

MOTIVATION CROWDING THEORY

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Abstract. The Motivation Crowding Effect suggests that external intervention via monetary incentives or punishments may undermine, and under different identifiable conditions strengthen, intrinsic motivation. As of today, the *theoretical* possibility of motivation crowding has been the main subject of discussion among economists. This study demonstrates that the effect is also of *empirical relevance*. There exist a large number of studies, offering *empirical evidence* in support of the existence of crowding-out and crowding-in. The study is based on circumstantial evidence, laboratory studies by both psychologists and economists, as well as field research by econometric studies. The pieces of evidence presented refer to a wide variety of areas of the economy and society and have been collected for many different countries and periods of time. Crowding effects thus are an empirically relevant phenomenon, which can, in specific cases, even dominate the traditional relative price effect.

Keywords. Crowding effect; intrinsic motivation; principal-agent theory; economic psychology; experiments

1. Background

The basic idea that rewards, and in particular monetary rewards, may crowd out intrinsic motivation emanates from two quite different branches of literature in the social sciences. Thirty years ago, in his book *The Gift Relationship*, Titmuss (1970) argued that paying for blood undermines cherished social values and would therefore reduce or totally eliminate the willingness to donate blood. Though he was unable to come up with any serious empirical evidence, his thesis attracted much attention.¹

A second literature stems from psychology. A group of cognitive social psychologists² has identified that, under particular conditions, monetary (external) rewards undermine intrinsic motivation. Providing rewards for undertaking an activity thus has indirect negative consequences, provided intrinsic motivation is considered to be beneficial.³ For that reason, this effect has been termed '*The Hidden Cost of Reward*' (see Lepper and Greene, 1978, for an account and extensive references), '*Overjustification Hypothesis*' (Lepper, Greene and

Nisbett, 1973) or '*Corruption Effect*' (Deci, 1975). More recently, the idea has been known as '*Cognitive Evaluation Theory*' (Deci, Koestner and Ryan, 1999a). In contrast to Titmuss' mere hunch, a great many laboratory experiments support this motivational effect: 'the evidence for a detrimental effect comes from a wide variety of works in which a large number of subjects and methodological parameters have been varied' (McGraw, 1978, pp. 55–58).

Judging from the missing cross references, the two strands of literature are quite independent of each other. In particular, Titmuss' idea was not connected to the psychological theories on the undermining effect of monetary rewards. As a consequence, two leading economists, and later Nobel-prize winners, Solow (1971) and Arrow (1972), when reviewing the book, were at a loss and could not detect any reason why increasing monetary incentives, or equivalently, the price that is paid for blood, should not increase the quantity supplied.

An early attempt to empirically validate the theories of Deci and his associates outside the field of social psychology, is Jordan (1986). He finds that intrinsic motivation, as measured by a job diagnostic survey, is moderately undermined for those two groups of participants in a government work incentive program, with rewards contingent on performance, and is moderately reinforced for those with non-contingent rewards.

Over the last few years, however, considerable developments have taken place. The theories on intrinsic motivation emanating from social psychology have been properly integrated into economic theory. Arguably, the '*crowding-out effect*' (as it will subsequently be called), is one of the most important anomalies in economics, as it suggests the opposite of the most fundamental economic 'law', that raising monetary incentives increases supply. If the crowding-out effect holds, raising monetary incentives reduces, rather than increases, supply. Under relevant circumstances, it is therefore not advisable to use the price mechanism to elicit a higher supply, and one should moreover rely on a quite different type of incentive, namely intrinsic motivation. Its introduction into economics has widened the narrow focus typically taken by the researchers in social psychology in laboratory experiments, towards studies of real world settings.

A respectable number of social scientists, including economists, now admit the *theoretical* possibility that motivation may be negatively affected when a previously non-monetary relationship is transformed into an explicitly monetary one. But it is often taken to be unclear whether the crowding-out effect is *empirically* relevant. Such scepticism has, for instance, been raised in the survey of 'Incentives in the Firm' by Prendergast (1999, p. 18): 'While this idea [crowding-out] holds some intuitive appeal, it should be noted that there is little conclusive empirical evidence (particularly in workplace settings) of these influences'. (comment in square brackets added). Gibbons (1998, p. 130), on the other hand, in his survey on 'Incentives in Organizations' concedes: 'A more troubling possibility is that management practices based on economic models may dampen (or even destroy) non-economic realities such as intrinsic motivation and social relations. Field experiments on this issue would be especially useful'.

The purpose of this survey is to discuss the crowding-out effect and its correlate, the crowding-in effect, especially with regard to empirical validity. We will proceed to demonstrate that these effects are empirically well-founded and have been observed in many different and important areas of the economy and society.

The following Section 2 offers a short discussion of crowding theory, as it has been integrated into economics. Section 3 provides the empirical evidence according to everyday experience, controlled laboratory evidence both by psychologists and economists, and field evidence by econometric studies. Section 4 draws conclusions.

2. Crowding theory: intrinsic motivation in economic thinking

Monetary incentives crowding out the motivation to undertake an activity may be considered a major anomaly because it predicts the reverse reaction to the one expected according to the relative price effect, on which much of economics is based.⁴ The successes of the 'economic approach to human behaviour' (Becker, 1976; Frey, 1999a) or of 'economic imperialism' (Stigler, 1984; Hirshleifer, 1985; Lazear, 2000) are due to the skillful application of the relative price effect. It is based on *extrinsic* motivation, i. e. on incentives coming from outside the person in question. By way of contrast, major schools in psychology emphasize the *intrinsic* motives coming from within the person. Following Deci (1971, p. 105), 'one is said to be intrinsically motivated to perform an activity when one receives no apparent reward except the activity itself'. Intrinsic motivation is a firmly established concept in psychology (and partly in other social sciences such as sociology); its modern formulation goes back to DeCharmes (1968) and Deci (1975).

