The Desire for Impact

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October 19, 2004

Abstract

This paper explores the meaning and implications of the desire by workers for impact. We find that this impact motive can make firms in a competitive labor market act as monopsonists, lead workers with the same characteristics but at different firms to earn different wages, may alleviate the hold-up problem in firm-specific investment, can make it profitable for an employer to give workers autonomy in effort or task choice, and can propagate shocks to unemployment.

Keywords: impact; monopsonistic behavior; wage differentials; hold-up problem; contracts; autonomy.

JEL-codes: J3, J4, M5.

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1 Introduction

People enjoy having impact. Psychologists consider the impact incentive as a major one (McClelland (1987), chapter 4). Having impact on the world gives people pleasure as it makes them feel strong and excited (McClelland et al. (1985), and Schultheiss et al. (2004)). The impact incentive appears early in life. McClelland (1987, p. 148) quotes Levy (1955) about the 'battle of the spoon':

> "...the moment when the baby grabs the spoon from the mother's hand and tries to feed itself. ... We can be sure that the child is not motivated at this point by increased oral gratification. He gets more food by letting mother do it, but by doing it himself he gets more of another kind of satisfaction—a feeling of efficacy."

In older babies, the desire for impact can result in annoying and even dangerous behavior, like making loud noises, knocking things about, or pulling things off tables. Out of the impact experiences in early childhood, and the gratification that it brings, develops what McClelland (1987) describes as the 'power motive:' a recurrent concern for having impact on others or the world at large (see also Winter, 1973). The desire for impact also relates to de Charms (1968)'s notion of 'personal causation' and to Deci (1975)'s concept of self-determination. According to de Charms (1968, p. 269), "Man's primary motivational propensity is to be effective in producing change in his environment." The impact motive also appears in the wonderful story Tom Wolfe reports in *The Right Stuff* about astronauts who demanded manual controls on a spacecraft, rather than allowing automatic controls to control the flight.

This paper explores the meaning and implications of a person's desire for impact. The meaning is not obvious. Taking a particular action x may well be considered as having the same impact as avoiding action x. We shall address this paradox. Our study focuses on how the impact motive affects behavior in the labor market. Employers deem this motivation as important. Job ads sometimes mention "desire to make an impact" as a qualification of the ideal candidate. For instance, the accounting firm Deloitte UK states on its recruitment website that one of the characteristics that their consultants have in common is "a desire to make an impact and create change."[1] Trader

[1] http://graduates.deloitte.co.uk/index.cfm?p_id=242

Joe's Grocery Stores tries to recruit store workers by offering the chance to "make an impact on people, product, and sales. We're talking about a chance to make a difference, not just be another cog in the wheel."[2] Perry (2001, p. 28) quotes a director of Xerox's research center as saying that: "Our top stars say they want to make an impact—that's the most important thing. Feeling they are contributing and making a difference is highly motivational for them." Similarly, a director of human resources of technology company Corning says: "People come to work here because they want to do world-changing things. If for some reason they think they can't do that, they may look elsewhere."

A report by the British Treasury (Foster et al., (2002), p. 6) quotes a senior manager of a University Hospital as saying that: "...being able to have a real impact on how the patients are treated is key. There are quite phenomenal returns in terms of motivation." In the same report (p. 11), a manager of Stockton Council says: "It is about the public service, but it is also about having the opportunity to make a difference ... It is more than wanting to do good. It is about knowing that you actually do make a real difference."

Our assumption that a worker cares about his impact relates to the assumption that a worker values the output he produces. The two differ, however, because a person can also make a difference by producing less than someone else would. Several recent papers study workers who care about output, either for altruistic reasons (Francois (2000, 2004), and Prendergast (2003)) or because they intrinsically value their contribution to the production of public services (Besley and Ghatak (2004), Delfgaauw and Dur (2002), and Glazer (2004)).

