical, counter-cyclical, or a-cyclical, and may help to resolve the ambiguity in the empirical literature.

The second set of comparative statics exercises involves the effect of changes in w. Increasing w has no effect at all if only good jobs are offered in equilibrium. If only bad jobs are offered in equilibrium and there is unemployment in the economy, then an increase in w will cause the total amount of effective labor supplied to increase (shirking workers will be more productive), and the effect on employment will be ambiguous (total effective labor supplied is higher, but each shirking worker is more productive). If only bad jobs are offered in equilibrium and there is full employment, than an increase in w can have no effect on employment, will cause total effective labor supplied to increase, and has an ambiguous effect on the bad-job wage.

[6] See Abraham and Haltiwanger (1995) for a survey.

If there are a positive number of both good jobs and bad jobs, the equilibrium condition requires that firms be indifferent between offering one good job and offering $1/q$ bad jobs. If there is unemployment in equilibrium, then the bad-job wage is fixed at the level just sufficient to induce unemployed workers to accept jobs and shirk. The good-job wage is fixed at $1/q$ times this level, which means that the number of good jobs is fixed as well. Total effective labor increases; the number of good jobs does not change and workers in bad jobs become more productive. The effect on the number of bad jobs is ambiguous; output from bad jobs increases, but each bad-job worker has become more productive. If there are a positive number of good jobs and bad jobs and there is no unemployment in equilibrium, then offering bad jobs becomes more attractive relative to offering good jobs, so the number of bad jobs increases and the number of good jobs falls. The effects on total effective labor, bad-job wages, and good-job wages are ambiguous.

This comparative statics exercise points out an unexplored possible consequence of technological change. If the change takes the form of making shirkers more productive, then its effect on wages, output, and employment will depend on which equilibrium the economy is in. More generally, the effect of a technological improve labook-25.7e e2c19.805 -2224-worc19.805 to rove o-es

A worker who habitually shirks when employed enjoys the benefit of a lower expenditure of effort, but pays the cost of spending more time in the unemployment pool. Consider an employed worker with a job paying a wage w. The expected present discounted value of lifetime utility for a shirker can be expressed as:

$$(1)\quad V_E^S = w - e_L + (1-b)(1-q)\frac{V_E^S}{1+r} + (b+q-bq)\frac{V_U}{1+r} \quad \Rightarrow \quad V_E^S = \frac{(b+q-bq)V_U + (1+r)(w-e_L)}{b+q-bq+r}$$

To interpret (1), note that in the present period, the shirker receives utility of $w - e_L$. If exogenous separation and being caught shirking are independent events, then the probability that neither one happens (so the shirker is employed in the next period) is $(1-b)(1-q)$. The value of still having a job in the next period is V_E^S, discounted one period to the present. Note that the value of shirking is the same in every period because of the infinite time horizon.[8] If she exogenously separates or is caught shirking, which will occur with probability $(b + q - bq)$, then she will receive a payoff in the next period (also discounted one period to the present) equal to the value of being unemployed.

The expected present discounted value of lifetime utility for a non-shirker is:

$$(2)\quad V_E^N = w - e_H + (1-b)\frac{V_E^N}{1+r} + b\frac{V_U}{1+r} \quad \Rightarrow \quad V_E^N = \frac{bV_U + (1+r)(w-e_H)}{b+r}$$

The interpretation of this equation is similar to that of (1) above. Current period utility is lower (because effort is higher) but the probability of becoming unemployed is lower as well.

[8] The infinite horizon assumption justifies treating V_E as a constant. But one of the goals of this paper is to do comparative statics exercises, which means that the world need not look the same in all periods. The steady-state framework can still be employed, however, by making the assumption that workers maximize expected lifetime utility.

The next step is to find an expression for the expected present discounted value of being unemployed V_U. A worker who is currently unemployed will be employed again in future periods,[9] and will receive positive per-period utility in those periods, so this value is strictly positive.