Standard economic theory does not normally 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). In most strands of economic literature, and above all in more formal economic models, the extrinsic type of motivation only forms part of the theoretical arguments.⁵ Intrinsic motivation is assumed to be an exogenously given constant, and often it is completely disregarded. There is a good reason why much of economic theory neglects intrinsic motivation. In spite of the seemingly simple definition offered by Deci, it is difficult, if not impossible, to determine which parts of an employee's motivation to perform his or her job are intrinsic, and which not. Although intrinsic motivation may play an important role in many areas of the economy and society, it is difficult to influence or control, especially in comparison with the large array of readily available extrinsic motivators.

Motivation Crowding Theory tries to mediate between the standard economic model and the psychological theories by stipulating a systematic interaction between extrinsic and intrinsic motivation.

2.1. *Analyzing changes in intrinsic motivation in economics*

2.1.1. *Basic approaches*

For the purpose of integrating intrinsic motivation into economic thinking and deriving testable hypotheses, it is useful to consider purely intrinsically and purely extrinsically induced individuals as polar cases of a whole spectrum of possible combinations of intrinsic and extrinsic motivation. Motivation Crowding Theory allows for movements along the continuum between these two poles — either towards the extrinsic (crowding-out) or intrinsic pole (crowding-in of intrinsic motivation). Such movement can be accounted for in two ways:

- (a) *A change in preferences.* This is the position assumed in Crowding Theory as proposed in Frey (1997a). This line of theorizing concentrates on the observation that an agent's behaviour may reveal an altered amount of intrinsic motivation due to an external intervention. The reason for the change in behaviour is attributed to a change in preference. Such a broad approach allows to obtain empirically testable hypotheses for a great number of areas and settings where intrinsic motivation is assumed to play a role.
- (b) *A change in the perceived nature of the performed task, in the task-environment or in the actor's self-perception.* To maintain the standard economic assumption of fixed preferences, the change in the intrinsic motivation to perform a task must be explained by a change in the nature, or a change in the perception of the task itself, in the task environment, or in an agent's self-perception, due to external intervention. This is e. g. the position of Bénabou and Tirole (2000), who model the influence of extrinsic factors on intrinsic motivation via their impact as signals on an agent's state of information concerning the nature of a task, and his or her self-confidence. A similar approach is used by Akerlof and Dickens (1982), who employ cognitive dissonance theory to criticize the shortcomings of the traditional economic theory of crime based on the price effect. An implication of their decision model is that severe punishment may not reduce crime, as it decreases self-motivation to obey the law. However, the detrimental effect of rewards is not taken into consideration.

2.1.2. *Motivation crowding theory: theoretical arguments*

For the purpose of economics, the 'hidden cost of reward' have been generalized in two respects (Frey, 1997a):

- (a) All interventions originating from outside the person under consideration, i.e. both positive monetary rewards and regulations accompanied by negative sanctions may affect intrinsic motivation;
- (b) External interventions may crowd-out or crowd-in intrinsic motivation (or leave it unaffected).

Three situations showing the effect of external intervention on performance in a principal-agent setting may be distinguished:

- (1) Following the standard economic principal-agent theory (e.g. Alchian and Demsetz, 1972; Fama and Jensen, 1983), external intervention raises performance by imposing higher marginal cost on shirking, or increasing the marginal monetary benefit of performing. This is the relative price effect of external intervention. One could also speak of a *disciplining effect*, which monetary reward or commands impose on an agent. Intrinsic motivation is, implicitly, taken to be a constant or to be absent. Therefore, external intervention unequivocally raises performance.

The same outcome holds if external intervention raises intrinsic motivation. In that case, the marginal benefit of performing is increased and the effect of disciplining the agent is further strengthened by the *crowding-in effect*. In this case, the relative price effect works in the same direction as the crowding effect. External incentives raise agents' motivation to perform, and at the same time their intrinsic motivation to perform is raised.

- (2) The opposite occurs if external intervention undermines intrinsic motivation and thus negatively affects the agent's marginal benefit from performing. Stronger external intervention unequivocally reduces the agent's performance level, provided the disciplining effect does not work.
- (3) In general, both the relative price effect and the crowding-out effect are active, so that external intervention has two opposite effects on the agent's performance. Whether intervening is beneficial from the principal's point of view depends on the relative size of the two countervailing effects.

The possibly conflicting nature of external intervention on behaviour has been formally analyzed in Chang and Lai (1999) and Bénabou and Tirole (2000).

Figure 1 shows the interaction of the crowding-out effect and the price effect graphically. *S* is the traditional supply curve based on the relative price effect: raising the external reward for work effort from *O* to *R* increases work effort from *A* to *A'*. The crowding-out effect induces the supply curve to shift towards the left to *S'*. Thus, raising the reward from *O* to *R* leads to point *C* (instead of *B*). As the figure is drawn, the crowding-out effect dominates the relative price effect, and raising the reward from *O* to *R* *reduces* work effort from *A* to *A''*. Once intrinsic motivation has been crowded out completely, the normal supply curve takes over again, and raising the reward unequivocally increases work effort (movement along *S'*).

The relationship sketched in this graph is borne out by a recent field experiment (Gneezy and Rustichini, 2000a). Whenever money is offered for performing a task, the standard price-effect is observed, i. e. a larger amount of money produces higher performance. The mere incidence of payment, however, lowers performance in many cases. In the experiment, out of all participants performing the same task, i. e. pupils collecting donations for charity from private households, only those groups receiving a considerable amount of money do as well as the

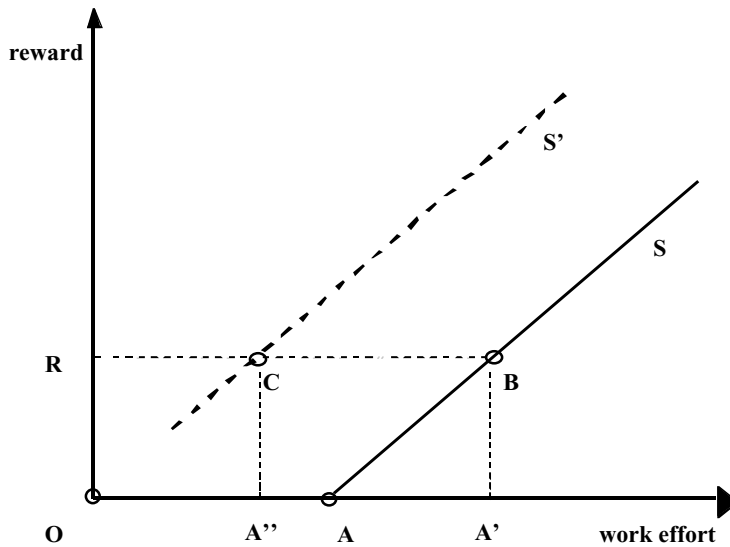


Figure 1. Net-outcome of the Price- and the Crowding-Out-Effect.

groups that work for free. The work environment (monetary vs. non-monetary) evokes different responses from the agents.

The effects of external interventions on intrinsic motivation have been attributed to two psychological processes:

- (a) *Impaired self-determination.* When individuals perceive an external intervention as reducing their self-determination, intrinsic motivation is substituted by extrinsic control. Following Rotter (1966), the locus of control shifts from inside to outside of the person affected. Individuals, who are forced to behave in a specific way by outside intervention, feel overjustified if they maintain their intrinsic motivation.
- (b) *Impaired self-esteem.* When outside intervention carries the notion that the actor's motivation is not acknowledged, his or her intrinsic motivation is effectively rejected. The person affected feels that his or her involvement and competence is not appreciated, which debases its value. An intrinsically motivated person is deprived of the chance of displaying his or her own interest and involvement in an activity when someone else offers a reward, or orders them to do it. As a result of impaired self-esteem, individuals reduce effort.

The two processes identified allow us to derive the *psychological conditions* under which the crowding-out effect appears:

- (1) External interventions *crowd out* intrinsic motivation if the individuals affected perceive them to be *controlling*. In that case, both self-determina-

tion and self-esteem suffer, and the individuals react by reducing their intrinsic motivation in the activity controlled.

- (2) External interventions *crowd in* intrinsic motivation if the individuals concerned perceive it as *supportive*. In that case, self-esteem is fostered, and individuals feel that they are given more freedom to act, thus enlarging self-determination.

2.2. *Other types of crowding-out in economics*

Crowding Theory as discussed here basically differs from other phenomena that are sometimes referred to as crowding-out effects. In monetary economics, a rise in the interest rate is taken to crowd out private investment (see any standard macroeconomic textbook, e. g. Mankiw, 1994, p. 62), and, in public economics, government subsidies are taken to crowd out private donations and charitable contributions (see e.g. Venti and Wise, 1990; Poterba, Venti and Wise, 1998; Bolton and Katok, 1998). In both areas, individual preference functions, or the perceived nature of the situation, remain unaffected, indeed the effects observed are a particular manifestation of the relative price effect.

2.3. *What are the implications of motivation crowding theory for economics?*

Crowding effects are potentially relevant in many different areas of individual behaviour in the economy. Examples are the labour market, where the effect of higher compensation on work effort and, in particular, performance wages are at issue; the natural environment, where the effect of pricing instruments, such as pollution charges on environmental ethics, is in question; social policy, where it must be considered whether monetary incentives crowd out the notion of responsibility for one's own fate; subsidization policy, where a possible negative effect on entrepreneurship, innovation and creativity must be taken into account; organization theory, where the limits of the firm must be reconsidered in view of possible limits of relying purely on extrinsic incentives; and contract theory where relational or 'psychological contracts' (Rousseau, 1995; Morrison and Robinson, 1997) may require intrinsic motivation and hence crowding-out should be avoided (for further developments along this line see Frey, 1997a; Osterloh and Frey, 2000).

Standard economics largely relies on the skillful application of the price effect, and economists tend to overrate the power of payment-based measures. An important example is pay-for-performance, which has become *the* uncontested instrument for eliciting higher performance from employees. Such a view is well supported by the theoretical economic literature. According to principal-agency theory, incentives of employer and employee are best aligned when the latter's pay is performance-based. Recent empirical studies for a particular work setting (mounting glass windshields in cars) are used to support the presumed effectiveness of pay-for-performance (Lazear, 1999). On this basis, far reaching claims were made on behalf of a general positive effect of price incentives on work

performance. Lazear (1999) states that all theories suggesting that 'monetizing incentives may actually reduce output are unambiguously refuted by [his] data. Not only do the effects back up economic predictions, but the effects are extremely large and precisely in line with theory'. (p. 2)

Motivation Crowding Theory serves as a warning against rash generalizations of conclusions derived from simple task environments (as in Lazear's study), where intrinsic motivation can be assumed to play no role, and therefore the crowding-out effect cannot occur.

3. Empirical evidence

3.1. *Circumstantial evidence*

Basic intuition tells us that we are more willing to undertake a task if we can expect a reward. But there are a number of specific situations where the undermining effect of external incentives is also just as easily understood. A good example is children who are paid by their parents for mowing the family lawn. Once they expect to receive money for that task, they are only willing to do it again if they indeed receive monetary compensation. The induced unwillingness to do anything for free may also extend to other household chores.⁶

An old Jewish fable confirms this intuition (in Deci with Flaste, 1995, p. 26):

'It seem that bigots were eager to rid their town of a Jewish man who had opened a tailor shop on Main Street, so they sent a group of rowdies to harass the tailor. Each day, the ruffians would show up to jeer. The situation was grim, but the tailor was ingenious. One day when the hoodlums arrived, he gave each of them a dime for their efforts. Delighted, they shouted their insults and moved on. The next day they returned to shout, expecting their dime. But the tailor said he could only afford a nickel and proceeded to hand a nickel to each of them. Well, they were a bit disappointed, but a nickel after all is a nickel, so they took it, did their jeering, and left. The next day, they returned once again and the tailor said he had only a penny for them and held out his hand. Indignant, the young toughs sneered and proclaimed that they would certainly not spend their time jeering at him for a measly penny. So they didn't. And all was well for the tailor'.

The reward need not be monetary in the first place. Take the case of a gifted child in violin class. Once 'gold-stars' were introduced as a symbolic reward for a certain amount of time spent practicing the instrument, the girl lost all interest in trying new, difficult pieces. Instead of aiming at improving her skills, her goal shifted towards spending time playing well-learned, easy pieces in order to receive the award (Deci with Flaste, 1995).

The crowding effect may also work the other way round. A patient found it difficult taking her medication for hypertension regularly. Her doctor's frequent reminders, admonishments, or plain warnings concerning the possible dire consequences had no effect. Despite ending up in the emergency room a couple of

times, the patient only managed to alter her behaviour when a new doctor — instead of pressuring her to take the medication — discussed with her what time of the day she considered best for taking her pills. Suddenly, she managed to follow the prescription, as her own (intrinsic) motivation was recognized and thereby reinforced.

3.2. *Laboratory evidence*

3.2.1. *In psychology*

There are such a large number of laboratory experiments on the crowding effect that it is impossible to discuss the individual results here. Fortunately, there is a long tradition in social psychology of compiling formal meta-analytical studies of the effects underlying Crowding Theory. Rummel and Feinberg (1988) use 45 experimental studies covering the period 1971–85, Wiersma (1992) 20 studies covering 1971–90, and Tang and Hall (1995) 50 studies from 1972–92. These meta-analyses essentially support the findings that intrinsic motivation is undermined if the externally applied rewards are perceived to be controlling by the recipients. However, these earlier studies, and especially the first two, are clearly flawed from a methodological point of view (see Deci, Koestner and Ryan, 1999, p. 631ff. for an account on shortcomings). As a consequence, these findings were challenged by studies defending the behaviouralistic psychological position, such as Cameron and Pierce (1994) and Eisenberger and Cameron (1996), on the basis of their own meta-analyses of studies published in the period 1971–1991 (the two analyses use a virtually identical set of studies). Deci, Koestner and Ryan (1999) review a total of 128 different studies covering the period from 1971 to 1997, including all the studies considered in the contributions by Cameron, Pierce and Eisenberger, as well as several studies which appeared since then.

The extensive meta-study by Deci, Koestner and Ryan (1999) today is the best available survey of the ‘hidden cost’ phenomenon in social psychology. They put special emphasis on identifying the methodological differences between the various preceding attempts of summarizing the psychological literature on the subject. Deci and his co-authors demonstrate that there are a number of significant shortcomings and misinterpretations in the studies challenging the idea of rewards undermining intrinsic motivation. Cameron and Pierce (1994), for example, omit nearly 20% of the relevant studies, supposedly because of being outliers, use inappropriate control groups, or even misclassify several studies. Another is that they collapse effect sizes despite the presence of different ‘theoretically meaningful variables’ — they e.g. include dull and boring tasks (for which a crowding-out effect cannot occur as the participants have no intrinsic motivation to begin with) in the same group as intrinsically rewarding activities, without doing moderator analyses (see Deci *et al.*, 1999, p. 633).

Deci and his co-workers conclude that the results from the meta-analysis of 128 well-controlled experiments exploring the effects of extrinsic rewards on intrinsic motivation are clear and consistent. Tangible rewards have a significant negative

effect on intrinsic motivation for interesting tasks. On the other hand, verbal rewards have a significant positive effect on intrinsic motivation. Tangible rewards do not crowd out intrinsic motivation, when they are unexpected or not contingent on task behaviour.

Their overall conclusion for the use of rewards in the real world is that rewards are able to control people's behavior, which is presumably why they are so widely advocated. The main negative effect of rewards is that they undermine self-regulation. As a consequence of rewards, people take less responsibility for motivating themselves.

A comment by Lepper, Henderlong and Gingras (1999) to Deci *et al.*'s analysis proves to be especially interesting as they clearly take sides in the dispute. Despite some general reservations against the method of statistical meta-analysis of a complex literature, they conclude that the general results of the literature on the effects of offering rewards and intrinsic motivation 'have been more accurately captured by the [review] of Deci *et al.* ... than by that of Cameron and Pierce' (p. 669). They even criticize the latter researchers for abusing the meta-analytic technique: 'We find it an unfortunate by-product of the present uses of meta-analysis that it seems to have encouraged some users to revert to drawing simplistic overall conclusions (Cameron and Pierce, 1994; Eisenberger and Cameron, 1996) even after 30 years of research demonstrating that extrinsic rewards can have both positive and negative effects on subsequent intrinsic motivation, depending upon the specific conditions of the study'. (p. 674). But even the most critical opponents of cognitive evaluation theory acknowledge that there are conditions where rewards may prove detrimental to intrinsic motivation. In fact, all meta-analyses — i. e. even those that claim the 'hidden cost of reward' to be 'largely a myth' — are consistent in finding a detrimental effect on intrinsic motivation for task-contingent tangible rewards (see Deci *et al.*, 1999, p. 634).

To provide the reader with an overview of the evidence subsequently discussed, a selection of major empirical studies undertaken by economists is presented in Table 1.

The table is sorted according to the areas in which a crowding effect occurs. The table also reports whether the respective study has been explicitly undertaken to test Crowding Theory (indicated by t), or whether the results are consistent with Crowding Theory (indicated by c).

3.2.2. *In economics*

Concerning crowding effects on motivation, experimental economic research lacks the long and rich tradition found in psychology. There are nonetheless an increasing number of studies done on the subject.

Laboratory experiments (Zanella, 1998; Fehr and Gächter, 2000) test the hypothesis that incentive contracts crowd out reciprocity, which can be considered to be a special type of intrinsic motivation. The findings confirm the crowding hypothesis. Those participants playing in a reciprocity-treatment perform better (i. e. they forfeit more rents, which could have been gained by not working) than the ones participating in an incentive-treatment. The incentive

Table 1. Major empirical economic studies identifying crowding effects.

Authors/year	Scientific method	Intrinsic motive	External intervention	Phenomenon is – Designed as a test for (t) – consistent with (c) Crowding theory
<i>A. Labor Supply</i>				
Gneezy/Rustichini 2000a	Field experiment	Volunteer work motivation	Payments	t
Zanella 1998	Laboratory experiment	Reciprocity	Incentive contracts	t
Fehr/Gächter 2000	Laboratory experiment	Reciprocity	Incentive contracts	t
Barkema 1995	Econometrics	Work effort	Type of supervision	c
Bewley 1995	Survey	Work effort	Payments	c
Frey/Goette 1999	Econometrics	Volunteer work supply	Payments	t
Austin/Gittell 1999	Case study	Team orientation	Supervision methods	c
<i>B. Services</i>				
Upton 1973	Field experiment	Donating blood	Payments	c
Gneezy/Rustichini 2000b	Field experiment	Norm adherence	Fines	t
<i>C. Common pool resources</i>				
Frohlich/ Oppenheimer 1998	Laboratory experiment	Other-regarding behavior	Payoff scheme	c
Frey/Oberholzer-Gee 1997	Econometrics/field research	Civic duty	Compensation payments	t
Kunreuther/Easterling 1990	Field research	Civic duty	Tax rebates	c
Cardenas <i>et al.</i> , 1999	Field research	Environmental care (other-regarding)	'Welfare-improving' regulations	t
<i>D. Constitutions, tax evasion</i>				
Bohnet/Frey/Huck 2001	Laboratory experiment	Trust/Trustworthiness	Legal system/institutions	t
Frey 1997b	Econometrics	Civic duty/Tax morale	Constitutional regulations	t
Kelman 1992	Field research	Civic virtue	Adversary institutions	c

mechanism used in these experiments is based on fines. Other mechanisms may prove to be crowding-neutral, or may even crowd in motivation. Principals exhibit a preference for incentive schemes. Although the total surplus gained is smaller in the incentive treatment, compared to the baseline of the trust treatment, a larger share of the surplus can be appropriated by the principals when incentives are introduced.

Crowding-effects in contract enforcement have been analyzed in an evolutionary game model (Bohnet, Frey and Huck, 2001). The probability of fining agents for breach of contract is varied from one treatment to another, i.e. there are different probabilities of bearing the cost of breaching a contract. The game is designed as a repeated contract game. In every round, a first mover could or could not offer a contract and a second mover could decide to breach it or not. The goal of this experiment is to study how the participants' motivation and behaviour evolves, depending on the institutional setting. When contracts are near-perfectly enforced, first movers can rely on the legal system with a high probability of being fined to deter second movers from breaching the contract offered. Personal trust is hence replaced by institutional trust. Low levels of legal enforcement, (i.e. a low probability of getting caught breaching the contract) tend to crowd in intrinsic motives to treat others fairly. When first movers in such a game decide to offer a contract (despite the fact that both participants are aware of the low probability of being fined for non-compliance), they signal their trust that the second mover will not to breach the contract. The number of contracts offered increases in the course of the game. This is contrary to standard economic expectations. An intermediate level of law enforcement turns out to be most detrimental to intrinsically motivated trustworthiness and reciprocity-driven behaviour. First movers tend not to offer contracts.

Starting with the observation of a surprisingly high rate of firm's compliance with pollution standards, Livernois and McKenna (1999) discuss a similar problem. They find that under plausible specifications of their model, higher compliance can be elicited with lower fines for noncompliance. Even more striking, the cost of enforcing a given level of pollution is minimized with a zero fine for noncompliance.

The potentially negative effect on individual intrinsic motivation of externally imposed institutions is also found in a series of experiments designed as contribution games to a pure public good (Frohlich and Oppenheimer, 1998). Randomly reassigned individual pay-offs in the game lead to an expected increase in contributions to the public good; on the other hand, the experimenters found strong evidence that the institution of random pay-offs itself shifted individual motivation towards greater self-interest.

3.3. *Field evidence*

3.3.1. *Labour supply*

Motivation crowding theory has been subjected to econometric studies in the case of work motivation. Barkema (1995) looks at firms where the intensity of the personal relationship between the principals and the agents depends on the form

of *supervision*. In the case of managers as agents of a certain firm, three major types can be distinguished:

(i) The managers are controlled by the parent company. This corresponds to a rather impersonal relationship so that, following our above proposition, a positive influence of monitoring on managers' performance is expected, because intrinsic motivation is little affected, or not at all.

(ii) The managers are controlled by their firm's chief executive officer, representing a personalized relationship. According to our proposition, monitoring in this case tends to reduce the agents' effort, as external intervention shifts the locus of control towards external preferences, and the agents perceive that their competence is not acknowledged by their superior.

(iii) The managers' behaviour is regulated by the board of directors. The crowding-out effect is expected to be greater than in case (i) but smaller than in case (ii).

Barkema's data set refers to 116 managers in medium-sized Dutch firms in 1985. They range from between less than 100 to more than 30 000 employees, and cover a wide variety of industries. The managers' individual effort is in line with Holmström and Milgrom (1991), operationalized as the number of hours invested. The intensity of regulating is captured by three aspects: the regularity with which their performance is evaluated; the degree of formality of the evaluation procedure; and the degree to which the managers are evaluated by well defined criteria. A measurement model is used to establish empirically that these variables meaningfully represent the latent variable 'regulating'. A structural model is then used to show the influence of so-defined external intervention on managers' performance.

The results are consistent with the proposition advanced. The econometrically estimated parameters capturing the effect of external intervention on work performance turn out to be positive and statistically significant in case (i) of impersonal control. In case (ii) of personalized control, on the other hand, the corresponding parameter is statistically significant and negative; regulating strongly crowds-out intrinsic motivation, so that the net effect of control on performance is counterproductive. In the intermediate case (iii) of somewhat personalized control, the estimated parameter does not deviate from zero in a statistically significant way.

A second econometric study (Frey and Götte 1999) looks at the voluntary sector, which is of substantial size in developed economies (see the survey by Rose-Ackerman, 1996; Salamon and Anheier, 1997). Intrinsic motivation has been argued to be important when it comes to volunteering (Freeman, 1997). The authors use a unique data set from Switzerland to evaluate how financial rewards to volunteers affect their intrinsic motivation. The incidence of rewards is found to reduce the amount of volunteering. While the size of the rewards induces individuals to provide more volunteer work, the mere fact that they receive a payment significantly reduces their work efforts by approximately four hours. The magnitude of these effects is considerable. Evaluated at the median reward paid, volunteers indeed work *less*, suggesting that the crowding-out effect dominates the

relative price effect. These results are immune to possible simultaneity bias or differences in reward policies between types of organizations. These findings have important implications for policy regarding voluntary work. Direct incentives may backfire, leading to less volunteering.

A comprehensive survey collecting 334 interviews with decision-makers in the labour market provides another avenue (Bewley, 1995). Interestingly enough, practitioners seem well aware of the possible traps of pay-for-performance schemes. They realize that external intervention via monetary incentives should not be used as a means of controlling, as it may undermine intrinsic realities such as work morale or creativity: 'Good [management] practice also offers financial rewards for good performance, when possible, but these rewards and employees' goodwill are thought of as mutually reinforcing. Managers claim that workers have so many opportunities to take advantage of employers that it is not wise to depend on coercion and financial incentives alone as motivators. Also, employers want workers to operate autonomously, show initiative, and use their imagination while working, and workers who are scared or disheartened do not do these things' (Bewley, 1995, p. 252)

3.3.2. *Services*

Daycare centres are confronted with the problem that parents sometimes arrive late to pick up their children, which forces teachers to stay after the official closing time. A typical economic approach (in line with the economic theory of crime, initiated by Becker, 1968) would suggest introducing a fine for collecting children late. Such a punishment is expected to induce parents to reduce the occurrence of belatedly picking up their children. The effect of such a policy has been studied for a daycare centre in Israel (Gneezy and Rustichini, 2000b). The number of late-coming parents over a particular period of time was first recorded. In a second period, extending over twelve weeks, a significant monetary fine for collecting children late was introduced. After an initial learning phase, the number of late-coming parents *increases* substantially, which is consistent with the crowding-out effect. The introduction of a monetary fine transforms the relationship between parents and teachers from a non-monetary into a monetary one. As a result, the parents' intrinsic motivation to keep to the time schedules is reduced or is crowded out altogether; the feeling now is that the teachers are 'paid' for the disamenity of having to stay longer. That parents' intrinsic motivation was crowded out for good by the introduction of a penalty system is supported by the fact that the number of late-coming parents remained stable at the level prevailing even after the fine was cancelled in the third phase.

In a study based on the comparison of carefully conducted case studies, Austin and Gittell (1999) find a crowding effect with respect to performance measurement in the airline industry. The specific issue studied is how airline carriers deal with delayed departures of flights and the factors or persons responsible. Different carriers use a variety of instruments to cope with delays. Each airline recorded the assumed source of a delayed flight departure for the

purpose of being able to improve performance in the long run and to give feedback to the responsible employees or units. However, attributing a single delay as exactly as possible to its source (as suggested by the principal-agent theory), is negatively correlated with the achieved end, namely the airline's on-time flight performance. The most successful company in terms of departing on time is the one carrier that uses the general term 'team delay' to indicate the source of a delay caused by the personnel, independent of whether a single employee, or one specific unit, was in fact responsible. A close attribution of the source of a delay, as suggested by principal-agent theory, is perceived to be controlling, as people's motivation to try their best is not respected. This leads to disagreements, provokes finger-pointing and encourages cover-up activities. On the other hand, a loose attribution of the source of delay crowds in the employees' intrinsic motivation to help out other units and groups.

3.3.3. *Siting problems and common pool resources*

An econometric test of Crowding Theory refers to the important real life issue of finding a site for locally unwanted projects (Frey and Oberholzer-Gee, 1997). This is known as the 'not in my backyard' or NIMBY-problem. For many different projects and major capital investments, a wide consensus exists that they are worth being undertaken. But no community is prepared to tolerate their vicinity. Such 'nimbyistic' behaviour is well documented in cases where citizens object to the siting of e.g. hazardous waste disposal facilities or airports in their communities.

Economists have a handy tool to deal with such a situation. As the aggregate net benefits of undertaking the project are positive, one must simply redistribute them in an appropriate way. The communities, which are prepared to accept the undesired project within their boundaries, must be *compensated* in such a way as to make their net benefits positive (O'Hare, 1977; Kunreuther and Kleindorfer, 1986). This policy recommendation underestimates the true costs of price incentives in that it fails to take into account the detrimental effects of motivation crowding-out. The hypothesis that external incentives crowd out civic duty or intrinsic motivation, and therefore the willingness to accept the locally undesired project, was tested by analyzing the reaction to monetary compensation offered for a nuclear waste repository in Switzerland. A survey was undertaken among the population of the community, which was chosen to harbor the site by the national government. More than half of the respondents (50.8%) agreed to have the nuclear waste repository built in their community, 44.9% opposed the siting, and 4.3% did not care where the facility was built. Thus, the siting decision was widely accepted, in spite of the fact that a nuclear waste repository is mostly seen as a heavy burden for the residents of the host community. In the next step, the level of external compensation was varied. The respondents were asked the same questions, whether they were willing to accept the construction of a nuclear waste repository, but it was added that the Swiss parliament had decided on a substantial compensation for all residents of the host community. While 50.8% of

the respondents agreed to accept the nuclear waste repository without compensation, *the level of acceptance dropped to 24.6%* when compensation was offered. The amount of compensation has no significant effect on the level of acceptance. About one quarter of the respondents even seem to reject the facility simply because financial compensation is attached to it.

Compensation fundamentally alters the perceived nature of a siting procedure. What was observed in the analysis of verbal behaviour represents precisely the type of mechanism postulated by Motivation Crowding Theory. While external intervention, i.e. offering compensation, manages to address concerns regarding the costs of a noxious facility, it reduces the intrinsic motivation to permit the construction of such a facility. In the case studied, this latter effect even outweighs the benefits of external intervention, thereby reducing overall acceptance. A corresponding effect was found for the siting of a nuclear repository in Nevada, where raising tax rebates failed to increase support (Kunreuther and Easterling, 1990).

In a field experiment conducted in Colombia, South America, a regulatory approach imposed from the outside, aimed at forestalling the exploitation of the local tropical forest (which should have brought about welfare improvements according to standard theory) leads to more egoistic behaviour on the part of the population involved, therewith intensifying forest destruction (Cardenas, Stranlund and Willis, 1999). Introducing an external regulation crowds out the existing level of intrinsically motivated other-regarding behaviour. The attempt to externally set incentives to lead people towards more efficient choices from a welfare point of view does in fact backfire. It may similarly be argued that an external intervention in common pool resource dilemmas may fail as it absolves people from moral obligations in general (e. g. Ostmann, 1998).

3.3.4. *Constitutional design and tax evasion*

Crowding Theory can be applied to how constitutional and other legal rules affect the individual citizens. Civic virtue (a particular manifestation of intrinsic motivation) is bolstered if the public laws convey the notion that citizens are to be trusted. Such trust is reflected in extensive rights and participation possibilities. Citizens are given the freedom to act on their own with respect to economic affairs, the freedom to freely express themselves, and to demonstrate and strike if they feel dissatisfied with particular government decisions and, most importantly, to take important political decisions by themselves via referenda and initiatives. The basic notion enshrined in the constitution that citizens are on average, and in general, reasonable human beings thus generates a crowding-in effect of civic virtue. In contrast, a constitution implying a fundamental distrust of its citizens, and seeking to discipline them, tends to crowd out civic virtue and undermines the support which citizens are prepared to give towards the basic law. The effects of such a distrustful constitution show up in various ways. The citizens are dissatisfied with the political system and respond by breaking the constitution and its laws whenever they expect to be able to do so at low cost (Frey, 1997b).

An important reaction to distrustful public laws is a reduction of *tax morale* and, as a consequence, the evasion of taxes. It has been well established that tax paying behaviour cannot be explained in a satisfactory way without taking tax morale into account. Thus, based on the American Internal Revenue Service's Taxpayer Compliance Maintenance Program, Graetz and Wilde (1985, p. 358) conclude that 'the high compliance rate can only be explained either by taxpayers' (...) commitment to the responsibilities of citizenship and respect for the law or lack of opportunity for tax evasion'. Reinganum and Wilde (1986) attribute the observed drop in tax compliance in the United States to the erosion of tax ethics.⁷

The extent of tax morale revealed by tax paying behaviour may be shown to depend on the type of constitution existing (see more fully, Pommerehne and Frey, 1993; Pommerehne and Weck-Hannemann, 1996; Frey, 1997b). Switzerland presents a suitable test case, because the various cantons have different degrees of political participation possibilities (or, in other words, different constitutions that affect public spirit and tax morale in systematically different ways). It is hypothesized that the more extended political participation possibilities in the form of citizens' meetings, obligatory and optional referenda and initiatives are, and the broader the respective competencies are, the higher is tax morale and (*ceteris paribus*) tax compliance. On the basis of these characteristics, about one third of the 26 Swiss cantons were classified according to the cantonal constitutional provisions as pure direct democracy, another third as pure representative democracies, while the remaining third satisfied only some of the characteristics. A cross section/time series multiple regression, explaining the part of income not declared, yields the following results: the coefficients of the variables indicating the type of democracy — controlling for all the determinants normally used in such tax equations — have the theoretically expected signs. In cantons with a high degree of direct political control (pure direct democracy), tax morale is (*cet. par.*) higher. The part of income concealed falls short of the mean of all cantons by 7.7 percentage points. In contrast, in cantons with a low degree of political control (pure representative democracies), tax morale is (*cet. par.*) lower. The part of concealed income is four percentage points higher than the average income gap. The estimation results are consistent with the hypothesis that greater democratic participation possibilities crowds in intrinsic motivation in the form of civic virtue and inclines people not to cheat on taxes.

Crowding-out effects have also been observed for public laws and institutions and for wages in the government sector. The fact that government employees in many countries are prepared to work for a significantly lower salary (for evidence see e.g. Poterba and Rueben, 1994) may be attributed to the higher motivation of the selection of people seeking employment in the public sector.⁸ An example would be those teachers who want to work in government schools because they believe in the virtue of public education for society. The increasing tendency to closely supervise government employees, and to curtail their discretionary room, has crowded out their work morale, which is consistent with a continuous reduction of private sector wage premiums.

A third way to test the influence of government rules on civic virtues looks at the cost of financing public expenditures in terms of interest rates for government bonds. It has been argued (Schultz and Weingast, 1994) that democracies find it less costly to finance themselves than authoritarian political systems, because nations under a democratic constitution are more credible, and therefore more likely to pay back their debts. The observation of lower cost of finance under a democratic constitution is, however, also consistent with Crowding Theory: the citizens have a higher level of trust in, and attachment to, their state, and are therefore more willing to grant credit to their state at more favourable financial conditions than are the subjects oppressed by a more controlling constitutional setting.

On a more general level, there is a cumulative body of research indicating that people's perceptions of how they are treated by the authorities strongly affect their evaluation of authorities and laws, and their willingness to cooperate with them (e.g. Bardach and Kagan, 1982; Lind and Tyler, 1988; Tyler and McGraw, 1986). Citizens who consider the constitution and its laws, and the authorities acting on their basis to be fair and to treat them respectfully, tend to be more compliant than those with more negative perceptions of government (e.g. Thibault and Walker, 1976; for extensive empirical evidence see Tyler, 1990, 1997). It has also been shown (Kucher and Götte, 1998) that the more the citizens agree with a city government's policy proposals in referenda, the lower tax evasion is. In contrast, the extensive use of adversary institutions for resolving public conflicts as they prevail e.g. in the United States, tends to crowd out civic virtue (Kelman, 1992).

4. Concluding remarks

In economics, the possibility of external interventions via monetary incentives or punishments crowding-out intrinsic motivation under different indentifiable conditions has generally been accepted at the *theoretical* level, but the theory is also disputed by some scholars. Still, most criticism has focused on the *empirical relevance* of the crowding effects.

This survey shows that this scepticism is unwarranted and that *strong empirical evidence* indeed exists for crowding-out and crowding-in. This conclusion is based on circumstantial evidence, laboratory evidence by both psychologists and economists, as well as field evidence by econometric studies. The evidence refers to a wide variety of areas of the economy and society: children's learning behaviour; patients' readiness to take prescribed medication; monetary and symbolic rewards for undertaking various laboratory tasks; the tendency to reciprocate in the laboratory setting, reflecting work conditions in a firm; the amount of trust exhibited in a laboratory situation of incomplete contracts; the reaction of managers to various forms of supervision by their superiors; the readiness to offer voluntary work; the observation of time schedules in daycare centres; the on-time flight performance in the airline industry; the readiness to accept nuclear waste repositories (and other locally unwanted sites); and the amount of civic virtue exhibited, in particular with respect to fulfilling one's tax obligations (tax morale).

This empirical evidence has been collected for many different countries and time-periods.

Crowding effects thus are an empirically relevant phenomenon. But it does, of course, not always prevail over the traditional relative price effect. Indeed, an effort has been made, both in theory and in the empirical applications to identify the conditions under which crowding-out and crowding-in effects arise, and under which they are predicted to dominate the relative price effect. To more fully identify these conditions is a worthwhile goal for future research.

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Notes

1. However, Titmuss' speculative suggestions were later supported by Upton (1973), who found systematic differences among a group of previous donors, depending on whether they were offered monetary rewards to donate again or not. Indeed, the rate of donating was substantially higher among those who were not offered any payment.
2. Headed by Deci (1971, 1972, 1975). The work is summarized and extended in Deci and Ryan (1980, 1985) and Deci with Flaste (1995). Extensive surveys are given e.g. in Pittmann and Heller (1987), and Lane (1991, esp. ch. 19).
3. This is the normal assumption when one thinks of activities such as work (work ethics), paying taxes (tax morale), preserving nature (environmental morale) or charitable giving (altruism). But intrinsic motivation may also be undesirable as for instance in the case of greed, envy or vengeance. Indeed, it may be argued that some of the most hideous crimes in history were at least partly intrinsically motivated, Hitler and Stalin being examples. In contrast, extrinsically motivated soldiers are less prone to commit crimes and tend to treat prisoners of war more humanely (Frey, 1999a, ch. 7).
4. Anomalies have received much attention in economics, see e.g. the summary in Thaler 1992. However, none of the anomalies, such as the endowment, sunk cost or recency effect reverses the relative price effect, but rather mitigates it only.
5. It should, however, be mentioned that there are a small number of noteworthy exceptions. Intrinsic motives are e.g. treated in terms of trust in Arrow 1974, with respect to emotions in Akerlof and Yellen 1986 or Frank 1992, concerning firm loyalty in Baker, Jensen and Murphy 1988, by way of incentives for managers in Güth 1995, or through implicit contracts and norms in Akerlof 1982. Also see Hargreaves Heap 1989, 1997, or Hirschman 1972, 1992. For a discussion of and further references to the pay-for-performance literature and intrinsic motivation, see Frey 1997a ch. 10, or Frey 2000.
6. This may be the main reason why all the parents consulted by the authors (in a non-representative, small-scale survey) pay their children's pocket money as a lump sum (at the same time as expecting some cooperation in household tasks) instead of assigning a specific sum of money to a given task.
7. Further evidence can be found, among others, in Schwartz and Orleans 1967, Lewis 1982, Roth, Scholz and Witte 1989, Pyle 1990, and Slemrod 1992.

8. Alternative explanations for the unobserved factor producing the wage differential such as higher fringe benefits or lower work intensity are, of course, possible.

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