Rewarding my Self. Self Esteem, Self Determination and Motivations

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Summary

Abstract

The paper presents a model where the self esteem and the self determination mechanisms are explicitly modelled in order to explain how they affect the intrinsic motivation and its impact on individual choices. The aim is to reconcile different explanations (and consequences) of the motivation crowding theory in a unique theoretical framework where the locus of control is introduced in a one period maximisation problem and the intrinsic motivation is assumed as an exogenous psychological attitude. The analysis is based on the different effect of the self esteem mechanism on intrinsic motivation input oriented or output oriented. Results show that crowding out of intrinsic motivation depends on the self determination sensitivity and the individual belief about one's own self.

Keywords: intrinsic motivation, crowding out, self-esteem, self-determination.

JEL: D11, D64, J22.

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1. INTRODUCTION

In psychology motivation is defined as a dynamic factor that directs behaviour toward an objective. According to Geen (1994), motivation refers to the initiation, direction, intensity and persistence of human behaviour. The extrinsic motivation operates when someone engages in a particular behaviour for purposes that are extrinsic to the behaviour itself, such as to receive praise, awards, good reviews or to avoid unpleasant situations, such as a punishment. In Deci et al. 2008 (p. 12) behaviour motivated by extrinsic motivation 'entails doing an activity because it leads to some outcome that is operationally separable from the activity itself. That is, extrinsic motivation concerns activities enacted because they are instrumental rather than because one finds the actions satisfying in their own right'. Intrinsic motivation, instead, operates when someone engages in behaviour because he finds the activity challenging and rewarding in itself, and gets satisfaction in enhancing his competence in that specific task.

Economic literature has devoted some attention to the effect of intrinsic motivation on the performance of workers and students, to study the crowding out effect of pecuniary incentives (extrinsic motivations). Two effects of increasing rewards can be distinguished: a relative price effect, that increases the supply of effort in the activity by lowering the opportunity cost of doing it; a crowding-out effect, which reduces the supply of effort by undermining the marginal utility deriving from the activity (Frey and Goette, 1999). Frey and Jegen (2001) have formalised the crowding out effect in the Motivation crowding theory, but they didn't explain why derivatives representing crowding effects could differ from one person to another and from one situation to another (Harvey, 2005). Much empirical evidence on the perverse effects of rewards is available: crowding out effects have been detected in supplying working effort (Barkema, 1995), in reciprocating behaviour (Fehr and Gachter, 2000; Bruni et al., 2009), and in situations where trust (Bohnet, Frey and Huck, 2001) or 'other regarding' feelings are involved (Frohlich and Oppenheimer, 1998)[1].

[1] See Frey and Jegen (2001) for a review of empirical studies on crowding out effects.

Many authors have stressed the relation between the crowding effect of rewards and the perceived control effect. Frey and Jegen (2001) identify two psychological processes that affect intrinsic motivations: impaired self determination and impaired self esteem. Benabou and Tyrole (2003) use the 'looking glass self' (Cooley, 1902) to show that an agent takes the principal's perspective in order to learn about himself. For the authors, the incentives enhance engaging an activity only if they reveal hidden information to the agent, about the task or the agent's talent, enhancing his confidence about himself. They stress that 'before worrying about the negative impact of rewards, one should first check that the reward provider has private information about the task or the agent's talent' (Benabou and Tirole, 2003, p.505). An asymmetric information framework is also in Sliwka model (2007), where explanation of crowding out is explicitly 'distinct from those proposed by psychologist', and is based on the learning of the prevailing social norm, emerging from the incentive scheme proposed by the principal.

In this general framework, the paper aims to reconcile different explanations (and consequences) of the motivation crowding theory in a unique theoretical framework, based on the relation between motivations and goals and taking into account the self esteem and the self determination mechanisms. A distinction between different goals of intrinsic motivation is introduced. Intrinsic motivation is *input oriented* if it is not directed toward the output dimension of the activity. On the other hand, when the goal of intrinsic motivation is the output of the activity the intrinsic motivation is *output oriented*. The distinction is relevant because of the different role of self esteem and self determination mechanisms. The self determination concerns autonomy and competence of individual effort and affects the input dimension of intrinsic motivation. Self esteem arises from the comparison between results (real self) and expectations (ideal self) and affects the output dimension of intrinsic motivation. It plays a role only when the intrinsic motivation is *output oriented,* whereas it is not relevant when an activity is engaged just for the pleasure to perform the activity itself and the agent doesn't care about the results of his performance. To explicitly model the self esteem and self determination mechanisms, the locus of control is introduced in a one period maximisation problem. Throughout the model the intrinsic

motivation is assumed as an exogenous psychological attitude that can be more or less highlighted in economic behaviour. Differently from some previous models, which will be discussed throughout the paper, intrinsic motivation is not a matter of economic choice where individuals choose to behave as intrinsic (altruistic) or extrinsic (selfish), according to the best payoff they can afford.

The paper is organised as follows. In the following section the economic approach to intrinsic motivation and the relation between intrinsic motivation and goals will be discussed. In Section 3 the role of self esteem, self determination and locus of control in motivation crowding out are examined. Sections 4, 5, 6 and 7 show the hypotheses and the results of the model for the different goals of human behaviour. Some concluding remarks are in Section 8.

2. MOTIVATIONS AND GOALS

The distinction between intrinsic and extrinsic motivations is based on the relation between motivation and the activity performed and/or the individual. Starting from the idea that motivation is a factor that activates and directs human behaviour, one can easily classify economic incentives in the category of extrinsic motivations, because they are exogenous both to the activity and to the individual.

On the contrary, any motivation that is endogenous to the individual and/or to his behaviour is intrinsic. When motivation is not provided by someone else, is formalised into a feeling and/or is strictly linked to the activity performed, it is intrinsic. The effect of the intrinsic motivation is easy to recognize when economic theory predicts a very different behaviour: volunteering with a zero wage is an example[2]. Nevertheless, in many other cases it is difficult to 'differentiate between different sources of motivation, which in the economic view are just manifestations of underlying preferences (for the task itself, or for the reward that is associated with performing the task)' (Frey and Jegen, 2001, p.591). The authors underline that between the two polar cases of purely extrinsically and purely intrinsically induced individuals there is a continuous of combination of the two motivations. To better explain how intrinsic and extrinsic motivations compete in behaviour orientation it is useful to consider the effect of

[2] See Bruno and Fiorillo (2009) for a theoretical model and an empirical investigation of intrinsic motivation role in volunteering.

more than one goal at a time, as suggested by Lindenberg (2001). Meier and Stutzer (2008) identified three kinds of goals of human behaviour that become relevant if intrinsic motivation occurs. Their classification is here extended with a fourth kind of goal to include the Benabou and Tirole framework.

1) Pleasure to perform the task. Strictly following the Deci definition, 'to be intrinsically motivated means to engage in an activity because the activity itself is interesting and enjoyable' (Deci et al. 2008, p. 11). Intrinsic motivation directs behaviour toward the pleasure to do something and the opportunity to let one's own competence grow. Being linked to individual preferences and to the activity, motivation is intrinsic both to the individual and to the activity. No one else is involved.
2) Desire to succeed in performing the task. From the Benanbou and Tirole perspective, an 'agent will undertake the task only if he has sufficient confidence in his own ability to succeed' (Benabou and Tirole, 2003, p. 491). Intrinsic motivation is identified with the probability to succeed, which in turn depends on the agent's self-confidence, his ability and the difficulty of the task. It is intrinsic both to the individual and to the activity. Through the 'looking glass self', the probability to succeed could be reinforced or crowded out by a principal that, supplying an extrinsic motivation, provides information on personal ability and/or the difficulty of the task. The extrinsic motivation may be an explicit reward or a public acknowledgement.
3) The warm glow. An impure form of altruism is what Andreoni (1990) defined the warm glow, to point out that people are often 'motivated by a desire to win prestige, respect, friendship, and other social and psychological objectives' (Olson, 1965). In this respect, motivation is a feeling that needs an ex post social approval to be reinforced. Though warm glow is provided by the surrounding society, it is intrinsic to the individual and could be intrinsic to the activity.
4) Social preferences. Social preferences imply that an individual has as objective not only his welfare but the other people's welfare too (Fehr and Fischbacher, 2002) and can be interpreted as a category of intrinsic motivation: individual choices are directed by an internal emotional

goal that regards the welfare of others. Motivation is intrinsic to the individual, for it is embedded in his preferences. It could be not intrinsic to the activity.

Moving from category 1 to 4, one can observe an increasing social involvement of the individual, from pure individual gratification, to the need of being accepted at a social level, to the other regarding preferences. Moreover, in the first category the intrinsic motivation is not related to the output dimension of the activity, and the intrinsic motivation is *input oriented*. In the last three categories the objective of intrinsic motivation is the output of the activity, instead that the activity itself, and the intrinsic motivation is *output oriented*.

3. SELF ESTEEM, SELF DETERMINATION AND LOCUS OF CONTROL

The two psychological processes that are supposed to affect intrinsic motivations are impaired self determination and impaired self esteem.

The first psychological process is well described by the Self determination theory (SDT) by Deci and Ryan (2000). Cognitive evaluation theory (CET) was presented by Deci and Ryan (1985) as a sub theory within SDT that had the aim of specifying factors that explain variability in intrinsic motivation and focus on the fundamental needs for competence and autonomy. According to CET, people must not only experience competence or efficacy, they must also experience their behaviour as self determined for intrinsic motivation to be evident. Motivation crowding out occurs when a reward affects perceived self determination, while the feeling of competence will not affect intrinsic motivation unless accompanied by a sense of autonomy (Deci and Ryan, 2000, p. 70). When individuals perceive an external intervention as reducing their self determination, intrinsic motivation is substituted by external control. Following Rotter (1966), the locus of control shifts from inside to outside (Frey and Jegen, 2001, p. 594). Locus of control is a term in psychology that refers to individual beliefs about what causes the good or bad results in their life, either in general or in a specific area. It can either be internal (meaning the persons believe that they control themselves and their life) or external (meaning they believe that their environment, some higher power, or other people control their decisions and their life). Internals tend to attribute outcomes of events to their own control. Externals attribute outcomes

of events to external circumstances. Rotter (1975) cautioned that internality and externality represent two ends of a continuum, not an either/or typology. Moreover, Weiner's early work (1974) suggested that, orthogonal to the internality-externality dimension, we should also consider differences between those who attribute to stable causes, and those who attribute to unstable causes: ability (an internal stable cause), effort (an internal unstable cause), task difficulty (an external stable cause) or luck (an external, unstable cause). The self determination process is relevant in every category of intrinsic motivation goals previously discussed.

The second psychological process acts when outside intervention carries some information about personal competence or the difficulty of the task and it could be either supportive or discouraging. In the BT framework the direction of the self esteem mechanism relies on the private information of the performer, but also in a symmetric information framework, the self esteem mechanism has relevant implication for crowding out.

Self esteem, considered in a specific dimension, reflects a person's evaluation of his or her own worth in that activity, which in the definition of Branden (1969) derives from 'the experience of being competent … and being worthy of happiness'. In the older definition of James (1890) self esteem is higher when there is coincidence between real self and ideal self. While self determination is always undermined by an external intervention, the self esteem mechanism can be supportive or discouraging, depending on the individual evaluation of his worth in that activity. Therefore, also self esteem is associated to the cognitive process where an individual claims his beliefs about what causes the good or bad results in their life, that is to say the locus of control. Self esteem can be reduced by the attribution of the results to external causes if individual experiences low competence and worthiness, or supported when internal causes are highlighted. In more detail, if individuals experience results under their expectations, they feel lower self esteem because their real self appears smaller than their ideal self. In this situation, a reward shifting the locus from inside to outside by reducing the role of competence will induce lower effort. The self esteem mechanism is then discouraging. On the other hand, individuals experimenting results over their expectations feel higher self esteem because the real self appears to be

greater than their ideal self. A reward shifting the locus from inside to outside will decrease their expectation, but feeling very competent to the task and with a good self esteem, they will put more effort to counterbalance lower power against external factors. The self esteem mechanism is then supportive.

The self esteem process is important in agent choice if the intrinsic motivation is performance related, because correspondence between ideal and real self has a role only when performance have to be measured. This happens in categories 2, 3 and 4 above. The pleasure to perform the task should not be interested by this mechanism, simply because individual is not interested in his own performance.

4. INTRINSIC MOTIVATION AND GOALS: A GENERAL FRAMEWORK

Discussion about intrinsic and extrinsic motivations shows that they concern the shape of the utility function and that they direct human behaviour. Basically, depending on the different weight that intrinsic and extrinsic motivations have in individual preferences, motivations direct behaviour toward different variables combination and different goals. Because we can observe only the resulting behaviour, not the decision-making process leading to it, it is difficult to discern how the overlapping motivations act on the same variables. If different motivations address different goals, it could be useful to distinguish in the utility function between intrinsic motivated goods and extrinsic motivated goods. Take as an argument of the utility function the amount of time one spends for intrinsic motivation and the amount performed for an extrinsic one. The same can be done for market expenditures (goods). The preferences are characterised by the weight that motivations have in individual behaviour. The arguments of the utility function are consumption goods (C), which contribute to higher material welfare (I feel good because I've got many assets) and the correspondent amount (D) that impacts on the emotional well being (I feel good because I've given many gifts, donations and so on). In the same way, time can be used to reach a material purpose (by consuming pure leisure T) or an intrinsically motivated objective (Y) which provides an output without any other explicit formalisation than a feeling, like the pleasure to perform a task, the desire to succeed in performing a task, the warm glow

deriving from an activity or the others' satisfaction deriving from an activity. The motivated output Y is produced through A, that is the individual effort, measured in units of time. The specific functional relation between Y and A will describe how the motivated good (the goal) is linked to the time spent to produce it (the input). This relation depends on the specific goal individual pursues: when *input oriented* motivations are concerned, the relation between units of time and goals can be affected only by the self determination process whereas, when *output oriented* motivations occur, also the self esteem process impacts on the productivity of effort.

According to the locus of control theory, each individual has an external-internal belief on what influences his performance Y. Let us denote K the individual belief that internal variables influence Y (locus of control) so that $Y=Y(A,K)$.

Denote γ the weight intrinsic motivation has in directing individual behaviour and $1-\gamma$ the corresponding weight of extrinsic motivation, parameters describing the individual preferences. A Cobb Douglas utility function is summarised in (1).

$$U = [CT]^{1-\gamma}[Y(A,K)D]^{\gamma} \tag{1}$$

s.t.

$$T_x = T + A + L$$

$$D + C = wL + X + hwA$$

where L is labour time, w is wage, X is non labour income, T_X is the maximum available time and $0<h<1$ is the ratio of the reward for the activity A with respect to wage.

CET Theory states that intrinsic motivation is much in evidence if the individual can experience some autonomy. When individuals perceive an external intervention as reducing their self determination, intrinsic motivation is substituted by external control. To include the effect on locus of control of an external intervention represented by a reward, consider K as a function of two distinct factors: the individual inclination for internal locus k and the *control effect on self determination* represented by a reward, so that $K(h, k)$. With subscript denoting partial derivatives, the following Assumptions are formulated.

Assumption 1*:* $K_k > 0; \quad K_h < 0$.

The Assumption states that the *control effect* of increasing rewards has a negative impact on self determination and that the external intervention is always perceived as reducing self determination.

This could be not always true, but it is useful to show how motivation could be crowded in, also in the worst hypothesis. The individual inclination has a positive effect on self determination.

Assumption 2: $Y_K > 0, \quad Y_A > 0.$

The Assumption states that the individual belief that internal variables influence *Y,* i.e. self determination *K*, has a positive impact on the motivated object *Y*. Consequently, from assumption 1 derives that the individual inclination for internal locus has a positive effect on the motivated object: individuals with higher internal locus of control tend to attribute outcomes of events to their own control and feel higher self determination; this enhances the satisfaction coming from intrinsic motivated activity. On the other hand, if the *control effect* of increasing rewards has a negative impact on self determination, higher rewards will correspond to lower levels of the motivated object *Y*. Finally, more time spent in the activity increases the production of the motivated good.

Based on the previous assumption, the following explicit form for self determination will be used:

$$K = \beta(1-h)^{\alpha} \tag{2}$$

where α and β are parameters describing the sensitivity of self determination to rewards or the individual inclination for the internal locus *k*. With α=1 every reward increase reduces internal belief in the same way. If α>1 growing rewards undermine the internal locus more than proportionally. These alternatives can be discussed as different degrees of *self determination sensitivity* to rewards.

5. INTRINSIC MOTIVATION 'INPUT ORIENTED': THE PLEASURE TO DO

When intrinsic motivation concerns the pleasure to do something and the opportunity to let one's own competence grow, the individual is interested only in doing the activity and learning by it. His satisfaction does not depend on the difficulty of the task or on his ability to perform it, as it would happen if he was interested in the good result of his activity. The self esteem mechanism has no role in the pleasure resulting from an activity such as going jogging in the morning, reading a book, listening to music or having sex.

The effects of the self determination process depend on the specific activity performed and on the relation between time spent in the activity and the marginal productivity of enjoyment. If self

determination directly supports the pleasure to do something, the individual feels autonomy as a part of his pleasure (I'm pleased in doing that by myself). Autonomy is a source of enjoyment and intrinsic.

A reward offered in this situation undermines the pleasure deriving from the time spent in the motivated activity, but for any reward and any level of effort, the intrinsic motivation is not crowded out by a reward increase because the price effect makes effort cheaper and the control effect undermine pleasure but does not make effort less productive. Consider as motivated output reading books. My father gives me a reward for any hour spent in reading books. I feel my self-determination threatened, because I'd be happier reading without a reward, but the marginal pleasure deriving from reading is always the same. As a whole, taking into account that with a higher reward I can purchase more books, I'll spend more time reading books.

If self determination supports the efficacy of effort in doing something (the marginal productivity of effort), individual experiences competence or efficacy as self determined and they grow with self determination (I'm pleased in doing that and I'm able to do it by myself). The marginal pleasure of effort increases with self determination. Crowding out could emerge depending on the sensitivity of self determination to reward variations (the value of α) because the price effect makes effort cheaper but, at the same time, the control effect make it less productive and the two effects conflict. Consider as motivated output having sex with someone. What effect will payment have for every appointment? If I feel that my self-determination is threatened, it is reasonable that my marginal pleasure in each appointment is lessened because I feel that my efficacy is not self determined. Than, it could happen that I'll reduce my appointments when a very high reward is offered.

The second definition is closer to the CET theory, whereas the first one is closer to some features of the 'enjoyment' described by Lindenberg (2001). Different sensitivity of self determination to rewards determine the direction of the crowding.

6. INTRINSIC MOTIVATION 'OUTPUT ORIENTED': THE PROBABILITY TO SUCCEED

If the individual is intrinsically motivated to succeed in performing a task, the intrinsic motivation is *output oriented* and the motivated good is the probability to succeed. The probability to succeed is considered a subjective estimate of the probability of an event (Kahneman and Tversky, 1972), based on the locus of control. Individual beliefs about what causes the good or bad results, i.e. the locus of control, is formalised through the expectation about the functional relation determining *Y*: it is a function of internal variables if it depends on ability (*S*), an internal stable cause, and time devoted to the activity (*A*), an internal unstable cause; on the other hand, the variables determining *Y* are external if the functional relation is Y*(θ, σ)*, where *θ* represents task simplicity (stable) and *σ* good luck (unstable). Each variable has a positive effect on *Y*. Therefore, the motivated good is an expected value *E(Y)*, based on the individual belief *K* that internal variables influence *Y*.

$$E(Y) = KAS + (1-K)\sigma\theta \tag{3}$$

where to simplify algebra $Y(\theta, \sigma) = \theta\sigma$ and $Y(S,A) = SA$.

When motivation is *output oriented* the self esteem mechanism comes into evidence in shaping utility. Individuals feel high self esteem if they experience a real self greater than their ideal self. Here, the ideal self is the expected result, whereas the real self is the ex post result of individual effort *Y(S,A)*. When the individual chooses an optimal level of effort corresponding to an ideal self smaller than the result really affordable by exerting that level of effort (the real self), then:

$$KA^*S + (1-K)\sigma\theta < A^*S \quad \rightarrow \quad A^*S > \sigma\theta \tag{4}$$

while if the individual experiences a real self lower than the ideal self:

$$KA^*S + (1-K)\sigma\theta > A^*S \quad \rightarrow \quad A^*S < \sigma\theta \tag{5}$$

With the introduction of a monetary incentive, individuals perceive an external intervention reducing their self determination. As a consequence of the external intervention, the expectation about what causes good or bad results changes. Individual feels lower self determination and attributes his performance to external factors more than to internal factors. The control effect of the reward increases the perceived importance of luck and task simplicity, whereas the role of effort and ability decreases. The overall effect on the expected result (the ideal self) will depend on the relation between

internal and external variables. The reaction to a higher feeling of incompetence (or lower self determination) could be a lower or higher effort, depending on how self esteem works.

Consider first an expected self lower than the real self, as in (4). By experiencing results beyond expectations, the individual feels increasing self-esteem. A reward shifting the locus from inside to outside will further decrease the probability to succeed[3] and the corresponding ideal self, making more evident the positive experience of self esteem. The self esteem mechanism is then supportive.

On the other hand, the self esteem mechanism is discouraging, when the weight of internal variables is lower than that of the external ones and the ideal self is greater than the real self, as in (5). In this situation individuals experience decreasing self esteem. A reward, shifting the locus from inside to outside, will increase their expectation[4], confirming that their competence and their effort are not important in determining results. The self esteem mechanism is then discouraging.

The effect of the simultaneous action of self esteem and self determination on the optimal amount of time spent in the activity depends on the relative contribution of internal/external variables.

Proposition 1:

When intrinsic motivation is directed toward the probability to succeed in a specific task, motivation crowding in will occur when the individual has high motivation, high potential income and high competence. The crowding in condition, by using the explicit form of *K* in (2), is

$$\frac{A_0}{B} > \frac{\alpha}{\beta}(1-h)^{1-\alpha} \qquad (6)$$

where $A_0 = \frac{\gamma(wT_x + X)}{2w}$ is the effort at zero reward, and $B = \frac{\sigma\theta}{S}\left(1 - \frac{\gamma}{2}\right)$.

Proof: see Appendix.

The relative contribution of internal/external variables is a key factor in determining crowding direction because it describes the proportion between the individual contribution to the probability (the time he would spend in the activity without locus and productivity implications) and the contribution of external variables. A highly motivated individual, with high competence in the task and high potential

[3] The derivative of *E(Y)* with respect to *K* is positive if $AS > \sigma\theta$.

[4] The derivative of *E(Y)* with respect to *K* is negative if $AS < \sigma\theta$.

income, would resist to the undermining effect of rewards better than someone with low levels of competence, motivation and income. On the other hand, an individual could be more easily crowded out in a simpler task or in a lucky situation than when the activity is very difficult or unlucky conditions occur. The rationale for this is in the self esteem mechanism. In a difficult task, the agent chooses a higher effort[5] and has a lower expectation of success. An increase of self esteem will come back by comparing expectations and results. The reward will be supportive in an unlucky or difficult task because, by shifting the locus from inside to outside, it further reduces the expectation, enhancing effort. A reward offered in a very simply task, instead, is perceived as discouraging if it is not proportional to the task; the agent who expects easy situations puts lower effort and has higher expectations. The results are more frequently below his expectations. A growing reward further decreases the role of competence he perceives and effort is reduced.

In this perspective, the Benabou and Tyrole framework gives further implications if two conditions for crowding out occur, that is when 'the agent is less knowledgeable in some dimensions than the principal' and 'the principal must be more inclined to offer a reward when the agent has limited ability or the task is unattractive' (Benabou and Tyrole, 2003, p.492). In the present framework, crowding out may occur also with symmetric information, and the principal's preferences have no role. Uncertainty works through the individual locus of control and the crowding out emerges if the locus decreases with external intervention.

Consider for instance the goals of a researcher. If he is output oriented, he cares about the probability of success of his research and is interested in the probability of publication. His goal is a good and successful research. The publication in a top journal is a very difficult task, with low probability to succeed. Two researchers with the same ability and motivation, but different locus of control, can react differently to a positive and quick review (a high reward). Assume that researcher 1 is an internal type and that he attributes the outcomes of the submission to his own effort, whereas researcher 2 thinks that acceptation depends on external circumstances, such as research networks, the choice of fashionable issues or less risky results. In a very difficult task, the internal researcher will exert a great

[5] The derivative of optimal effort with respect to external variables is negative.

bulk of effort in the research (suppose $A^*S > \sigma\theta$), whereas for the other researcher $A^*S < \sigma\theta$. The quick and positive review will have different effects on their future research effort. The internal researcher 1, testing a real self greater than his ideal self, feels a supportive enhancement of self esteem and he will increase his research effort because he trusts in his effort and competence. Researcher 2, who is further convinced by the reward that publication is a matter of luck, will lower his effort because the reward, shifting the locus from inside to outside, confirms that his competence is not so important in determining results.

The self determination sensitivity plays an important role in the relation between crowding out and the size of the reward. Consider the simplest form of *K* with $\beta=1$.

The $a=1$ hypothesis implies that a growing reward reduces internal belief proportionally. For $A_0 > B$, the individual will be always crowded in, because supportive self esteem always offsets a lower self determination, while the crowding out will occur if the opposite is verified, because self esteem and self determination have the same direction. When $A_0 = B$, the agent always exerts the level of effort corresponding to no reward, because the self esteem support exactly counterbalances the undermined self determination. Therefore, the crowding direction strictly depends on the value of A_0 (the effort without reward) and its relation with external factors, that is on the self esteem mechanism. The exogenous variables (psychological and economic) univocally determine the crowding direction and the size of reward is irrelevant.

To illustrate these results, let's come back to the two researchers and their publications. In the hypothesis of constant self determination sensitivity, the researcher will react in the same way regardless the journal accepting the paper. A highly motivated researcher chooses a high level of effort before receiving any reward ($A_0 > B$). A positive review, whatever journal will make it, will enhance his effort. The researcher poorly motivated (or low skilled) will reduce his effort after the publication because the reward will lessen his belief about the relevance of internal factors as effort and skill.

For the same self determination sensitivity ($a=1$) and $\beta=k$, the right hand side of crowding condition becomes equal to $1/k$. This combination of hypothesis allows us to deeply discuss the influence of

psychological attitudes on motivation crowding. Consider the combinations of locus of control and intrinsic motivation that allow respectively the crowding out or the crowding in situations. Couples of γ and k that ensure a stable value of A are described by the following equation.

$$k = \frac{w(2-\gamma)\sigma\theta}{\gamma(wT_x + X)S} \tag{7}$$

that is decreasing in γ.

With increasing rewards, individuals with high intrinsic motivation reduce time in intrinsic motivated activity if their natural locus of control k is relatively low. They easily perceive that reward attempts to their autonomy, because they are not self determined and they attribute outcomes of events to external circumstances: a growing reward, that is external, intensifies this attribution. On the contrary, internals will intensify effort in the activity with increasing rewards, also with lower intrinsic motivation, because they are highly confident in their own ability and they perceive growing rewards as an assessment of it.

On the other hand, highly motivated individuals will be always crowded in, unless of a low locus of control. They give much weight to intrinsic motivated production, independently from the factors determining it. The highly motivated individual faces an increasing reward as an enlargement of his income possibility to consume it. In the two researchers' example this situation corresponds to two researchers with the same ability and locus, but with different motivation. The highly motivated researcher will increase his research effort because the published paper enlarges his research possibilities, making them more reliable. The low motivated researcher will be discouraged by the easy result and will lower his effort because he is not really interested in research.

Finally, the hypothesis that self determination sensitivity implies growing reduction of locus can be discussed ($a>1$). Consider $a=1/k$ and $\beta=1$. The crowding condition is expressed by

$$\frac{A_0}{B} > \frac{1}{k}\left(\frac{1}{1-h}\right)^{\frac{1-k}{k}} \tag{8}$$

When the self determination sensitivity implies growing reduction of locus, the appearance of crowding out depends both on the size of the reward and on the ratio between internal and external variables,

reflecting the self esteem mechanism. Higher individual inclination for internal locus will make the individual more resistant to the undermining effects of rewards, and higher intrinsic motivation will do the same. The crowding out would occur, when lower rewards are offered, also for low potential income individuals or when activity entails easy task, depending on the relative strength of locus and intrinsic motivation.

7. INTRINSIC MOTIVATION 'OUTPUT ORIENTED': THE PRINCIPAL'S PAYOFF

As discussed above, psychological literature suggests that motivation crowding out occurs when a reward affects perceived self determination. The perception of external intervention (K) has been expressed as a function of the size of reward, while the individual psychological characteristic is represented by the individual locus of control (k). Other conditions may alter the perception intensity of external intervention. Harvey (2005) showed that extrinsic rewards might be perceived as controlling if two conditions occur: a large size of the reward and the coincidence between the object of an agent's intrinsic motivation and the source of his rewards. The first condition has been discussed above, while the second needs a slight modification of the objective of intrinsic motivation.

In the proposed classification of goals, social preferences can be interpreted as a category of intrinsic motivation if an individual has as objective not only his welfare but the other's welfare too. If the other's welfare is the source of intrinsic motivation, utility will be a direct function of the other's utility.

$$U = (CT)^{1-\gamma}(U_o D)^{\gamma} \tag{9}$$

where U_0 is the other's utility. The condition described by Harvey is a special case of intrinsic motivation induced by social preferences, where U_0 is the principal's profit. The social preferences framework has been modelled also by Sliwka (2007), with selfish agents compared with fair agents, who care for the principal's payoff, and conformist agents, who behave alternatively as selfish or fair, depending on how the largest fraction of population behave. Asymmetric information is assumed about the type of the agent and the distribution of types in the population. A social preferences hypothesis is also in Bolle and Otto (2010), where a linear relation between individual utility and others' utility is

assumed. The intrinsic motivation to the other's welfare depends on the value of the good the other receives and not on the good itself: the individual estimation of this value is assumed higher than the signal he learns from the reward and the crowding out could occur if the signal is too low.

When the agent cares about other's utility, the intrinsic motivation is directed toward the result of the activity. The agent has an expectation about his performance based on the personal belief about the functional relation determining his principal's payoff. U_0 is a function of internal variables if it depends on ability and time devoted to the activity, minus the reward the agent perceives. On the other side, the variables determining U_0 are external if the principal's profit depends on task simplicity and good luck.

The principal's payoff is described in (10):

$$U_0 = K(AS - hwA) + (1 - K)\sigma\theta \tag{10}$$

Proposition 2:

When intrinsic motivation is directed toward the principal's payoff, the crowding in condition, by using the explicit form of K in (2), with $a=1$ and $\beta=1$, is

$$\frac{A_0}{B} > \frac{(S - h^2 w)S}{[S - wh]^2} \tag{11}$$

Proof: see Appendix.

Compared with the probability to succeed hypothesis, with a constant self determination sensitivity, an internal highly motivated, that would be crowded in for any reward, will be still crowded in with very low rewards. But with growing control, the agent who has a stake in principal's payoff will be crowded out. The explanation for an easier crowding out relies again on the self esteem mechanism. Also where the reward is perceived as supportive, because the agent experiences results over his expectations, an additional effect of reward must be taken into account. By reducing the principal's payoff, the reward acts directly on the internal variables contribution: it reduces their perceived weight, through undermined self determination, but reduces also their real weight, through a higher cost for the principal. While the expectation is reduced proportionally to the self determination parameter, the real self is reduced of the whole higher cost. Consequently, the real self (the principal's payoff) decreases

with rewards faster than the ideal self, because of the imperfect psychological perception. An individual experiencing high self esteem with low rewards, can experiment low self esteem with higher rewards because he underestimates the role of costs in profit function.

This result is quite similar to other results in the existing literature, where a higher reward is a condition for crowding out, but with a different explanation. In the Harvey (2005) framework, the perfect substitutability between intrinsic and extrinsic goals shifts choices from intrinsic to extrinsic behaviour, because individuals choose to behave 'as if' being intrinsically or extrinsically motivated according to the situation that gives a higher welfare. The size of the reward is determinant for the shift from one goal to another. In the Sliwka (2007) signalling game, the trust/control strategy of the principal is not related to the reward size and the conformist agent chooses to behave 'as if' being selfish or fair by learning the prevailing social norm. Bolle and Otto (2010) find that the reward size is relevant for crowding out because the individual estimation of the value of goods is substituted by the (lower) market signal when a reward is offered. The subjective psychological attitude toward the other is replaced by a market evaluation.

Here, individual intrinsic motivation can be more or less enlightened by the simultaneous work of self determination and self esteem mechanism, but the motivation is not ruled out by an opportunistic evaluation of benefits deriving from the motivated action. In other words, intrinsic motivation is considered as a psychological attitude of the individual, exogenous to the economic behaviour, where it can become more or less evident.

8. CONCLUDING REMARKS

Taking into account that intrinsic motivation is a psychological issue whose relevance in economics has already been addressed, the paper presents a model where some relevant psychological mechanisms are explicitly modelled in order to explain how the self esteem and the self determination mechanisms affect the intrinsic motivation. Both mechanisms are associated to the cognitive process where an individual claims his beliefs about what causes the good or bad results in his own life that is the locus of control. The self determination concerns autonomy and competence of individual effort and affects

the input dimension of intrinsic motivation. Self esteem arises from the comparison between results (real self) and expectations (ideal self) and affects the output dimension of intrinsic motivation. Therefore, the analysis is based on the different effect of the self esteem mechanism on intrinsic motivation *input oriented* or *output oriented.*

The intrinsic motivation is *input oriented* when it is not related to the output dimension of the activity. In this situation, motivation cannot be affected by impaired self esteem. If an activity is engaged just for the pleasure to perform the activity itself, the agent doesn't care about the results of his performance. The effects of rewards on motivation depend on how the self determination sensitivity affects the marginal productivity of pleasure, that is when self determination enlightens the role of intrinsic motivation by putting in evidence individual competence. This implication is coherent with the statement of cognitive evaluation theory about the need for competence and autonomy for intrinsic motivation to be in evidence.

When the agent is motivated to succeed in performing a task, he is *output oriented* and the self esteem effect must be taken into account. With constant self determination sensitivity, the crowding out could emerge if the individual experiences very low self esteem but the crowding direction does not depend on the size of the reward. The exogenous variables (psychological and economic) univocally determine the crowding direction. When growing self determination sensitivity is assumed, also the reward size determines crowding direction.

Finally, when the individual is motivated to pursue the principal's payoff, more occasions for crowding out of intrinsic motivation may occur because of the imperfect estimation of the cost effect on principal's profit, that progressively undermines his self esteem.

Throughout the model, the intrinsic motivation is assumed as an exogenous psychological attitude that can be more or less highlighted in economic behaviour. Differently from some previous models, intrinsic motivation is not a matter of economic choice where individuals choose to behave as intrinsic (altruistic) or extrinsic (selfish), according to the best payoff they can afford.

Further research is needed to define the variability of self determination sensitivity or its better functional form, but the distinction among different goals of motivation can be useful to distinguish the effects of rewards. The theoretical framework here proposed can be tested in experiments that should take into account the above distinction.

APPENDIX

Proof of Proposition 1:

The optimal value for A is:

$$A^* = \frac{\gamma(wT_x + X)}{2w(1-h)} - \frac{\sigma\theta}{S}\frac{1-K}{K}\frac{(2-\gamma)}{2} \qquad \text{if} \qquad \frac{\gamma(wT_x + X)}{w(1-h)} > \frac{\sigma\theta}{S}\frac{1-K}{K}(2-\gamma) \tag{A1}$$

$=0$ otherwise

where the first addend is the standard leisure time and the second addend represents the perceived weight of external variables in the production of the motivated good. The derivative of A^* with respect to the reward is:

$$\frac{\partial A^*}{\partial h} = \frac{\gamma(wT_x + X)}{2w(1-h)^2} + \frac{\sigma\theta}{S}\frac{K'}{K^2}\left[1 - \frac{\gamma}{2}\right] \tag{A2}$$

A growing reward reduces the opportunity cost of intrinsic goods with respect to the extrinsic ones, increasing A, through *price effect*, and increases the weight (reduces autonomy) of exogenous factors, reducing A, through *external effect*. The external effect modifies A through two channels: a negative direct external effect, due to the share of motivated good production that is independent from A and exogenously determined by task difficulty and luck; and a positive indirect external effect, capturing how exogenous 'endowment' of Y is redistributed between goods. The total external effect is always negative on A, because redistribution of exogenous 'endowment' is spread over all intrinsic and extrinsic goods and only a part ($\gamma/2$) of exogenous contribution to Y is redistributed on A.

While internal locus reduces total external effect, the intrinsic motivation has a positive effect both on the indirect part of external effect (the positive one) and on the price effect. Therefore, a more intensive motivation, by increasing the positive impact of external factors, reduces the overall negative impact of external effect. Intuition behind this result relies on the different role of intrinsic motivation and locus of control. Locus determines if the effect of external variables on intrinsic activity is strong or weak, while the absolute weight of intrinsic activity depends on motivation.

By using the explicit form of K in (2), the crowding in condition $\frac{\partial A^*}{\partial h} > 0$ is:

$$\frac{\gamma(wT_x + X)}{w\sigma\theta(2-\gamma)} > \frac{\alpha}{\beta}(1-h)^{1-\alpha}$$

Proof of Proposition 2:

Consider again the simplest form of K, with $a=1$ and $\beta=1$. The optimal value for A is

$$A^* = \frac{\gamma(wT_m + X)}{2w(1-h)} - \left[\frac{h}{(1-h)(S-hw)}\right]\frac{(2-\gamma)\theta\sigma}{2} \tag{A3}$$

where $\frac{\partial A^*}{\partial h} > 0$ if $\frac{\gamma(wT_m + X)S}{w(2-\gamma)\sigma\theta} > \frac{(S-h^2w)S}{[S-wh]^2}$

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