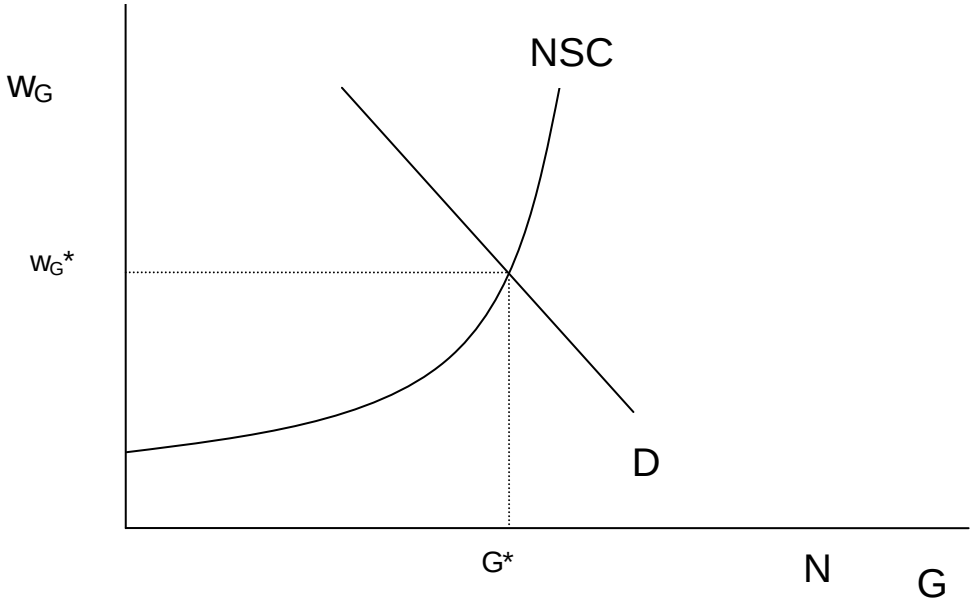
$$V_U = \bar{u} + a\frac{V_E}{1+r} + (1-a)\frac{V_U}{1+r} \qquad V_U = \frac{aV_E + (1-)^{-}}{a+r} \tag{3}$$

pay a wage w_G, which is the lowest wage at which the NSC is satisfied. Setting (6) equal to (7) and solving for w, this critical wage can be expressed as:

$$w_G = \bar{u} + e_H + \frac{(a + b + r)(e_H - e_L)}{q + bq} \tag{8}$$

Equation (8) implies that the critical wage w_G is

Figure 1: The Shapiro & Stiglitz Equilibrium



3. Allowing Shirkers to Have Positive Output.

The analysis up to this point has essentially been a restatement of the S&S model. A key assumption in that model is that shirking workers do not produce any output, which means that no firm would ever hire a worker without also paying an efficiency wage high enough to ensure that the worker would not shirk. In contrast, I assume that shirking workers produce a fraction as much output as non-shirking workers, which means that shirkers produce as much output as one non-shirker. Define a "bad" job as a job in which a worker is hired, but paid just enough to induce the worker to show up and shirk, and not enough to induce non-shirking. Bad jobs pay a wage of w_B, and do not come with a policy of firing shirkers. As will be shown below, there are some parameter values for which no bad jobs will be offered in equilibrium. However, there are also parameter values for which only bad jobs are offered in equilibrium, as well as parameter values for which both good jobs and bad jobs are offered. I consider each of these cases in turn.

3.1. The Shapiro & Stiglitz Equilibrium (SSE).

As discussed above, in the original S&S model shirkers are assumed to produce no output at all. S&S point out, however, that the output of a shirking worker need not be literally zero for the SSE to hold, but rather cannot be above some threshold. Specifically, the SSE will exist as long as, for the G defined by the intersection of the NSC and the (unspecified) labor demand function, no firm would prefer to hire a unit of effective labor by offering bad jobs at a total cost of $w_B/$ than to offer one good job at a cost of w_G. Since the presence of unemployment in the SSE guarantees that $w_B = e_L$ and hence that $\pi = 0$, this condition can be written as:

$$(11) \qquad w_G \left(\frac{w_B}{J}\right) \geq w_G \left(\frac{e}{Y}\right) - e_H \left(\frac{r(e_H - e_L)}{q - qb}\right) Y - \frac{bN(e_H - e_L)}{(q - qb)(N - G)} \left(\frac{e_L}{J}\right)$$

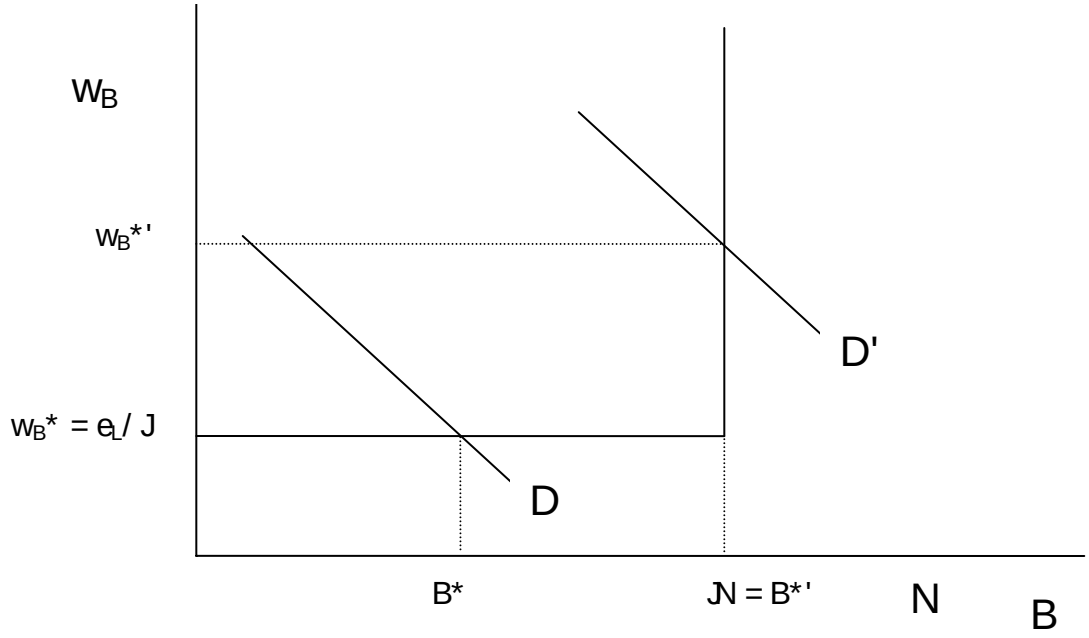
Equation (11) implicitly defines the threshold of b below which the SSE exists.[11] When the SSE holds, equilibrium is as depicted in Figure 1 above. It is easy to see that the condition in (11) gets more difficult to satisfy as G increases. As G approaches N, the left-hand side of the inequality goes to infinity, which means that the condition in (11) can only be satisfied if b approaches zero. Since G is increasing in labor demand this means that the higher is labor demand, the smaller is the range of