An extensive literature in psychology, both theoretical and empirical, stresses the importance of the impact motive for workers' behavior. Hackman and Oldham (1976) identify task significance (that is, the degree to which the task is seen as important and having impact) as one of the five core job dimensions promoting performance quality and job satisfaction. Relatedly, in Thomas and Velthouse (1990)'s concept of 'worker empowerment,' sense of impact is one of the four core dimensions fostering intrinsic task motivation (see also Conger and Kanungo, 1988). Spreitzer and Doneson (2005) review extensive empirical evidence showing that employees are higher performing and have more positive attitudes in terms of work satisfaction when

[2]http://company.monster.com/trader/

given more power. Relatedly, much evidence indicates that people intrinsically value freedom of choice beyond the mere opportunity to match personal preferences with available alternatives (see, for example, Deci (1975), Perlmutter and Monty (1977), and Zuckerman et al. (1978)).[3]

Economists have also found evidence that impact matters to workers. In a recent survey among US nonprofit workers, 61% say that the chance to make a difference is more important to them than the salary and benefits (Light (2002)). Clark (1998), relying on a survey of seven thousand workers in OECD countries, reports that 33.5% of respondents consider it very important to have a job that "allows [a person] to work independently;" 22.7% consider it very important that the job "allows [the worker] to help other people," and 25.1% that the job is "useful to society." In contrast only 11.9% consider it very important that the job "leaves a lot of leisure time" and only 18.1% that it gives "flexible working hours." In a more direct study of the relation between impact and wages, Handel (2000) examined 1,311 responses to the Quality of Employment Survey of 1977. He finds that 18.1% of respondents were willing to trade a 10 percent pay raise in return for "more freedom to decide how to work." Benz and Frey (2003) examine why, though employees earn more than the self-employed, self-employed workers are happier than employed workers. Using survey data from 23 countries, they find that the greater autonomy of self-employed people fully explains the positive job satisfaction differential between self-employed and employed people (see also Frey and Benz (2003)). Frey and Kucher (1999), using survey data on Swiss managers, find that having more subordinates does not significantly increase the wage after controlling for manager's education and tenure. They interpret this finding as evidence that people are willing to pay for power. Frey et al. (2001) study earnings of Swiss public employees in 1996, and find that earnings of higher-ranked public employees are higher in cantons having more direct democracy, indicating a compensating wage differential for less discretionary leeway. Smith, Masi, and Lemay (1997) find evidence for the impact motive from market data: the greater a worker's autonomy in decision making, the lower his pay.[4]

[3]Freedom of choice may, however, also cause a psychological burden, in particular when choices are complex, or when people must choose among unwanted outcomes. See Botti and Iyengar (2004), and the papers discussed therein.

[4]We note, however, that the evidence on how a worker's wage varies with how closely he is supervised is mixed. (See, for example, Leonard (1987), Groshen and Krueger (1990), Krueger (1991), and Brunello (1995)). While the desire by workers for impact implies a

In the following, we shall suppose that a person's utility increases with his income and with his impact. As noted above, identifying impact can be problematic: if action x increases output, then not taking action x reduces output, and so taking action x and avoiding action x may be seen as having the same impact. We address this paradox by supposing that a person measures the impact of any action he may take by comparing output in the current period to what it would have been had he unexpectedly ceased to exist an instant before. Thus, we define a person's impact as the difference that his existence makes to output. Note that impact can arise both because a person increases output, and because he reduces it. We allow for both.

2 Monopsony-like behavior

For our first application, consider a firm producing goods using capital (K) and labor (L) as inputs. For simplicity, let effort by each worker be exogenously given, so that L represents the number of workers hired. Output is $Q = f(K, L)$, with $f_L > 0$ and $f_K > 0$. Suppose, as is conventional, that $f_{LL} < 0$ and $f_{KK} < 0$, or that the marginal product of labor declines with the number of workers the firm hires, and similarly for capital. Output is sold at price p; the rental rate of capital is r.

A person's utility, $U(w, I)$, increases with his income w and with his impact I. We assume that a worker's outside option is unemployment. An unemployed person gets an unemployment benefit b, and engages in household production with monetary value $\overline{q}$, implying income $\overline{w} = b + \overline{q}$. (We could instead assume that the worker's outside option is self-employment, resulting in production value $\overline{q}$, and $b = 0$).

Following our definition of impact, when a worker chooses the outside option, his impact is $\overline{q}$, since output declines by $\overline{q}$ when the worker ceases to exist. A worker's impact when working for a firm depends on the ease with which the firm can replace a worker. If a worker cannot be replaced, and the capital stock is fixed, then his impact equals the value of his marginal product $pf_L(K, L)$. If a worker can be replaced immediately by an unemployed person, then the firm's output remains the same when a worker vanishes.

positive relation between wages and supervision, standard efficiency wage theory suggests a negative relation between wages and supervision. (See, however, Walsh (1999), who shows that the sign of the efficiency-wage effect depends on the shape of the worker's effort supply curve.)

Aggregate output in the economy, however, falls by $\overline{q}$, since the worker's substitute no longer engages in household production. Hence, when a worker can be replaced immediately, an employed person's impact equals an unemployed person's impact, $\overline{q}$. More generally, suppose that with probability ϕ a firm can immediately replace a worker. Assume that, because of search frictions in the labor market, $\phi < 1$.[5] An employed worker's impact is then

$$I(K, L) = (1 - \phi)\, p f_L(K, L) + \phi \overline{q}, \tag{1}$$

with first derivatives:

$$\begin{aligned} I_K &= (1 - \phi)\, p f_{LK} \geq 0, \\ I_L &= (1 - \phi)\, p f_{LL} < 0. \end{aligned}$$

When the firm hires more labor, the marginal product of labor declines, and so each worker's impact, I, declines. Unless capital and labor are perfect substitutes ($f_{LK} = 0$), an increase in the capital stock increases each worker's impact.

When hiring labor, the firm must satisfy a worker's participation constraint, $U\left[w, I(K, L)\right] \geqslant U\left(\overline{w}, \overline{q}\right)$. When the participation constraint binds, it follows that

$$\begin{aligned} w_L &\equiv \frac{\partial w}{\partial L} = -\frac{I_L U_I}{U_w} > 0, \\ w_K &\equiv \frac{\partial w}{\partial K} = -\frac{I_K U_I}{U_w} \leq 0. \end{aligned}$$

Hence, a firm which hires additional labor will find that each worker's utility from impact declines, so that it must compensate with a higher wage. When the firm installs more capital, and $f_{LK} > 0$, each worker's impact increases, and so the firm can offer a lower wage.[6]

[5] Using data from a survey of 800 managers in 12 industries in the United States, Nicholson et al. (2004) find that only 22% of the workers are easy to replace with a worker of similar quality or productivity. A 3-day absence has no effect on output for only 29% of workers, whereas a 2-week absence affects output for all but 15% of the workers.

[6] This does not necessarily imply that more capital-intensive firms pay lower wages. Indeed, in empirical work Abowd, Kramarz, and Margolis (1999) and Hellerstein and Neumark (1999) find the opposite. Depending on the exact properties of the production function, more capital-intensive firms may pay higher or lower wages in the optimum.

The firm chooses K, L, and w to maximize profits, $pf(K,L) - rK - wL$, subject to $U[w, I(K,L)] \geqslant U(\overline{w}, \overline{q})$. The first-order condition for optimal employment is:

$$pf_L(K,L) - w - w_L L = 0. \tag{2}$$

Since $w_L > 0$, the firm will hire less labor than at the point where the wage equals the marginal product of labor. For by hiring more labor, it increases the wage it must pay. Thus, the desire by workers for impact has implications similar to monopsony.

A standard result in the monopsony literature, is that when firms have monopsony power over heterogeneous workers, the imposition of a minimum wage can increase employment. That result also holds in our model. This relates to the finding by Card and Krueger (1994) that an increase in the minimum wage in New Jersey in 1992 did not reduce employment in fast-food restaurants. One explanation offered was monopsony. But it is unclear why fast-food restaurants in New Jersey enjoyed any monopsony power. As is clear from the above results, a minimum wage may increase employment even when workers are identical and firms lack monopsony power. All that is necessary is that workers value impact, and cannot be replaced immediately when they quit the firm or vanish.

Another immediate implication of our model is that the impact motive may lead workers with the same characteristics but at firms with different production technologies to earn different wages. When workers do not care about impact ($\gamma = 0$), the wage w simply equals the reservation wage $\overline{w}$, and is thus independent of the characteristics of the industry or of the firm. When workers do care about impact, the wage depends on worker's impact in the optimum, which differs according to the properties of the production function.

Workers' desire to make an impact also affects firm's choice of the amount of capital it installs. Given the number of workers, the firm's optimal capital stock is implicitly described by

$$pf_K(K,L) - r - w_K L = 0. \tag{3}$$

If $f_{LK} > 0$, then $w_K < 0$, and hence the workers' desire for impact increases the firm's optimal capital stock. A higher capital stock reduces wage cost as all workers find their job more meaningful. Hence, the return to capital will be lower than the market interest rate, and the more so in sectors where capital and labor are more complementary; only when capital and labor are

perfect substitutes does optimal investment have the return to capital equal the market interest rate.[7]

Our results will continue to hold when the firm has monopoly power in the product market. Then, even for a given physical marginal product of labor, the worker's wage increases with firm's output: the downward sloping demand curve means that the value of marginal product declines with output even if physical marginal product does not decline as the firm expands output. Hence, if the firm has some monopoly power in the product market, workers' wage increases with the number of workers hired, even when $f_{LL} = 0$.

3 Propagation of unemployment shocks

A firm can more easily replace workers the looser the labor market. The literature on job search commonly assumes that the probability that a vacancy is filled increases with the unemployment rate (see for instance Pissarides (2000)). In our model, this implies that ϕ increases with the economy's unemployment rate. An immediate implication is that, all else equal, wages increase with unemployment:

$$w_\phi \equiv \frac{\partial w}{\partial \phi} = -\frac{I_\phi U_I}{U_w} > 0,$$

where $I_\phi = -\left[pf_L(K, L) - \overline{q}\right] < 0$, as seen from (1). A rise in unemployment makes it easier for a firm to replace a worker, implying a decline in worker's impact. As the job has become less attractive compared to the outside option of unemployment, the wage must rise. This, in turn, induces the firm to lay off some workers. Similarly, a shock which reduces demand for the firm's product reduces each worker's value of marginal product for any given level of employment. As the utility from employment has declined, the wage a person will demand to accept the job will increase, thereby reducing employment. Worker's desire for impact thus supports high wages during recessions, and may therefore deepen recessions. The opposite holds when the economy booms.

[7]Stronger substitutability of capital and labor may also reduce in another way a worker's impact. When the firm fails to hire a new worker after the current worker vanishes, it may install additional capital, which increases production more, the closer capital and labor are substitutes.

Clearly, in practice as well as in a more elaborate model, workers may be willing to accept wage cuts during recessions, for instance when employed workers earn a rent and a wage cut reduces the probability of job losses. Then, the impact motive reduces workers' willingness to accept wage cuts, and may therefore contribute to wage stickiness.

4 Investment in worker's skills and hold-up

We saw that if capital is complementary with labor, a firm can reduce the wage it pays by investing in more capital. Clearly, the same holds for investment in worker's firm-specific skills, as such investment directly increases a worker's marginal product when working for the firm. The impact motive may thus alleviate the well-known hold-up problem which may arise when wages may be renegotiated after the investment has been made. (See Malcomson (1997) for a survey of the hold-up literature.)

Consider the following example. A firm employs one worker whose productivity is given by $R(S)$, where S is firm's investment in worker's firm-specific skills. The firm's profits are $R(S) - w - S$. Hence, for a given wage, the firm's optimal investment satisfies $R_S(S) = 1$. That is, the firm invests up to the point where the last dollar invested yields a return of a dollar. This level of investment would arise in the absence of both the hold-up problem and the impact motive.

Suppose that after a firm invested, the firm and the worker can renegotiate the wage, resulting in the generalized Nash bargaining solution. The firm's surplus is:

$$R(S) - w - \phi \left[R(S_o) - w_o - S_o \right],$$

where, as before, ϕ is the probability of filling a vacancy, S_o is the investment in a new employee's skills, and w_o is the wage paid a new employee. Note that S does not appear as a cost, since it is a sunk cost once the investment has been made. For convenience, let a worker's utility be linear in income and impact, with γ measuring the weight on impact. A worker's surplus from working rather than taking the outside option is the difference in income, $w - \overline{w}$, plus γ times the difference in impact. A worker's impact when working at the firm equals $(1 - \phi) R(S) + \phi \left[R(S) - R(S_o) + \overline{q} \right]$. The only difference from (1) is that a new worker's productivity can differ from the current

worker's productivity, since S need not be equal to S_o.[8] Worker's impact in the outside option is $\overline{q}$, as in Section 2. The worker's surplus is therefore

$$w - \overline{w} + \gamma \left\{ R(S) - \phi R(S_o) - (1 - \phi)\, \overline{q} \right\}. \tag{4}$$

The Nash bargaining solution implies:

$$\begin{aligned} w = {} & \alpha \left\{ R(S) - \phi \left[R(S_o) - w_o - S_o \right] \right\} + \\ & (1 - \alpha) \left\{ \overline{w} - \gamma \left[R(S) - \phi R(S_o) - (1 - \phi)\, \overline{q} \right] \right\}, \end{aligned} \tag{5}$$

where α is the worker's relative bargaining power. The worker receives his reservation payoff plus a share α of the total surplus. The worker's wage resulting from the bargaining clearly depends on the firm's investment S:

$$\frac{\partial w}{\partial S} = \alpha R_S(S) - (1 - \alpha)\, \gamma R_S(S).$$

As in the standard hold-up model, the wage increases with S, the worker capturing part of the return on investment; see the first term. For a given S_o, however, the worker's impact also increases with S, resulting in an increase in the worker's surplus and, hence, a lower wage; see the second term. If the impact motive is sufficiently strong compared to a worker's bargaining power (that is, if $\gamma > \alpha/(1 - \alpha)$), the bargained wage declines with the firm's investment. This contrasts to the standard hold-up model without the impact motive.

The firm anticipates renegotiation of the wage when deciding how much to invest on the worker. Maximizing profits $R(S) - w - S$ with respect to investment in worker's skills S, where the wage w is given by (5), yields

$$R_S(S) = \frac{1}{(1 - \alpha)\,(1 + \gamma)}. \tag{6}$$

As in the standard hold-up model, the worker's ex post bargaining power ($\alpha > 0$) reduces the firm's optimal investment, because the firm anticipates that it does not reap the full return on its investment. But the worker's desire for impact ($\gamma > 0$) increases the firm's investment: an increase in the worker's skills increases the worker's impact, reducing the wage that results

[8] If the investment in a new worker's skills S_o is also considered as output, the current worker's impact is ϕS_o higher. Including this does not affect the results, except for the equilibrium wage in equation (7), which is γS_o higher.

from bargaining. When $\gamma = \alpha/(1-\alpha)$, the two effects cancel and optimal investment satisfies $R_S(S) = 1$. When γ is larger, the firm invests even more.[9]

The effect of the impact motive on optimal investment is independent of the value of ϕ. So, even when the worker can be replaced immediately ($\phi = 1$), worker's desire for impact promotes firm's investment in worker's skills. Inspection of the expression for worker's surplus (4) shows why. When the firm increases S, the worker's impact increases for a given value of S_o, independent of the ease with which the worker can be replaced. The higher impact implies a higher surplus to the worker, resulting in a lower negotiated wage. Because the firm's investment in its current worker's skills does not affect the profitability of investing in a new worker's skills were the current worker to vanish, S_o is taken as given. In equilibrium, of course, $S = S_o$ and $w = w_o$. It follows from (5) that in equilibrium the resulting wage is

$$w = \frac{1}{1-\alpha\phi}\left(\alpha\left[(1-\phi)\,R(S) + \phi S\right] + (1-\alpha)\left\{\overline{w} - \gamma\,(1-\phi)\left[R(S) - \overline{q}\right]\right\}\right)$$

As opposed to the firm's incentives to invest, the equilibrium wage does depend on ϕ. The ease with which a worker can be replaced has two effects. First, a higher ϕ improves the outside option of the firm, implying a lower bargained wage. Second, a higher ϕ reduces a worker's impact, implying a higher bargained wage. Only when γ is sufficiently large does the impact effect dominate.

Consider the extreme cases $\phi = 0$ (a worker is never replaced) and $\phi = 1$ (a worker is immediately replaced). When $\phi = 0$ the equilibrium wage is

$$w = \alpha R(S) + (1-\alpha)\left\{\overline{w} - \gamma\left[R(S) - \overline{q}\right]\right\},$$

which increases with S when $\gamma < \alpha/(1-\alpha)$; this is identical to the condition for $R_S(S) > 1$ we obtained before. When the worker can be replaced immediately ($\phi = 1$), the equilibrium wage is

$$w = \overline{w} + \frac{\alpha}{1-\alpha}S, \tag{7}$$

[9]The high wage returns to private-sector training usually found in empirical studies may suggest that the impact motive plays only a minor role in investment decisions. However, a recent study by Leuven and Oosterbeek (2003) shows that a large part of the estimated returns can be attributed to unobserved heterogeneity. Controlling for the selectivity bias reduces the point estimate of the return to training from 12.5% to 0.6%. Low or zero returns to company training are also found by Leuven and Oosterbeek (2004) and several studies mentioned therein.

which always increases with S, but is independent of the return on investment and also independent of the worker's desire for impact as measured by γ. The intuition is straightforward. The equilibrium wage increases with equilibrium investment since, when the worker would leave, the firm hires a new worker and incurs investment cost S. The current worker captures part of this quasi-rent. Since a worker can be replaced immediately, his impact is the same inside and outside the firm, and equals $\overline{q}$, as in Section 2. Hence, in equilibrium, the worker derives no utility from impact, and so impact does not affect the wage. Nevertheless, as we have seen, the worker's desire for impact raises the firm's investment in worker's skills, independent of the value of ϕ; see (6). Hence, $R_S(S)$ may be less than 1, implying high investment in worker's skills, even when the worker captures much of the (quasi-)rents from the firm's investment. If the firm could commit to investment in future worker's skills, it would commit to little investment, aiming to increase the current worker's impact and hence reduce the wage it pays the current worker.

5 Effort and incentive pay

We so far assumed that a worker's effort is exogenously fixed. In this section, we relax this assumption and examine the implications of the impact motive for optimal incentive schemes and worker's effort. As in the previous section, we consider a firm which employs a single worker whose utility is linear in income and impact. For simplicity, let a worker's cost of effort be $\frac{1}{2}\theta e^2$. Effort e generates output e, sold at unit price p. To save space, we also abstract from household production ($\overline{q} = 0$). We distinguish two cases: noncontractible effort and contractible effort.

5.1 Noncontractible effort

When effort is noncontractible, the firm's only choice variable is the wage offer. The optimal wage offer is such that the worker's participation constraint is just met, as in Section 3. The worker chooses effort. The worker's impact is

$$I(e) = (1-\phi)\, pe + \phi\, |pe - Epe_o|\,,$$

where Ee_o is the expected level of effort by the replacement worker. With probability $(1-\phi)$, the worker is not replaced and his impact equals the value of his production. With the remaining probability, the worker is replaced, and

his impact equals the expected absolute difference between his production and production of the replacing worker. The first-order condition for optimal effort is:

$$\gamma\left[(1-\phi)\,p+\phi p\frac{pe-Epe_o}{|pe-Epe_o|}\right]-\theta e=0,$$

where $e \neq Ee_o$. Note that when $\phi = 0$, optimal effort is $e = \frac{\gamma}{\theta}p$. Hence, though the firm does not reward the worker for effort, the worker optimally chooses positive effort, as it increases his utility from impact. For any $\phi > 0$, the first-order condition yields two local maxima:

$$e_h^* = \frac{\gamma}{\theta}p \text{ and } e_l^* = \frac{\gamma\,(1-2\phi)}{\theta}p.$$

Suppose first that $\phi \leq 1/2$, so that both local maxima imply positive effort. Clearly, the Nash equilibrium cannot have a unique value of optimal effort. If one of the effort levels would be strictly optimal for the current worker, it will also be for the worker who would replace him, reducing a worker's impact to zero, and violating the requirement that $e \neq Ee_o$. An equilibrium must instead have mixed strategies. For this, the worker must be indifferent between choosing high effort and low effort. That is,

$$\begin{aligned} &w+\gamma\left[(1-\phi)\,pe_h^*+\phi\,(pe_h^*-Epe_o)\right]-\frac{1}{2}\theta e_h^{*2}= \\ &w+\gamma\left[(1-\phi)\,pe_l^*+\phi\,(Epe_o-pe_l^*)\right]-\frac{1}{2}\theta e_l^{*2}. \end{aligned} \tag{8}$$

Let z be the probability with which the replacing worker exerts e_h^*. Consequently:

$$Epe_o=(1-z)\,pe_l^*+zpe_h^*.$$

Substituting this and the values of e_h^* and e_l^* into (8) yields

$$z = 1/2.$$

The symmetric Nash equilibrium therefore has workers mix with equal probability on e_h^* and e_l^*. (Of course, the equilibrium need not have any one worker use mixed strategies, but rather can have half the population of potential workers choose one level of effort, and the other half the other level.) Similarly, it follows that when $\phi > 1/2$, and so e_l^* must be zero, in equilibrium the worker chooses e_h^* with probability

$$z=\frac{1}{4\phi},$$

and with the remaining probability exerts no effort.

The wage the firm must offer follows from the worker's participation constraint $U \geq \overline{U}$:

$$\begin{aligned} \text{if } \phi &\leq 1/2 \text{ then } w = \overline{U} - \frac{1}{2}\frac{\left[1 - 2\phi\left(1-\phi\right)\right]p^2\gamma^2}{\theta} \\ \text{if } \phi &> 1/2 \text{ then } w = \overline{U} - \frac{1}{4}\frac{\gamma^2 p^2}{\theta} \end{aligned}$$

Clearly, the wage decreases with how much workers care about impact (γ) and increases with the cost of effort (θ) and the outside option utility ($\overline{U}$). For $0 \leq \phi \leq \frac{1}{2}$, the wage increases with the replacement probability (ϕ), as higher replacement implies less opportunity to make an impact. A higher price of the product implies greater impact at given effort and so reduces the wage.

5.2 Contractible effort

When effort is contractible, the firm can avoid inducing workers to mix on high and low effort by offering a contract that fixes effort. Then, however, a worker's utility from impact falls, and so the firm must pay a higher wage. This section examines this trade-off by comparing expected profits under two alternative contracts: one that fixes effort and one that offers a piece rate.

Consider first the fixed-effort contract. The firm maximizes profits $pe - w$ subject to the worker's participation constraint:

$$w + \gamma\left(1-\phi\right)pe - \frac{1}{2}\theta e^2 \geq \overline{U}.$$

Obviously, when the firm offers a fixed-effort contract, the worker's existence only affects output if the worker is not replaced, which happens with probability ϕ. The profit-maximizing effort level is:

$$e^* = \frac{1 + \gamma\left(1-\phi\right)}{\theta}p, \tag{9}$$

which increases with the weight attached to impact γ and the product's price p, and decreases with cost of effort θ and the replacement probability ϕ. The resulting profits are

$$\pi_{fe} = \frac{1}{2\theta}\left[1 + \gamma\left(1-\phi\right)\right]^2 p^2 - \overline{U}.$$

Consider next a piece-rate contract paying a bonus of αp per unit of output and a base salary of β. When choosing effort, the worker's utility is:

$$U = \alpha pe + \beta + \gamma \left[(1 - \phi) \, pe + \phi \left| pe - Epe_o \right| \right] - \frac{1}{2} \theta e^2.$$

The first-order condition for optimal effort yields two local maxima:

$$e_h^* = \frac{\alpha + \gamma}{\theta} p \text{ and } e_l^* = \frac{\alpha + \gamma \left(1 - 2\phi \right)}{\theta} p. \tag{10}$$

As under noncontractible effort, the equilibrium has mixed strategies, with workers mixing with equal probability on e_h^* and e_l^*.[10] Expected profits are

$$E\pi_{pr} = \frac{1}{2} \left(1 - \alpha \right) \frac{\alpha + \gamma}{\theta} p^2 + \frac{1}{2} \left(1 - \alpha \right) \frac{\alpha + \gamma \left(1 - 2\phi \right)}{\theta} p^2 - \beta$$

Maximizing with respect to α and β, subject to the worker's participation constraint $U = \overline{U}$, yields optimal $\alpha = 1$. Hence, as in a standard principal-agent model with risk-neutral agents, the firm pays the full marginal product. Note that this implies that the expected level of effort is the same under the piece-rate contract as under the fixed-effort contract. (If $\alpha = 1$, then $e^* = \frac{1}{2} e_h^* + \frac{1}{2} e_l^*$, see (9) and (10)). The resulting expected profits are

$$\pi_{pr} = \frac{1}{\theta} \left\{ \frac{1}{2} \left(1 + \gamma \right)^2 - \gamma \phi \left[1 + \left(1 - \phi \right) \gamma \right] \right\}^2 p^2 - \overline{U}.$$

It is easy to verify that if $\gamma > 0$ and $\phi > 0$, then a piece-rate contract always yields higher expected profits than does a fixed-effort contract ($\pi_{pr} > \pi_{fe}$). Hence, the firm profits from giving the worker some autonomy. The intuition follows. A fixed-effort contract limits worker's opportunity to make an impact since a worker's successor will exert the same effort as the current worker. A piece-rate contract leaves effort choice to the worker. The worker mixes on a high and a low effort level, resulting in the same expected effort level. Worker's utility is higher, however, as his expected impact is larger. The firm can therefore offer a lower wage by not specifying effort, but instead giving

[10] As we will see, if $\gamma < 1$ the restriction that $\alpha + \gamma \left(1 - 2\phi \right) > 0$ for positive e_l^* does not bind. That is, the marginal utility from impact must be smaller than the marginal utility from consumption, which seems reasonable. If $\gamma > 1$, workers mix on exerting effort e_h^* and exerting no effort, as in the previous subsection.

the worker some autonomy.[11] Desire by workers for impact may thus explain why firms leave employment contracts deliberately incomplete.[12]

6 Concluding remarks

Our model considered the desire of workers for impact, ignoring the same desire by managers or entrepreneurs. This motive is a theme in one of the most popular TV shows in the U.S., 'The Apprentice.' In the show, a wealthy businessman, Donald Trump, fires a worker each week. The pleasure he takes in saying "You're fired" is evident. And, in line with our model, he also gets the pleasure of hiring one person at the end of the show, and he clearly likes the impact he then has. Trump even enjoys firing high productivity contestants.

Such an impact motive exhibited by managers may explain several stylized facts. First, employer's desire for impact may imply a bias towards expanding the firm. This may happen when, with positive probability, the firm vanishes once the employer vanishes. Second, when the employer is replaced with positive probability, employers may mix on expanding and contracting the firm. For by doing so, the employer minimizes the probability that a successor will behave identically, and hence his existence matters for output. Employers have more opportunities to make an impact in more rigid labor markets. The reason is that laying off workers hardly affects the economy's output in very flexible labor markets as laid-off workers easily find a new job. So we may expect more volatile and higher unemployment in more rigid labor markets.

Another extension of the model would be to allow for heterogeneity in desire for impact among people. As McClelland (1987, p. 173) notes, "While all children start out enjoying having impact, some parents may strongly discourage this activity, so their child does not develop much pleasure from it or develop a good concept of how to attain pleasure in this way. Other parents may allow or even encourage the activity, so their child develops a more elaborate schematic representation of the many different ways in which he or she can get pleasure from having impact." Allowing for such

[11] Note the difference with Aghion and Tirole (1997) where authority is valued by a worker as it allows him to make his preferred choice.

[12] See Fehr et al. (2001) for an alternative explanation based on the theory of inequity aversion.

heterogeneity may raise interesting issues of sorting by workers and selection by employers.

We have defined impact as the immediate effect that a person's existence has on output. Clearly, there are other, possibly complementary concepts. In addition to the 'flow'-approach we have pursued in this paper, one could think of a person's 'stock' of impact, that is, the effect that his life has had on output. People may value knowing that the world would be a different place if they had never been born. Part of our results will also hold under this definition of impact. Others may not. Lastly, one might revise the definition of impact to the effect a person has on other people's lives, rather than on output.

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