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Άρθρα - Articles

The Political Economy of Incentive Contracts: The Role of Social Identities

by

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In this paper, we show a connection between the Barnard-Simon (Simon(1991)) view of employee identification within the firm and recent work of Akerlof and Kranton (2000) on the psychology of identity. The connection is demonstrated with an example: (a discrete version of) Holmstrom's result regarding the impossibility of attaining the first-best with incentive-compatible, budget-balancing contracts holds in a smaller subset of the parameter space when we allow for identity formation in the sense of Akerlof and Kranton (2000).

The construction of contracts which provide incentives to individuals working within a firm to put in maximum effort is one on which there is a vast literature. Even within hierarchical firms where managers or supervisors are responsible for monitoring individuals' actions, the amount of effort expended is rarely observable directly. Rather what managers/supervisors observe is outputs rather than inputs, but of course the output can easily be affected by exogenous random factors beyond the control of the individual worker such as general economic conditions. A further complication occurs when people work in teams since in this case output depends on the effort levels of all members of the team thus creating possible free rider problems. This interdependence operates in the same way as the exogenous random factors, making it difficult for supervisors or managers to assess individual effort and design contracts that will ensure that the appropriate level of effort is expended (see Dutta and Radner, 1994 for a review of the literature in this area).

Holmstrom (1982) shows that, when individual effort levels are unobservable, but total output is observable, the first-best outcome cannot be

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obtained with incentive-compatible, ex-post credible (budget-balancing) contracts. First-best outcomes can be obtained by forcing contracts, that is contracts which prescribe destruction of output whenever output levels are suboptimal. Eswaran and Kotwal (1984) showed that the ex-post credibility problem persists even if the firm does not destroy output, but is legally bound to offer the difference between optimal and actual output (the surplus) to a player outside the firm (the owner). By offering a bribe to one member of the team, the owner can generate a suboptimal output, and thus appropriate the surplus. Members of the team are likely to foresee this and hence refuse to accept the contract.

In a recent contribution, Akerlof and Kranton (2000) discuss the role of identity in shaping economic outcomes. They argue that the inclusion of identity in a person's utility function can help to explain behavior which is usually inexplicable in mainstream economic models. By identity they mean the tendency agents in an economy have to identify with particular social categories, each of which has its own norms of behavior. A violation of these norms causes a loss both for the individual who has not conformed to the norms of his/her category and also for others in the same social category. More formally, the utility of an individual j is a function of self image (that is the extent to which j conforms with the norms of his/her category), the actions of j and the actions of others. Akerlof and Kranton (2000) use these ideas in order to shed light on issues such as gender and employment, poverty and social exclusion and the household division of labour. Our contribution in this paper is to determine the extent to which issues of identity can help to solve the problems of designing contracts for teams of workers in order to generate incentives for appropriate levels of effort.

In section 1 we consider a simplified version of Holmstrom's team production model where we show that it is only possible to design a contract which will produce the Pareto optimal outcome if the disutility of effort is sufficiently small. In section 2, we consider an extension of the team production model which allows for members of the team to identify with each other and the goals of the team. The effect of adding identity makes it more likely that we can find an incentive contract which induces the players to choose first-best effort levels. This suggests that contracts designed with identity considerations in mind could play a role in helping to alleviate otherwise intractable incentive problems, exactly as in the Barnard-Simon view.

1. The basic Holmstrom game without identities

The economy consists of two players A and B, and two goods, consumption and leisure. Each player $i = A, B$ can choose whether to put in effort ($e_i = 1$) or not ($e_i = 0$). Preferences for consumption c_i vs. leisure $1-e_i$ are described by the utility functions:

$$u_i = c_i - de_i, \quad 0 < d < 1$$

where d is a parameter measuring the disutility of labor, and c_i is a continuous nonnegative variable. The production function depends on the effort of both players and is given by:

$$q = e_A + e_B$$

First best Pareto efficient points

Assuming that the values of all variables are observable to all, the points that exhaust the gains from trade in this economy are the solutions of the following maximization problem:

$$\begin{aligned} \max \; & u_A = c_A - de_A \\ \text{subject to } \; & u_B = c_B - de_B \geq \dot{u}_B \\ & c_A + c_B = e_A + e_B, \quad e_i = 0, 1, \quad c_i \geq 0 \end{aligned}$$

The solution to this problem is:

$$e_i = 1, \quad c_A + c_B = 2, \quad c_B = \dot{u}_B + d, \quad c_A = 2 - d - \dot{u}_B$$

The utility levels corresponding to this solution are $u_B = \dot{u}_B$, $u_A = 2(1-d) - \dot{u}_B$, that is B gets his/her reservation utility while A gets the remainder. The Pareto frontier is therefore $u_A + u_B = 2(1-d)$, $-d \leq u_B \leq 2(1-d)$.

Contracts when effort levels are unobservable

Suppose now that effort levels e_i are unobservable, while total output q is observable (this is the problem of hidden action and the fact that output is jointly produced by the team of two players). Can we design contracts $c_i = w_i(q)$ that motivate players to choose the first-best outcome (1,1)? We consider only contracts that are ex-post credible, namely contracts that always satisfy the following constraint which implies that everything which is produced is shared out $w_A(q) + w_B(q) = q$.

Contracts define the following game between the two players:

$$u_A(e_A, e_B) = w_A(e_A + e_B) - de_A$$
$$u_B(e_A, e_B) = e_A + e_B - w_A(e_A + e_B) - de_B$$

The utility of each player depends on both their effort levels since these determine total output, hence wages.

The contracts that ensure maximum effort from both players (1, 1) the Nash equilibrium of this game satisfy:

$$u_A(1,1) \geq u_A(0,1), \text{ ie } w_A(2) - d \geq w_A(1)$$
$$u_B(1,1) \geq u_B(1,0), \text{ ie } 2 - w_A(2) - d \geq 1 - w_A(1)$$

Combining these two equations we obtain a condition for the intensity of incentives that is necessary and sufficient for (1,1) to be a Nash equilibrium:

$$d \leq w_A(2) - w_A(1) \leq 1 - d \qquad (1)$$

Equation (1) states that in order for player A to put in maximum effort, the disutility of effort (d) must be less than the increase in the wage that player A gets when he/she puts in effort ($w_A(2)$) than when he/she does not ($w_A(1)$). Note that (1) can only be satisfied if $d \leq 0.5$, that is if the marginal disutility of labour is sufficiently small.

In what follows we concentrate on the case where $0.5 < d < 1$, i.e. the case in which the first-best is unattainable with ex-post credible contracts. As a final preparatory step, we compute the contracts that make each of the remaining three action combinations, namely (0,1) (1,0), (0,0) into Nash equilibria.

- (0, 0) is Nash if contracts satisfy

$$1 - d \leq w_A(1) \leq 1 - d$$

- (0, 1) is Nash if contracts satisfy

$$w_A(2) \leq w_A(1) + d, \quad w_A(1) \leq 1 - d$$

- (1, 0) is Nash if contracts satisfy

$$w_A(1) \geq d, w_A(2) \geq w_A(1) + d$$

2. The game with identities

Akerlof and Kranton (2000) argue that there are four ways in which identity can influence economic outcomes. First, people's actions have payoffs which are related to their own identities. For example, a person taking on a job which is not deemed to be appropriate for their gender (eg female marine, male nurse) may require that person to suppress certain elements of their identity simply because they are moving outside the social norms associated with that identity. Thus a female marine may be thought to lack tenderness, a characteristic which society associates with women. Such considerations can help to explain why some jobs are dominated by either males or females. Of course, such identities are not necessary cast in stone. The women's movement has done much to change society's views and reduce the extent to which jobs are considered gender-specific.

The second way in which identity might enter into a person's utility function is through the idea that other peoples' actions generate payoffs associated with identity. Thus, for example, a women in a "man's job" can generate a cost for the man in that it challenges his notions of identity; it may also challenge other women's notions of their identity in that one of their sex is seen to be doing something inappropriate. This can help to explain the fact that men often act aggressively to women who they see as encroaching on their ground or indeed why some women are ostracized by other women for the stance they have taken (this represents a form of retaliation in order to recapture threatened or lost identity).

Third, people can in some cases choose their identities, but choice is often limited. For example, those outside the dominant group in a society (on, for example, ground of race of class) may find it difficult to integrate (often they talk of loss of own identity in an attempt to become part of the dominant group). They may also make what seems to others as bad economic decisions or engage in self-destructive behavior as a means of establishing their own identity (e.g. drug taking, joining a gang). Akerlof and Kranton argue that it is such considerations of identity which may lie behind the significance of dummy variables for race or class in regressions explaining poverty or social exclusion, even when other socioeconomic factors have been taken into account.

Finally, it is also possible to consider that social categories (identities) and the norms associated with them can be created and manipulated by advertising or politicians. Hence we cannot take identities and the norms associated with them as given.

What the implications of such considerations about identity for the Holmstrom model? We augment the basic Holmstrom game with Akerlof-Kranton type preferences where individuals identify with a particular category associated with the existence of the team (or organization). For each category there is a prescribed behavior and a loss associated either with an individual's own violation of that behavior of with another member of the group's violation of that behavior. The new payoff functions are:

$u_A = w_A(e_A + e_B) - de_A$

$-ce_A$ cost of retaliating against B

$-lx_B$ cost of B^s retaliation against A

$-t_A(1-e_A)I_S$ loss of identity due to own violation of own identity

$-t_A(1-e_B)I_O$ loss of identity due to B^s violation of A^s norm

$+x_At_A(1-e_B)I_O$ restauration of A^s identity as a result of retaliation

Similarly, the payoff function of B is:

$u_A = e_A + e_B - w_A(e_A + e_B) - de_B$

$-ce_B$

$-lx_A$

$-t_B(1-e_B)I_S$

$-t_B(1-e_A)I_O$

$+x_Bt_B(1-e_A)I_O$

The Akerlof-Kranton game is played in two stages. In the first stage, each player i chooses an identity t_i, i.e. in our case he/she chooses either to identify with the organization ($t_i = 1$), or to be indifferent to it ($t_i = 0$). In the first stage, each player i also chooses his effort level e_i. In the second stage, each player i chooses whether to retaliate ($x_i = 1$) or not ($x_i = 0$), with full knowledge of the first stage decisions e_A, e_B, t_A, t_B.

The new payoff functions describe the psychology of identity according to Akerlof and Kranton. If A chooses to be indifferent to the goals of the organization ($t_A = 0$), then he/she does not suffer a loss of identity when he/she or others shirk. On the other hand, if A chooses to identify with the goals of the organization ($t_A = 1$), then he/she suffers a loss of identity I_S if he/she shirks, and a loss of identity I_O if others shirk. Loss of identity due to others shirking can be recovered by retaliating against shirkers. Retaliation is personally costly to its instigator, and imposes a cost on those on whom it is inflicted.

We assume that all new parameters, namely l, c, I_S and I_O, are positive but sufficiently small to ensure that $e_A = e_B = 1$ is still part of any Pareto efficient allocation. Our task now is to compute contracts that make the choices $e_i = t_i = 1$, a Nash equilibrium of the Akerlof-Kranton game even in the case $d > 0.5$, i.e. we want contracts that will induce players to choose the first–best outcome by motivating them to identify with the organization. We start from the second stage, where the optimal retaliation decisions of each player are:

$$x_A = 1 \quad \text{if} \quad c \leq t_A(1 - e_B)I_O$$
$$x_B = 1 \quad \text{if} \quad c \leq t_B(1 - e_A)I_O$$

We will assume that $c < I_O$, so that retaliation can sometimes be the optimal choice.

In the first stage of the game, the players consider the second-stage decision rules just described as constraints. We want the action combination $(e_A, t_A, e_B, t_B) = (1, 1, 1, 1)$ to be a Nash equilibrium of the Akerlof-Kranton game. This translates into the following inequalities:

$$\begin{aligned} u_A(1,1,1,1) = w_A(2) - d &\geq u_A(1,0,1,1) = w_A(2) - d \\ &\geq u_A(0,1,1,1) = w_A(1) - l - Is \\ &\geq u_A(0,0,1,1) = w_A(1) - l \\ u_B(1,1,1,1) = 2 - w_A(2) - d &\geq u_B(1,1,1,0) = 2 - w_A(2) - d \\ &\geq u_A(1,1,0,1) = 1 - w_A(1) - l - I_S \\ &\geq u_A(1,1,0,0) = 1 - w_A(1) - l \end{aligned}$$

Note that it is only the third constraint for each player that is imposes any restrictions on the contracts. Combining these, we obtain:

$$d - l \leq w_A(2) - w_A(1) \leq 1 - d + l \qquad (2)$$

Note that this implies $d \leq 0.5 + l$. Hence, by assuming the possibility of identifying with organizational goals, we can extend the range of cases for which it is possible to achieve the first best from $d \leq 0.5$ to $d \leq 0.5 + l$.

3. Conclusions

In this paper we have shown that the addition of identity in the Akerlof-Kranton sense can make it easier to find incentive contracts which allow the first-best outcome to be achieved and effort levels to be efficient. The extension to the Homstrom model explains why individuals working within a team often exhibit less of a tendency to shirk than is predicted by models which ignore questions of identity. Such considerations of identity may also prove useful in other models of moral hazard problems within teams where it proves difficult to find contracts which motivate players to put in the appropriate levels of effort.

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