of hiring a unit of effective labor by offering 1 bad jobs will be $e_L/$, which is represented in Figure 2 by the horizontal line segment. If labor demand is low enough that it intersects with the horizontal line segment to the left of N, then there will be unemployment in the economy.

The second condition is that firms must in fact prefer offering bad jobs to offering one good job even when $G = 0$ and $l = 0$ (which is when w_G is smallest) . That is:

(12b

Figure 2: The "Everyone Shirks" Equilibrium



For sufficiently large, the inequality in (12) must hold, so the ESE^{UE} will hold as long as labor demand is sufficiently low. If (12) is satisfied at a given level of labor demand, then increasing can never cause it not to hold.

B. The "Everyone Shirks" Equilibrium with Full Employment (ESE^{FE}).

Two conditions must hold for the ESE^{FE} to exist. First, labor demand must be high enough to generate full employment, conditional on all jobs in the economy being bad jobs.

$$D(JN) \geq \frac{e_L}{J} \tag{13a}$$

This requirement can be seen graphically in Figure 2. If all jobs in the economy are bad jobs, then there will be full employment as long as labor demand intersects the vertical line at a height above e_L / J. Full employment drives w_B above e_L.

The second condition is that firms must in fact prefer offering bad jobs to offering one good job when $G = 0$ and $\lambda = w_B - e_L > 0$. That is:

(13b) $$w_G \left(\frac{w_B}{J}\right) e_H + w_B e_L \left(\frac{(b - r)(e_H - e_L)}{q - qb}\right) \left(\frac{w_B}{J}\right)$$

The w_B in (13b) is not an exogenous parameter, but rather is implicitly defined by the labor demand function. An increase in labor demand sufficient to cause a one-unit increase in w_B will cause the left-hand side of the inequality in (13b) to increase by one unit, and will cause the right-hand side to increase by 1/

replacing good jobs with bad jobs would continue until the indifference between the two types of jobs was restored.

As discussed above, when labor demand increases, the conditions for the SE and the conditions for the ESE

This system is similar to (14) above, except that now $w_B > e_L$ and so λ is equal to $w_B - e_L > 0$, instead of being fixed at zero. $D(\xi)$ represents the total demand for effective labor, and (15) represents the requirement that in equilibrium w_B

must fall, which means that w_G must fall and the effect on w_B is ambiguous. If the net effect on Ω is negative, then the price of a unit of effective labor must rise, which means that both w_G and w_B must rise.

4. Empirical Implications:

A. Cyclicality of Wages.

There is an empirical literature on the question of whether or not wages are pro-cyclical, the results of which are mixed.[15] This paper may make some contribution to resolving that ambiguity in the data, as model makes testable predictions about when wages are pro-cyclical, counter-cyclical, or a-cyclical. In the SSE, ESE^{FE}, and IE^{FE}, wages are pro-cyclical; higher labor demand causes higher average wages. In the ESE^{UE} wages are a-cyclical; higher labor demand has no effect on average wages. In the IE^{UE}, increases in labor demand have no effect on bad-job wages or on good-job wages, but they increase the number of bad jobs in the economy and have no effect on the number of good jobs, so average wages rise. It remains an open empirical question whether the specific predictions of the model can resolve any part of the ambiguity in the empirical literature.

B. Technological Change.

The key parameter in the model is Ω, which represents the ratio of the output of a non-shirker to that of a shirker. If Ω is in fact an important determinant of economic outcomes, then any economic change that influences Ω may be important as well. The model makes explicit predictions regarding the effect on employment, wages, and output of productivity improvements that take the form of an increase in the output of shirkers (holding the output of non-shirkers constant),

[15] See Abraham and Haltiwanger (1995) for a survey.

In any equilibrium where $e_G > 0$, the NSC must be satisfied. Substituting (14) for w_G^{ES}

References: